CONFLICT, WAR, DISPLACEMENT AND ARCHAEOLOGY IN PARTS OF OSUN STATE, SOUTHWESTERN NIGERIA

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ABSTRACT

Most archaeological works in southwestern Nigeria are concentrated in Ile-Ife, Esie, Old Oyo and Owo. In these areas, the focus of archaeological studies had been on different works of art in bronze, terracotta, wood and stone. Studies on cultural themes related to the issues of conflict, war and displacement which have implications for landscape archaeology of the area are often relegated to the background. The main goal of this research was to highlight how conflict, war and displacement impacted on the settlement history of parts of Osun State, southwestern Nigeria. The study also appraised human interactions with the environment and the concomitant effects on emergent settlement configurations.

Oral and written data were collected from Ile-Ife, Ikire, Ipetumodu, Ila-Orangun, and Ajaba to generate anthropological data. Investigations aimed at identifying and collecting surface artifacts involved reconnaissance and detailed surveys of the studied sites. Excavations were carried out on potsherd pavements at Ajaba and Asi and on a refuse mound at Ajaba. Artifacts from surface collections and excavations were classified according to types, decoration and functional attributes. Analysis of Mo, Cu, Pb, and Ni of sherd samples was done using inductively coupled plasma mass spectrometry. Ten thin sections were made from selected sherd samples for determination of pottery fabric and inclusions. Palynological analysis of soil samples collected from different depths of the excavated mound was carried out using a microscope with an attached camera.

Decorative motifs such as single twisted cord impression were common to all sites. With exception of sherds from Ila-Orangun, those from other areas were related in terms of types, fabric and functional attributes. Some of the sherds bore striking resemblance to those documented for Old Oyo and Ile-Ife with regard to type, decoration and function. Stylistically, the potsherd pavements at Asi and Ajaba were similar to those documented for Ile-Ife. A C-14 date of AD 1263 was obtained from charcoal at a depth of 80cm from the Ajaba mound excavation. Maize cob decoration was absent which indicated that Ajaba site was occupied prior to 16th century when maize was introduced into West Africa. Pollen of forest species and ornamental plants of Asian origin, such as *Lagerstroemia indica*, *Casuarina equisetifolia* and *Delonix regia* was identified from the excavated mound. These were abundant at the lower levels of the excavated mound. However, pollen of ornamental plants disappeared completely at the upper levels while secondary forest species and artifacts increased in abundance which was indicative of increase in human population and subsequent impact on vegetation. There was evidence of increased peopling of the area from around AD 1263. Oral and written records suggested that conflicts and war caused displacement and re-occupation of most of the settlements.

Conflict and war resulted in the abandonment and reoccupation of all the sites, resulting in the delineation of several historical phases of occupation. Human impact on the environment was noted from the 13th century.

Keywords: Conflict, War, Displacement, Archaeological data
Word Count: 500

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CERTIFICATION

I certify that this dissertation was carried out by Mr. Benjamin Adisa Ogunfolakan under my supervision.

Signature…… Date:……

Supervisor

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DEDICATION

This work is dedicated to Almighty God and my loving late mother (Alhaja) Chief (Mrs.) Juweratu Abegbe Ogunfolakan who saw the beginning of this project but did not see the end. 'Iya Muri', I miss your motherly care. You inspired, influenced and encouraged me to become what I am today. Forever, you will remain in my heart. May your soul, rest in perfect peace.

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CHAPTER ONE

INTRODUCTION

1.1: Introduction

This study entails archaeological and anthropological investigations in parts of northeast Osun. It also touches on aspects of previous archaeological works carried out in the study area. The work examines the concepts of conflict, war and displacement in the light of archaeological and anthropological evidences from the area.

Before now, most archaeological works done in southwestern Nigeria were concentrated on Ile-Ife, Benin, Old Oyo and Owo focussing mostly on art works in bronze, terracotta, and wood. Other themes especially conflict, war and displacement vital to the areas' history and archaeology have been neglected.

To understand this neglect, and other related issues in parts of Osun Northeast of Osun State, Nigeria, series of archaeological works were carried out since 1992 by the author. The first phase of the research work which took the author to Ila-Orangun, Ila-Yara, Oyan, Asi, Asaba, Iresi and Ajaba (Kajola) was meant to expose the archaeological potentials of this part of Osun northeast for future intensive archaeological investigation (Ogunfolakan 2006). The second phase was a continuation of the previous exercise with visits to other notable towns and villages in Northeast Osun such as Oke-Ila, Ila-Magbon, Para-Oke, Otan-Ayegbaju, Ire, Ikirun and revisit to Iresi which had earlier on been visited. This second phase was also aimed at exposing the archaeological potentials of these towns and villages. Also a potsherd pavement site at Ajaba earlier identified during the first phase was excavated. This excavation was meant to identify the material content, orientation, pattern and design of the pavement, so as to relate it to other known pavements in other part of Yorubaland (Ile-Ife, Ila-Oranguun, Iragbiji, Otan-Ayegbaju, etc (Ogunfolakan 2007). It was also meant to assess the relationship between the pavement and a sacred grove 'igbo'aiko'. The sacred grove was later revealed as part of the abandoned settlement. Its investigation forms one of the bases for the study.

In realising these goals, both archaeological excavations and anthropological investigations were carried out in Ajaba an abandoned settlement earlier identified during the previous works in the study area. A refuse mound earlier identified within

Ajaba abandoned settlement was excavated. The mound was identified during archaeological survey of the area. It is expected that the study would throw more light on the culture history of Northeast Osun in particular and Yorubaland in general. It is also expected that this investigation would contribute to the emerging body of archaeological and anthropological data with regard to the peopling of this part of Yorubaland.

Archaeological investigation in the study area started only in the 1990s when the author and other colleagues reconnoitered the area (Ogunfolakan 1994, 2007, Akpobasa 1994).

Initial investigations into the archaeology of northeast Osun were generally targeted at exposing the archaeological potentials of the area as earlier stated. The first two phases of the project was able to reveal quite a large array of cultural entities in the area.

Chapter One introduces the subject matter of this study and examines the issue of conflict, war displacement and archaeology of Northeast Osun State, Nigeria. It further went in-depth into the geographical background, location climate, geology, relief, drainage system, soil, vegetation, history of the region, and previous archaeological works carried out in the study area. Previous archaeological works around the study area were also highlighted.

Chapter Two provides the theoretical framework for the thesis. Migrational factors such as conflict, war and displacement, trade, religion, personal adventure and other parameters of people's movement were discussed. The theoretical prop for the study, historical archaeology, ethno-archaeology, geo-archaeology and settlement archaeology are the discussed.

Chapter Three examines the archaeological surveys carried out in the study area. These include the 1994 pioneering as well as current archaeological works in the area by the author. This chapter thus discusses the preliminary reconnaissance surveys carried out in towns and villages (Oyan, Ila-Orangun, Ila-Magbon, Ila-Yara, Para-Oke and Oke-Ila), Iresi, Ikirun, Iragbiji and Ajaba) were also investigated. There were potsherd pavements in almost all of these towns and villages most especially, in all of those towns that claimed affinity with Ile-Ife (Ila-Orangun, Iragbiji, Oyan, Ire, Iresi, Ajaba and Oke-Ila). Excavations of some of these pavements are discussed in chapter four.

Chapter Four focuses on archaeological excavations at Ajaba and environs. The first was the excavation of a potsherd pavement site within the study area at Asi (Ogunfolakan 1994). The second was at Ajaba (Ogunfolakan 2007). The first and second excavations were meant to identify the orientation of the pavements, the materials and technology for comparison with the known pavements in other parts of Yorubaland. In continuation of the excavation exercise, another pit was opened on one of the mounds earlier identified in the course of archaeological survey of Ajaba. This chapter, therefore, discusses in detail, the excavation of this refuse mound.

Chapter Five discusses the analyses of finds. The analyses include the general inventory of both the organic and non-organic materials. The chapter also discusses palynological analyses of soil samples taken from different layers of the excavated refuse pit. In this chapter, geo-chemical analysis of pottery sherds from Osun Northeast and some other parts of Yorubaland was carried out to provide data for comparative analysis.

Chapter Six attempts an integration of the analysed data. It also provides an interpretation of the integrated data and offer suggestion for future work around this area.

1.2: Geographical Background:

Ajaba is located in Northeast of Osun State, Southwestern Nigeria (Fig. 1.1). The abandoned site is within the present day Ajaba town at a junction linking the northern and southern part of Osun State, on one hand and Igbomina and Ekiti land on the other. Ajaba is along Iresi-Ila-Orangun road. It also links Oke-Ila and other satellite villages within Ila-Orangun region while it links the south via Edemosi to Esa-Oke in Ijesa land. It is a market town that enjoys patronage from different part of the country as traders from both the northern and eastern part of the country patronize this market on weekly basis for farm products (Plate 1.1). The present site is to the western side of the present town of Ajaba (Fig. 1.3). In discussing the geographical background of Osun northeast it is necessary to note the location of the study area, its climate, geology and geomorphology, relief, drainage system, soil and vegetation.

1.2.1: Location:

Osun State where northeast Osun is situated is located towards the northeast of Southwestern Nigeria. The northeast area of Osun State lies between latitude 7°50'

Figure 1.1: Nigeria showing Osun State (Ogunfolakan, 1994)

Plate1.1: A typical market day in Ajaba (Kajola).

and 8°05' N and longitude 4°40' and 4°50 E of the equator. The area covers six Local Government Areas namely Odo-Otin, Ila-Orangun, Boripe, Ifelodun, Boluwaduro, Ifelodun and Ifedayo (Fig. 1.2). Ajaba is a small town at the boundary of two Local Government areas in the study area namely Boluwaduro and Ila-Orangun Local Governments Areas. It is along Iresi/Ila-Orangun road. It also links Oke-Ila and other satellite villages within Ila-Orangun environ while it links the south via Edemosi to Esa-Oke in Ijesaland. Interestingly, Ajaba is a 'resurfaced' ancient town as it grew and is still growing on an ancient settlement abandoned some centuries ago. According to oral information, it first developed as a market place in the middle of the last century (1950s) where all the neighbouring villages came on weekly basis to sell their goods. Today, Ajaba has returned to her ancient status of a beaded crown king's town with a market in front of the Oba's palace. The present study site is located to the western side of Ajaba town (Fig. 1.3).

1.2.2: Climate:

The study area has the climate characteristics of the savanna and tropical rain forest region of Nigeria. To the south of the study area is a tropical rain forest region while the northern part is predominantly of the savanna type. For that reason arable farming is practiced more in the northern part of the study area than in the southern part of it. The annual temperature averages between 26°C and 27°C, while the average rainfall ranges between 114.3 mm to 139.7 mm annually (Adeoye, 1988). It is humid throughout the year. Highest humidity is witnessed around late February and early March. Osun northeast experiences two seasonal climatic variations similar to those of other West African rainforest regions. The two seasons are determined by two airwaves; one is the rain bearing moist Atlantic 'monsoon' wind that travels from the southwest and the second one is the dry Northeast Trade wind that comes from Arabian Desert and sweeps through the Sahara. The raining season begins in March and last till early November. In August, the rain becomes weak with light drizzles which the local people refer to as *oda* 'August break.' This is the period that allows one to clear and prepare the farmlands for dry season planting. 'August break' consists of about two weeks of no-rains and allows residents to clear the farm and burn the grass, as enough sunshine to dry the grass is available during this short break. This period is known as late planting season, whilst the March-July period is the early planting season. These two seasons provide for two periods of maize

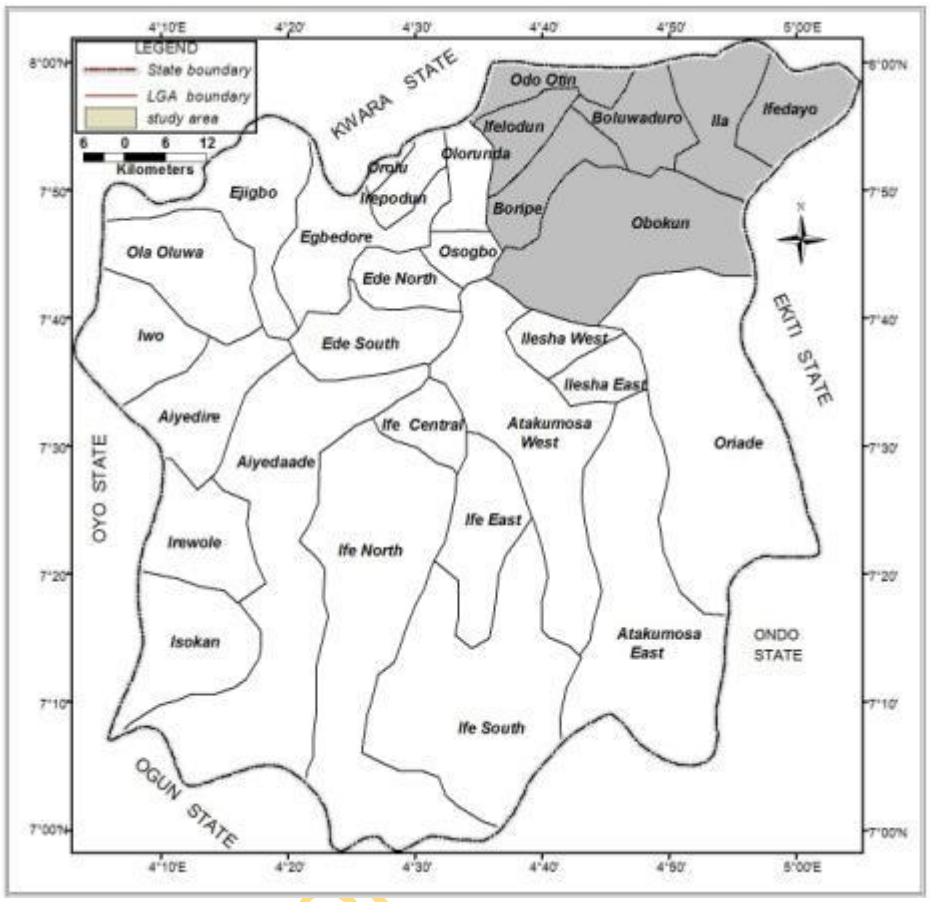

Fig. 1.2: Osun State showing Osun Northeast (Ogunfolakan 1994)

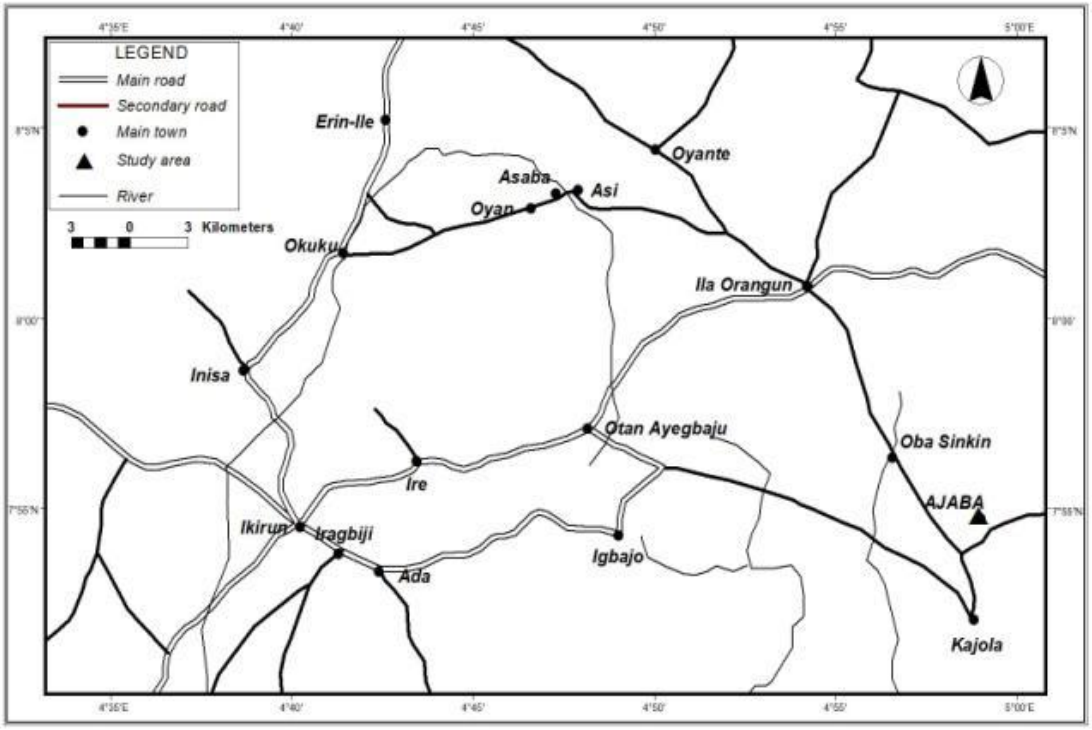

Fig. 1.3: Osun Northeast showing areas of study (Ogunfolakan 1994)

planting which is referred to as '*agbado eerun and agbado ojo'* (dry season maize and rain season maize). The latter is punctuated in December and early part of January by dry and cold weather known as harmattan. The temperature is always high and almost uniform throughout the year.

1.2.3: Geology and Geomorphology:

Generally, crystalline and sedimentary rocks dominate the geology of Nigeria (Fadipe, 1991). Crystalline rocks are distributed in three major areas of the country: (i) a roughly circular area in the North-Central part of Nigeria; (ii) a triangular area in Southwestern part of the country and; (iii) an area with three main units in the eastern and north-eastern parts of the country. Sedimentary rocks bound these crystalline rocks area (Mabogunje 1985). The predominant rocks consist of banded gneisses and pegmatite whilst the schists are composed mainly of mica schists and sillimanite quartzites. A prominent feature of this geology is the occurrence of basic and ultra-basic rocks which are commonly found as amphibolites, metapyroxenites, meta-ultramafites and talc-rich schists. The main minerals of the amphibole schist parent rocks are green hornblendes, plagioclases, with secondary chlorites, epidote and little quartz. The bedrocks of Ile-Ife area consist of coloured gneiss of tonalitic to grandioritic composition, which occur as prominent hills and inselberg around Ile-Ife and surrounding towns. Several textural varieties of this rock have been found. The most common type is a medium-grained rock with regular and persistent banding of milimetric to centimetric thickness. A variety of these rocks is coarse-grained, pink coloured gneiss with large lensoid alkali-feldspar porphyroblasts 2-3 cm long. The bedrock of Ajaba, Iragbiji, Ipetumodu and Ikire area are broadly similar to that of Ife except for variation in outcrop patterns of mica schists and mafic-ultramafic rocks. In Ila-Orangun, the bedrocks consist mostly of quartz mica-schist with sub-ordinate occurrence of granitic rock. (Ige et al: 2009). From Ikirun to Ire and Iragbiji, granite gneiss dominate. From Iree to Iresi via Otan-Ayegbaju, rock types are mainly porphyrite granite. The Ila-Orangun and Oyan area is dominated by schist and epidiorite complex (Geological Survey map of Nigeria, Iwo Sheet 1: 25000). The study area in essences belongs to the undifferentiated basement complex and undifferentiated meta-sediments (Fig. 1.4) Principally, most of the towns here are located within and on rocky hills. Because of this situation, the towns are today

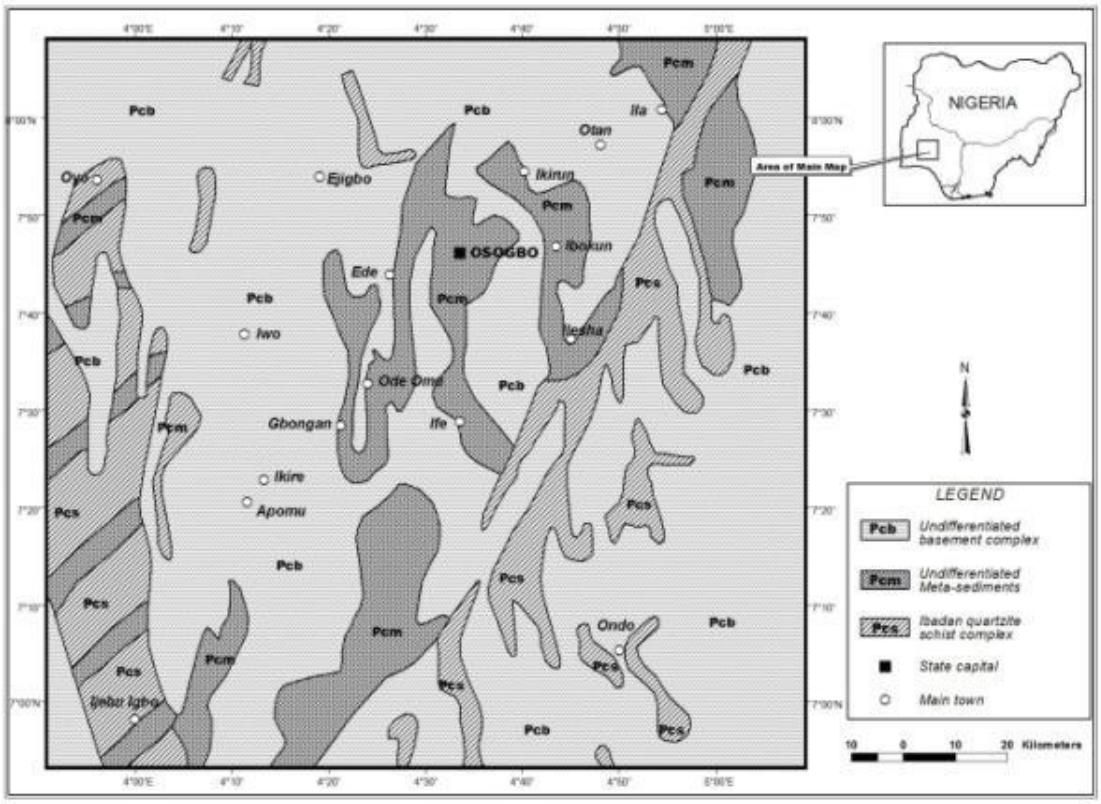

Fig. 1.4: Generalised geological map showing the study area (Adapted from Ige et al 2009).

developing along the stretch of the roads that cut through these ridges (emergence of linear settlement in the area).

1.2.4: Relief

The relief features of the south-western Nigeria, where Osun State is situated may be roughly divided into three belts. The first belt is formed by peninsulas, islands and sand-bank, together with the southern edge of the mainland, including the intervening lagoon and swamps. It is about twelve miles wide, raised only slightly above the sea-level and consists of sea-sand and river sand, alluvium, and decaying vegetable matter, the whole being more or less covered with aquatic plants or forest vegetation (Fadipe, 1991:22). As the movements go inland, the second belt is noticed with the ground rising gently yet steadily northward to an altitude of about 198.12m. The belt consists of mainly unstratified red clayey-sand, known as Benin sands. Northward of the second belt, is the third belt which makes Yoruba country hilly, being mainly a dissected northward-rising plain with isolated hills or groups of hills, usually of granite, rising out of the plain to heights varying between 15.4m and 243.84m. Osun northeast under study falls within this northward belt. The rising hills played a prominent role during the conflicts and wars that led to migration and displacement that took place in this region. Looking at the relief of the main study area, Ajaba, the relief within the vicinity of Ajaba and Ila-Orangun to Ede and Ila-Yara, they fall within valley of the Yoruba ridges that encapsulate the study area.

1.2.5: Drainage system:

Osun northeast is well drained by numerous but small seasonal streams and rivers that have their sources from the hills on which most of the towns in the region are situated. Most of the streams are seasonal. Some of these streams bisect the towns; the Afo stream bisects Ikirun, while Isoko stream virtually splits Iresi into two. These streams later merge as they flow to form a large river known as Oyi River in the Ila region to the north of the study area and Osun River in the Ikirun axis to the western part of the study area. Archaeological survey in Osun northeast shows that the gentle slopes of the valleys were favoured for settlement location in the past. Most of the identified abandoned settlements are located on the valley slopes, less than 200 metres from the closest stream. But because the substantial part of the study area is within rocky and hilly region, erosion has continued to wash the cultural materials in

Plate 1.2: Erosion washes at Iresi (Drainage)

the area. In some cases, it has virtually washed the foundation of buildings thereby exposing the stratigraphy of the soil on which the building was built (Plate 1.2). This scenario is well pronounced in Igbajo, Iree, Otan-Ayegbaju, Ila-Orangun, Oke-Ila, Iresi, and Iragbiji where gully erosion is vastly eroding the area.

1.2.6 Soil:

Osun northeast is characterized by gentle to moderate slopes, and the soils of this area belong to both the Iwo, Egbeda and Okemesi soils associations (Reconnaissance Soil Survey, Western Nigeria, 1961). This soil type as clearly identified occurs on the foot-slopes of quartz ridges that dominate this area. The texture of the soil ranges between very coarse, coarse and fine texture (Fig. 1.5). The soil colour also ranges between greyish brown and brown, reddish brown and brownish red and pale greyish brown to brown. To the northern part of the study area (Ila-Orangun, Asi, Asaba and Oyan) the soil texture is heavily close to the surface, and the percentage of gravel and quartz increases with the depth. It is of sandy to fairly clayey soil, overlying weathered rock material, fresh rock at depth of 2.4 to 2.75 m shallower on steep slopes with fairly frequent rock outcrops (RSS, Western Nigeria, 1961). To the south and specifically in Ajaba area, the soil there belongs to the Iwo soil association. Since the study area falls within this soil association i.e. Iwo association and that the characteristics of the soil is of sandy to fairly clayey soil, permanent crop farming like cocoa, oranges, kolanut and other arable plants are adequately encouraged. This then clearly shows why these crops thrive better in the area. This could have been the reason why in the first instance the first settler of Ajaba settled around this place.

1.2.7 Vegetation:

Nigeria is covered by three types of vegetation: forests (where there is significant tree cover), savannas (insignificant tree cover, with grasses and flowers located between trees), and montane land (Fadipe 1991). The latter is the least common, and is mainly found in the mountains near the Cameroonian border. Both the forest zone and the savannah zone are divided into three parts. Some of the forest zone's most southerly portion, especially around the Niger River and Cross River deltas, is mangrove swamp. North of this is fresh water swamp, containing different

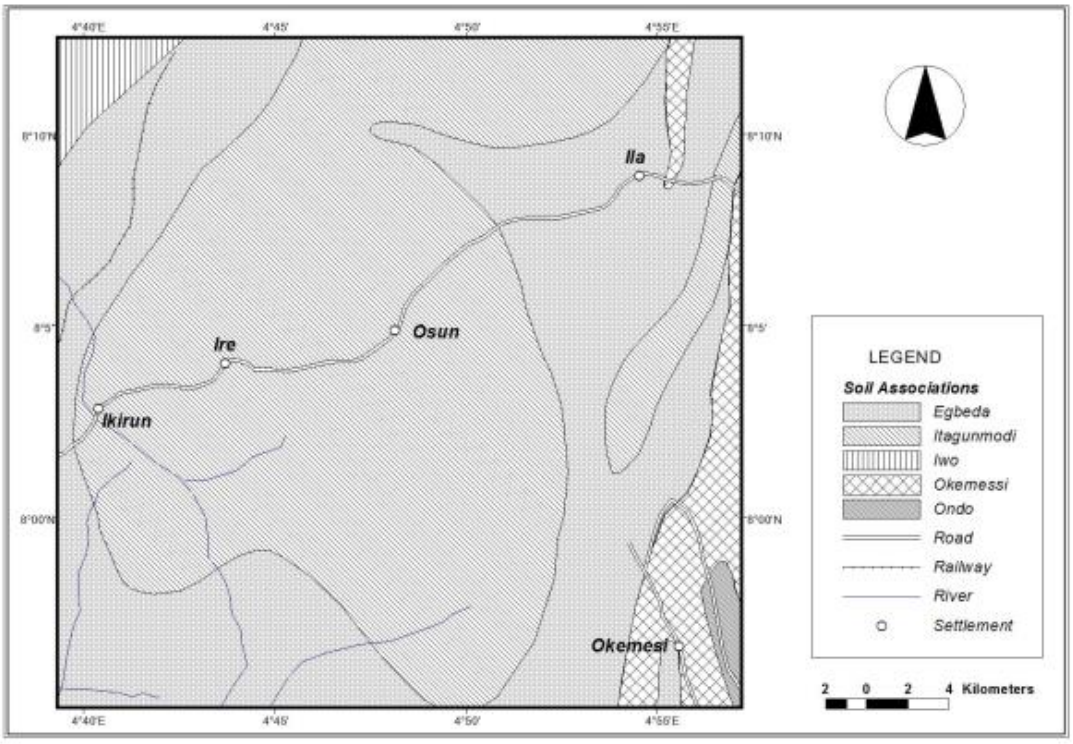

Fig. 1.5: Soil Association of study area (Adapted from Reconnaissance Soil Survey, Western Nigeria, 1961)

vegetation from the salt water mangrove swamps, and north of that is rain forest. The savanna zone's three categories are divided into Guinean forest-savanna mosaic, made up of -plains of tall grass which are interrupted by trees, the most common across the country; Sudan savannah, similar but with shorter grasses and shorter trees; and Sahel savannah patches of grass and sand, found in the northeast.

In Yorubaland, there are four principal vegetation belts. The first is within the coastal region (Fadipe 1991). The vegetation of the northern part of the study area is similar to that of other savanna areas. To the south is tropical rain forest where timber and kolanut (*Cola acuminata* or *C. nitida*) are exploited while cocoa trees (*Theobroma cacao*) are also cultivated in abundance (Cocoa actually form the major permanent and exportable crop in this area). Palm trees (*Elaeis guineensis*) are also abundant in the forest region (Ogunfolakan 2007).

The vegetation of Osun northeast is generally derived savanna with relics of trees typical of the drier type of rainforest vegetation. This suggests that Ajaba is within the northernmost extension of the rainforest zone.

In the immediate vicinity of the present study area and most especially within the excavated mound, about three to five metres (3-5m) away, are *Khaya grandifoliola, Chrysophyllum albidum, Nauclea diderrichii, Ceiba pentandra, Elaeis guineensis, Raphia vinifera, Millicia excelsa (Syn.chlorophora excelsa) Tetracarpidium conophorum* (African walnut tree), *Alstonia boonei*, *Dracaena africana*, *Vernonia amygdalina*, *Cordia millenii*, *Chromolaena odorata*, *Cassia* sp and members of *Amaranthaceae*. There are also cultivated plants such as cocoa (*Theobroma cacao*), cassava (*Manihot* utillissima*)*, yam *(Discorea bulbifera),* pepper *(Capsicum sp),* banana *(Musa paradisiaca),* plantain *(M. sapientum), and* cocoyam *(Colocasia* sp.). Others are pawpaw (*Carica papaya),* orange (*Citrus sinensis*), coconut (*Cocos nucifera*) and pineapple (*Ananas comosus*) (Orijemie et al. 2010).

To the northern fringe of the study area (Oyan, Asi, Asaba and Ila-Orangun) the vegetation is derived savanna, trees are more scattered here. In some areas, most especially along the valley or along the course of the rivers and streams that cut across Osun northeast, porch of forest is noticeable. To the southern fringe, secondary forest can still be noticed and economic plants like cocoa, Kolanut trees and in some cases, cashew are still planted. The following plants were found within a radial distance of four hundred to eight hundred (400-800m) metres from the excavated site: *Blighia sapida, Cocos nucifera, Newbouldia laevis, Tectonia grandis, Carica papaya,*

Thaumatococcus danielli, *Samanea saman*, *Duranta repens* (yellow bush), *Thevetia peruviana* and *Napleona sp.* (Ogunfolakan 2007).

It is sad to note that the sacred grove ('Igbo riro') the traditional reserved forest which should have given us the idea of the primary/secondary forest within the abandoned site has of recent been badly deforested. Most of the trees have been cut down without replacement (Plate 1.3). Out of about five acres of land left as sacred grove, about four acres have been desiccated. But the remnant clearly shows that the area was once a forest or better that the area originally was a thick forest before the deforestation.

1.3: Historical Background:

Osun northeast as an entity does not have a collectively written history, though the area remains that part of the Yoruba ethnic group that gained prominence during the Yoruba wars of the 19th century. Specifically, Igbajo the camp site for the Latosa/Ibadan group during the Kiriji War of the 19th century remains a centre of political/military history for Yorubaland. Unfortunately, apart from the records of the Yoruba War written by Samuel Johnson in his famous book 'The History of the Yoruba…' (Akintoye 2010), most of the books relating to Osun northeast, the towns and specifically, Igbajo, deal with the Kiriji War and not with the early history and archaeology of the area. Historical records for each town and city in this region still remain in the archives of the oral historians. Though, more write-ups are coming out now for towns such as Ila-Orangun (Adetoyi 1974, Pemberton and Olaniyan 1996, Adebayo 1996 among others) Igbajo (Tugbiyile 1989, Fashiku 1995) and Otan-Ayegbaju). Most of their histories are only recorded on the pages of pamphlets for chieftaincy installation, social programs or long essays submitted by graduating students of history in some of our universities.

The people of Osun Northeast are united by overlapping socio-cultural institutions, historical traditions, religion and world view. The intermingling of the people, most especially before, during and after the Yoruba Wars of the 18th and 19th centuries led to demergence of three sub-groups of the Yoruba entity (Ogunfolakan 2007). These groups include the Oyo Yoruba group of Ikirun, Iragbiji, Oyan, and Asi; Ijesa Yoruba group of Igbajo, Iresi, Otan-Ayegbaju and Igbomina Yoruba group of Ila-Orangun, Ajaba and Oke-Ila. This dialectical division is reflected in the Yoruba language dialects each one of these groups speaks.

Plate 1.3: Deforestation of the sacred grove

Oral history of most of the people in the study area points to the fact that they migrated either from Oyo or Ile-Ife. For instance the people of Ila-Orangun claimed that their forebearer came from Ile-Ife before finally settling at their present site after more than four different places of settlements (Ogunfolakan 2006). In Asaba near Oyan, the oral history recorded that they came from Oyo and here *Egungun* festival is prominent (Ogunfolakan 1994). In Oyan it is claimed that their ancestor, Epe, came from Ile-Ife and settled first at Igbo-Ogun (Ogun grove) and finally at their present site on the instruction of Ifa oracle after wandering through thick forest (Ogunfolakan 1994).

In some towns, there are mixtures of people migrating from different areas and coming together to form a town. In such cases, each group of people maintains a separate identity and their area known either as a quarter or family compound. For instance, the people of Ede settled at Ila-Orangun in the area known today as Oke-Ede this group of people are also found in Igbajo, Imesi-Ile and Otan-Ayegbaju. Igbajo town of today also displays an interesting relationship of people coming together to unite under the same town polity but maintaining their self-identities. For instance, Igbajo is known as Igbajo Iloro i.e. Igbajo of Iloro. Today chieftaincy title of the paramount chiefs is duplicated. For instance we have the Ejemu Iloro and Ejemu Igbajo, Odoffin Iloro, Odofin Igbajo etc, but all of these chiefs are subject to Owa the paramount ruler of Igbajo.

How had the conflict and war leading to dispersal of people from one town or the other influenced the growth of others in this area? How did this influence the socio-cultural affinity of the people? These are pertinent questions that form the focus of this present work.

1.4: Previous Archaeological Investigations in the area

Archaeological investigations in this area started only in early 1990s when the author and others carried out an archaeological survey of the area around Ila-Orangun, Oyan, Ajaba, Asi and Asaba (Ogunfolakan, 1994; Akpobasa, 1994; Usman, 1995). These early works were generally targeted at documenting the archaeological, cultural and historical sites in this area so as to expose the area archaeologically. The author was thus interested in documenting the occurrence of potsherd pavements in this area so as compare and relate the pavements to known one in Ile-Ife and Old-Oyo. After exploring the area, an exposed pavement in one of the sites (Asi) was opened so as to

identify its orientation, design and material content. The excavation then did not go below the pavement level. In all, the first phase of the work by the author was aimed primarily at mapping archaeological, historical and natural features for future detailed archaeological investigations and also to locate potsherd pavements in the area.

Akpobasa (1994) also carried out archaeological investigations of the abandoned site of Ila-Yara in his pursuit of the archaeology of Igbomina land. In his work, he identified series of occupational features including a defence trench and embankment, refuse mounds, some natural formations such as a small water fall. He archaeologically surveyed these features for further work.

In 1995, in his pursuit of survey of fortifications in the northern periphery of Old Oyo, Usman et al, (1995) carried out a survey description of Ila-yara trench and embankment earlier identified by Akpobasa, (Akpobasa, 1994). According to Usman, the aim of the work was twofold. 'The first is to provide a survey description of the walls, and the second is to explore the functional interpretations of the walls' (Usman et al, 1999:45). Usman et al (1995: 45) is of the opinion that '*The study of fortification in this part of Yorubaland will provide an understanding of the nature of Old Oyo frontier and the prehistoric social relations in the area, especially between Igbomina, and the Nu*pe'.

In 1997, the author carried out further archaeological explorations of other parts of Osun northeast with visits to other areas that were not earlier visited and revisited Iresi and Ajaba. Also at Ajaba, a test geological probing of archaeological site for archaeological features and artifacts was carried out with geo-magnetic and electro-resistivity survey of the pavement site area. The idea was to test the usefulness of this method in location of archaeological sites. Thereafter, the author carried out excavations of a potsherd pavement earlier identified within the vicinity of Ajaba (Ogunfolakan, 2007). This was carried out in other to (i) confirm the geo-magnetic and electro-restivity data generated from the survey carried out; (ii) know the extent of the pavement; (iii) examine the orientation and design; (iv) check the materials used and; (v) identify if possible, other associated materials and finally determine the relationship of the pavement to the whole Ajaba abandoned site. The result of the investigation shows that (i) evidence of archaeological materials; (ii) the potsherd pavement bears resemblance with known Ife pavements with pots embedded in the middle of the pavement and; (iii) the result of the excavation shows that different people were working on the pavement at almost the same time because of different

orientations the pavement faced. From these surveys it was possible to identify the extent and cultural compositions of the Ajaba abandoned site i.e. refuse mounds, a semi-circular defence wall and other features.

Usman et al (2005) carried out excavations of a mound earlier identified by Akpobasa in 1994. This work according to Usman *et al* (2005) was to examine the ceramic of Ila-Yara and serrate it with other Igbomina ceramics and also relate it to the Old-Oyo ceramic. The essence is to examine the relationship of Igbomina with Old-Oyo and probably establish the origin of the Igbomina people.

In continuation of the archaeological research work in the area, in 2005/2006, the author carried out excavations of a cultural mound within the previously studied abandoned site of Ajaba where a pavement was earlier excavated. The data from this excavation with other previous data form the core data for this present work. The present work is thus a continuation of archaeological investigations in northeast Osun.

1.5: Scope of the Study

The present work is focused on a better understanding of the effect of conflict, war and displacement in parts of Yorubaland, with specific reference to Osun northeast of Osun State, Nigeria, from archaeology, oral history and ethnographic perspectives. This is done so as to examine how this has affected the settlement pattern of this area within the context of Yoruba settlement. It is also to decipher the inter-regional relationship of Yoruba towns and villages.

What is or are the relationships among the people that moved and intermingled over periods of time within this region and other Yoruba towns, most especially Ile-Ife and Old-Oyo? Within the context of understanding Igbominaland and culture, what linked these groups of settlements together in the beginning, at certain periods and over time?

The present research work which includes excavation of a cultural mound within the abandoned settlement site at Ajaba is aimed at relating and inferring the relationship between the cultural materials from this area and the materials from previous excavations and surface materials from other sites earlier identified by the author and other researchers in northeast Osun on the one hand, and Ile-Ife and Old-Oyo cultural materials on the other hand.

1.6: Research Aims and Objectives:

The goal of this research is to understand how conflict, war and displacement have affected the settlement history of the study area. The objectives are therefore to: (i) examine the relationship amongst Ajaba and other settlements within the study area on the one hand and other Yoruba groups in southwest Nigeria on the other, so as to have a better understanding of the effect of conflict, war and displacement on the archaeological landscape of the area; (ii) ascertain human interactions with the environment in this region using the cultural materials from both archaeological excavations and ethnographic surveys and; (iii) examine the effect or otherwise of war, conflict and displacement on the people of the study area. The concomitant effects of these interpretations on the emergent settlement configuration are also inveestigated.

In order to realize the goal and set objectives;(i) a critical assessment of the local oral historical model of settlement history, migrations and displacement in the study area was carried out; (ii) archaeological data including dates from the region were assessed and compared to establish the nature of cultural and genealogical relationships among the settlements within the region.

1.7: Methods of Research

Direct historical approach is seen as the appropriate methodology in carrying out this work. The historical approach is integrated with the archaeological data, ethnographic and historical information (most especially, oral traditional historical accounts). Since oral tradition encompasses a series of entities – folklore, praise-poems (oriki), myths, festival, poetry and host of others, its application in the archaeological investigation of northeast Osun is appropriate and expedient in the investigation and interpretation of archaeological data for a better understanding of conflict, war and displacement of the people of Osun Northeast. This will help to understand what is responsible for the 'push and pull' factors in migration and displacement in the study area. Also, taking into account the sacred sites and places that are still valued by the people of northeast Osun, the:

> *.... critical use of direct historical approach in African archaeology has been found very relevant for situations in which there is a cultural and historical continuum between the archaeological past and the ethnographical present (Ogundiran 2002: 8).*

The archaeologist has to look for material culture to supplement, understand, and decipher the meanings of the minds and hands of the ancient residents and their conditions. One can also use oral and written historical materials to document and interpret archaeological material or site.

The following research methods were employed to establish the migration and displacement pattern, settlement strategies, ceramic use and factors of change in our area of study:

i. Re-evaluation of oral history earlier collected among the people in the area, paying attention to key informants especially custodians of tradition and culture;
ii. Archaeological reconnaissance and detailed surveys;
iii. Excavation of a mound earlier identified and which is within the area where a potsherd pavement was earlier excavated;
iv. Laboratory analyses and classification of cultural materials. Classification of cultural materials entailed a general artefact inventory, pottery decoration analysis, and pottery typology. The laboratory analyses include both geo-chemical and mineralogical characterization of pottery sherds from the excavation and pottery sherds from other sites within northeast Osun State and Ile-Ife, most especially from the potsherd pavement.
v. In order to ascertain the aspect of the environment of Ajaba and the interaction of the people with this environment, a palynological study of some of the excavated soil samples was carried out.

In re-evaluating the historical account of the study area, and specifically, traditional heads of each town was always the first target as they are the 'owners of the land' and custodian of the tradition. The traditional rulers are the ones that know who to contact or invite for information. There are times when the traditional ruler himself is not vast in the history of his town, in such a case, elders in the town are usually invited to the palace of such a ruler for interview.

In carrying out the interview, direct interview with the custodian of history and culture was employed instead of using questionnaire. Questionnaire is viewed as limiting the respondent to say what the interviewee wants and not what the respondent know or want to say. Questionnaire a times do not give the required result as majority of the custodians of history and tradition could not read or write, though they are literate in the African sense of it (they have good understanding and memory of the oral history and tradition of their community (Ogunfolakan 2007). Those interviewed

were chosen based on the recommendation of the traditional ruler, based on age and observation of their interest in tradition and culture. Also, in some instances, a meeting of the chiefs and traditional title holders were convened to interact with them on the oral history and understanding of their environment (Plate 3.1). Serious attention was not paid to gender equity because from observation, the women always give the men the right to give historical account. Often the women believed that they are wives and may not know more than their husbands who were born and grew in the same community.

After collecting and synthesising the oral historical account, archaeological survey of the area was carried out with visits to cultural, natural and historical sites as mentioned in the oral history. The informants often piloted visits to historical or natural sites. It is now left for the archaeologist to identified archaeological, cultural and historical features. This was done in the identification of several sites and features identified in the study area. Also, with the picture of potsherd pavement and rockshelter shown to the informants, pavement at Ajaba, Ire, Otan and Ila-Orangun and the rockshelters in Iresi and Iragbiji were able to be identified.

In the archaeological reconnaissance, simple traversing round the site was adopted. Each feature was marked and surface material collected for analysis. The road where vehicle was parked always serves as the reference point.

After the archaeological reconnaissance, identified pavement at Asi and Ajaba were excavated while a refuse mound at Ajaba was also excavated. The result of the mound excavation forms the core of this present work.

In carrying out the laboratory analysis, both the surface and excavated materials retrieved were sorted out (this is discussed in chapter 5) and analysed based on their material (organic and inorganic) then ceramics were sorted out according to their features rim or body then decoration motives. The analysis went further by the use of geo-chemical, geo-physical and mineralogical methods for the identification of material composition, fabrics and mineral contents so as to relate the sherds from Ajaba with the selected sites in the study area and Ile-Ife, Ikire and Ipetumodu.

Finally, palynological analysis of soil collected from the mound excavation at Ajaba was carried out (details are discussed in chapter 5). The Palynological analysis was carried out so as to understand the past vegetation of the area and have insight into the man-environment interaction in the past.

CHAPTER TWO
THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1: Theoretical Framework:

The archaeologist is committed, among other things to the business of explaining the past. This has been encouraging the development of numerous concepts and methods **(**Ogundele 2004). Therefore, theories in archaeology are to solve problems and not to further confuse people. Theories are to guide archaeologists in their operations so that the archaeological research being carried out can be more valued. In carrying out this work, some theories and models employed include historical archaeology, ethno-archaeology, oral tradition and settlement archaeology, archaeology of conflict and migrations so as to understand and have a good understanding of the effect of conflict, war and displacement in the study area.

2.2 Historical archaeology

Historical archaeology developed as a distinct branch of archaeology first in the United States and Canada. Here archaeologists draw a distinction between prehistoric archaeology, which studies the pasts of indigenous peoples, and historical archaeology, which studies European sites and indigenous sites with evidence of European contact. Scattered references exist for excavations in European sites from the eighteenth and nineteenth centuries, but it is only in the 1920s and 1930s that historical archaeology developed as a coherent field of study. This was a period of great interest in historical reconstruction. Numerous private foundations and the U.S. and Canadian governments sought to study and reconstruct important historical sites. These efforts led to the establishment of many of the major living history museums. Historical archaeology began in places such as Jamestown, Port Royal, Plymouth Plantation, Saint Marie One, and Colonial Williamsburg (McGuire and Paynter 1991).

Archaeologists contributed to these efforts by supplying information on the correct placement and reconstruction of buildings, forts, roads, wells, and other features. They also provided details, such as what artifacts should be placed in the reconstructions. These reconstructions emphasized great men, first settlements, and great events.

Historical archaeology has been propounded and defined primarily by European and American archaeologists, and members of post-colonial societies, who were to be more concerned with their own society than with visualizing more universal concepts of archaeology. Their definition may reflect the spread of European culture **(**Deetz, 1965) or stress the availability of written account of the society under study with tacit limitation to European documents. Posnansky and Decorse (1986) follow Deetz's definition as a practical matter to limit the scope of a brief survey, but note the inadequacy of this and related definitions for Africa. Wesler 1998:13 defined historical archaeology as `the archaeology of peoples who can also be studied or investigated through historical document'. Wesler's explanation of his definition of historical archaeology is that it draws from two sources of data, archaeological and historical. But his submission that historical archaeology includes the archaeology of literate societies, observed by literate societies manifests certainly his euro-centrictism.

In Africa, there are orally literate societies whose, members could neither read nor write, but they recount, recollect and recite events as they happened. They perform experiments and administered results as deemed fit. Literacy here is more than one who can read and write. Literates here are those who are conscious of their environments and transmit and translate this consciousness into practical forms suitable for their daily living conditions and for both their mental and physical development (Ogunfolakan 2007).

Therefore, historical archaeology could be defined as the archaeology of a people, and whose archaeological investigations could be carried out through their means of historical documentation. This in essence means that the archaeology of the people could be studied through their festival, folklore, written and unwritten historical facts, songs and others. For instance, Yoruba people are known for their `*oriki*' (praise poem/cognomen). Through this `*oriki*' their history is often recited (Aleru and Alabi, 2010). In a situation where we use the presence of European, foreigners or colonial structures as a sign of historical archaeology, more euro centrism than universal phenomenon are explained.

Historical archaeology continues to be divided between humanists and scientists, but much of the fervor of the debate has been lost. This reflects the fact that, since the 1970s, anthropology has become more historical, and history more anthropological. It also indicates a growing realization that good work can be done

through both approaches. The core methodological question remains how to integrate artifacts and documents in the study of historic sites. Historical archaeologists promote two complementary positions that stress the value of the study of material culture. The first position grows out of historical archaeology's original role of filling in missing information from the documentary record. It focuses on the incompleteness of the documentary record and how material culture can be used to complete historical knowledge. Historical archaeologists recognize that not all time periods and events are equally well represented in the documentary record. In the European history of North America, the number of documents that were produced, and that survive, increases geometrically over time. This makes historical archaeology especially useful in early periods when few, and often only fragmentary, documents are available. Certain events may also not leave a rich documentary record. For example, at the Battle of the Little Big Horn (Fox, 1993), none of the Seventh Cavalry who rode with George Armstrong Custer (1839–1876) survived the battle, and the Native American victors left no written accounts of the battle. Historical archaeologists, such as Richard A. Fox, have been able to reconstruct what happened to Custer's command on that day and substantially confirm Native American oral accounts of the action. In Africa, where few written records exist prior to the European encounter with the region, the use of oral and material records to augment the written evidences from the beginning of the European knowledge of African continent becomes imperativve.

Historical archaeologists note that the documentary record tends to focus on great people and great events. Even when common documents survive, such as diaries and letters, they tend to focus on the personal and emotional concerns of individuals. People do not generally write about the mundane and day-to-day activities that make up most of their lives. In contrast, the archaeological record is primarily made up of the remains of these day-to-day activities. Many of the great events of history (e.g., the dispersal of the prince and princesses from Ile-Ife at a point known as '*Ita-A-jo-ro'* (*Ita'Jero* meaning a point of decision making) leave little in the way of material remains, but the day-to-day activities of life do. More so, the early Europeans that visited Africa did not believe that Africans could be so creative to have done most of what they saw. No wonder when Leo Frobenius visited Ile-Ife between 1910 and 1911 and saw Ife arts, that he likened Ile-Ife to the lost Atlantis! (Frobenious, 1921).

Historical archaeologists stress the consistent biases to the documentary record. It is primarily the literate and the powerful that produce documents and see to their survival. In North American history, wealthy European males tend to dominate the documentary record. The vast majority of people who have lived in North America are poorly represented in the documentary record or not represented at all. This is particularly true of groups that were disenfranchised and the oppressed, such as enslaved Africans, Native Americans, workers, and women. These people did leave physical traces of their lives that historical archaeologists can study. Through these traces, historical archaeologists can learn about the day-to-day experience, the nutrition, and the health of everybody in history (Fox, 1993).

Finally, much of the information in the documentary record is prescriptive (i.e., it tells people how they should have acted). People did not always act the way that they were told to. The archaeological record provides a check between the prescriptive literature and what people actually did. It also provides a record of a wide range of illicit and illegal activities ranging from opium smoking to smuggling (McGuire and Paynter 1991).

The second line of argument begins with the position that archaeology is not simply a poor substitute for the written word. It is, instead, a unique way of studying the world that allows us to learn things we could not learn otherwise. People create material culture, and it bears the mark of that creation. From these marks, archaeologists can reconstruct technologies, costs, trade, and even aspects of the organization of work that created these objects. In these ways, material culture gives archaeologists a means to reconstruct past behaviours. Material culture is also an active agent in people's lives. Material culture structures what people do, and it carries meaning. Thus, non-material culture may embody emotions, aesthetics, social relations, and beliefs, and these things affect how people will think and act. In this way, material culture becomes an active instrument that affects what people will do. Documents are valuable from this perspective because they allow the historical archaeologist greater access to meaning and belief. In this way they supplement the study of material culture, rather than the material culture just filling in what the documents lack.

2.3 Ethno-archaeology

The aim of ethno-archaeology is focused at discovering general principles that link human behaviour and material culture variability, thus it streses the importance of linking ethno-archaeological studies to archaeological questions. The possibilities for archaeological inference by applying ethnographic insights to archaeological case studies are there. Ethno-archaeologists need to be generalists, with good grounding in both ethnographic and archaeological methods, with a clear sense of how their theoretical leanings shape and potentially limit the models that result from their work, and with a more clearly defined sense of how their ethnographic research can further archaeological interpretation.

The preoccupation of ethno-archaeology is the study of the 'the role of human behaviour in forming archaeological accumulations' (Gifford 1980), and its main goal is to aid the interpretation of the archaeological data and determine as much as possible the associated behaviour (Atheron 1983). Archaeology is sometimes, according to Kramer, (1979) refers to as fossilized human behaviour that is, a living record of past life preserved through time and artifacts or the lack of knowledge of these artifacts. This is when the archaeologist starts to employ a type of archaeology called Ethonoarchaeology. Okpoko in his investigation of Anambra valley defines ethnoarchaeology as the study of aspects of the history (oral tradition), material culture and linguistic data of the present inhabitant of the valley to elicit the information useful for (i) the location of archaeological site; (ii) the interpretation of such sites, features and artifacts and (iii) the reconstruction of material and non-material aspects of the ways of life of former inhabitants of the valley (Okpoko 2006) Folorunso (1993: 98) argued that 'it would not be correct to treat the use of oral traditions and linguistic evidence in archaeology as falling under ethnoarchaeology. These fields of study are, on their own, useful for archaeological interpretation and cannot be subsumed under ethnography'. His submission is that the use of oral history in archaeology should be considered within the realm of historical archaeology. Aliyu (2006) defines ethnoarchaeology to mean the use of present cultural information about a group in order to understand the material cultures and ways of life of the ancestors of the same or related people or otherwise, especially in the areas of methods of production, use and discard.

Therefore ethnoarchaeology is the theoretical use of analogies derived from present observations to aid in interpretation of past events and processes. In using this

method the archaeologist uses the application of deductive arguments to archaeological evidence in order to discover how human beings in different prehistoric societies may have behaved in the past. The idea of ethnoarchaeology can be a very helpful and intriguing tool to the archaeologist when there is a lack of archaeological evidence to support an idea or theory.

The best way of explaining past events and practices of peoples is through solid archaeological research and facts that come from the artifacts recovered from a site. But, when there is a question as to what a tool was used for or why certain buildings are positioned in such a way, ethno-archaeology can be a great aid. It works with the known facts and helps create ideas and hypothesis about the problem or question being asked. Ethno-archaeological research can be most useful when used in an area where cultural continuity is great, for example in most places inn sub Saharan Africa, where traditions and customs survive for generations. When considering modern day rituals and customs of a culture, it is important to remember that they are only modern day rituals and customs and should only be regarded as a hypothesis on how an ancient custom was performed and must be tested before being accepted as an explanation for the custom in question. This is important because it doesn't matter where an interpretive hypotheses comes from, but rather how it stands up to, and fits the archaeological record.

Every archaeologist knows that there are limitations in the recovery of historic data and artifacts posed by the decay of archaeological material and deposits, sampling errors, seriation errors, and plain human procedure error. All these problems can affect behavioural interpretations of past events. Archaeologists attempt to understand past human behaviour and to constantly find better ways to do this. The methods of ethnoarchaeology step up to the challenge as a legitimate aid in the science of archaeology as archaeologists develop different ways to overcome limitations posed by traditional means.

2.4 Oral Tradition Account

Any researcher working on the archaeology of Yoruba in particular and Africa in general must rely seriously on the account of oral history as recorded by the tradition. Oral tradition can be defined as the 'recollection of the more distant past that has been transmitted for several generations and has become more or less the common property of a society' (Henige 1982: 106). Vansina (1960: 56) defines oral

tradition as `testimonies of the past which are deliberately transmitted from mouth to mouth'. They concern past events and are distinct from rumors which always bear the character of sensational `news' which are not deliberately transmitted from generation to generation the same way" (Andah & Okpoko 1979). Such traditions form the main available source for a reconstruction of the past; 'in those parts of the world without writing…. and even among peoples who have writing, many historical sources including the most ancient ones are based on oral tradition' (Vansina 1960). Oral testimonies should be regarded as those versions of history that are not widely known and according to Henige (1982), `if they relate to recent events, they belong to the realm of oral history. Oral information could be seen as coming from two major ways or forms. First is oral history and the second is oral tradition. Either of the two infers a means of transmission of history through the word of mouth from an interviewee to an interviewer (Bakinde 2009). The former refers to the history of a people; society or group over period of time while the latter is contemporary narrative of an event that might be on going at the time of the interview. Oral history then is personal reminiscence solicited by the researcher in an interview format, on specific events of interest to the researcher, or on the subject's perhaps idiosyncratic memories of a family, neighborhood, community or movement (Cooper 2005).

Oral tradition on the other hand, relates to a group of society's history. It tries as much as possible to capture the history of a society that has not been documented. Secondly, it concentrates on the role or roles played by individuals such as warlords or kings in shaping the history of a group or society. Oral traditions are generally stories about the past that local populations produce and reproduce orally, as a means of preserving their worn history and consolidating or contesting a sense of belonging and identity (Cooper 2005).

Oral history has been and continues to be a `guide' in the archaeological investigation of Yoruba country. Oral tradition as history in its own right and as a source of history and archaeology has always been indispensable in the study of the historic and proto-historic periods, for archaeologists often depend on the information acquired from it to locate various archaeological features, sites and abandoned settlements (Ogunfolakan 1994). Oral tradition plays an important role in the location of archaeological sites. As Artherton (1983) and Ki-Zerbo (1981) rightly pointed out, for a proper archeological research in Africa, one needs to start with the collection of

both oral tradition and ethnographic data. By so doing, archaeologist will be able to identify sites that would otherwise not have been known.

The problem with oral tradition in archeological investigation lies with individual archaeologist in their approach to its use and adoption. Archaeologist making use of oral tradition must allow informants lead in the investigation rather than researcher guiding informants with questionnaires. Guiding informant with questionnaire will lead the informant to say what one wants him/her to say rather than what he knows or wants to say. Also, objectivity may be a problem in the selection of those to be interviewed in the collection of oral history, but I tried to be near objective by selecting those to be interviewed across all levels of the society. In these days of political insincerity and the fight for supremacy, one must be very careful in the use of oral history in archaeological interpretation.

In Oral societies, personal recollections are usually lost in the ever-moving current of oral traditions. By surviving into the present, oral tradition has demonstrated a capacity to appeal to the interest of enough people to ensure its success. In this it differs markedly from personal recollections, which seldom survive the lifetime of the individual or, at least, the lives of any children (Henige 1982: 107).

Awe (1974; Adeeko 2001) suggested that historians of non-literate societies should view oral traditions as valuable sources for chronicling the evolution of African social and cultural consciousness, because in societies without permanent archives, creative oratures do capture the mentalities of their milieu of production and consumption. For the archaeologist who is using material evidence to authenticate the historical facts supplied by written or oral history, he/she must count seriously on oral tradition for his investigation (locating sites) and interpretation of data collected.

Until recent past, African history, most especially Yoruba history, remains `awigbo' (hearsay) and according to Yoruba sayings, `awigbo' (hearsay) is the father of history (awigbo ni baba itan). A historian can rely on `awigbo' (hearsay) but to an archaeologist, awigbo is not satisfying. Therefore the archaeologists are not contented with hearsay. An archaeologist must have material things, objects, artifacts that he can hold in his hands, count, measure, and photograph and relate to the 'hearsay'. Archaeologist do not necessarily rely entirely on `hearsay' of the historian or adhere strictly to their written documents. They do realise that not all that is worth knowing is written by literate societies, or recited by oral societies or even photographed and/or video-taped by computerized societies (Ogufolakan 2007). The aspect of oral tradition

that archaeologists have not been paying attention to is *Oriki* (praise names) and names (personal and place names). The use of *Oriki* (praise name), personal and place names in the archaeological survey of abandoned settlements in Yorubaland and interpretation of archaeological data is advocated by Aleru and Alabi (2010). In *Oriki*, there are lots of salient information that are of importance to the archaeologist in his investigation most especially, in the identification of abandoned settlements and in the interpretation of archaeological data.

Oriki, a source of historical information is a variety of Yoruba poetry which, as an aspect of literature, is `one of the universal means of communicating the emotional, spiritual or intellectual concerns of mankind' (Akinyemi in Adeeko 2001). *Oriki* reminds one of the real life incidents details of which might have been forgotten. In Yorubaland, *oriki* plays an important role in preserving the history and culture of the people. It is believed that when '*oriki*' is chanted for a person, it inspires the person and it even invokes the spirit of the ancestor of such a person. If a child is crying, it is Yoruba custom and tradition for his/her mother or the grand-mother to chant the '*oriki*' of such a child. It is believed that '*oriki*' cools down the nerves of babies. Ideally, *oriki* is meant to inspire the subjects addressed to pursue loftier attainments. (Adeeko, 2001). Also, '*oriki*' inspires people not to derail from the good name of the family. In this way it is performing a cultural role of making the addressee see the past, assess the present and project into the future. But importantly, salient information are embedded in this 'principal means by which a living relationship with the past is daily apprehended and reconstituted in the present' (Barber 1994:15). Therefore, in the oral history of the people of Osun northeast, 'oriki' is partly examined in the identification and interpretation of archaeological data collected.

Festivals were also examined in the study area as part of oral tradition since past events are recited and rekindled during the festivals. Festival involves religious and ritual activities and practices. These activities and practices should be seen as concrete practices that left interpretable material remains for archaeological studies and interpretation of past social behaviour among Yoruba people (Whitley and Loendorf 1994).

There are features, land marks and event that serve as reference points of oral tradition and these are sacred groves and hills. In the study area, abandoned settlement or sacred grove (Igbo 'Riro) or rock shelter (Ota ebora i.e. the stone of the demons)

are not just relics of the past, they represent the home of the ancestors, from where they breathe a breath of life, where they derive their daily subsistence and way of social life, where their 'fathers sit and oversee their children' (Ogunfolakan 2007).

Most of the sacred places, usually abandoned settlements, homes of the ancestors are located on the rocky hills. Hence there is the annual ritual of 'visiting the ancestors' (Ebekun festival in Iresi, Oroke festival in both Igbajo and Iragbiji. In the course of the festival, the king renews his authority, replenishes his strength and re-affirms his loyalty to the course of the ancestors and the development of his people. Here he prays for the year ahead and for the success of his 'children' wherever they are (children means all the sons and daughters and everybody within the community) and commune with the ancestors on the problems ahead. The annual and constant ritual practices at the sacred points established and re-establish the long standing history of the people by keeping the historical narratives alive.

2.5 Settlement and Settlement Archaeology

Settlement studies are an examination of how people organized their use of space, and can pertain to a continuum of phenomena ranging from the use of space within structures, to the arrangement of structures or other features within the context of a local occupation, to the location of occupations within the broader landscape. A settlement approach formulates archaeological units at a scale beyond that of the discrete artifact; units are essentially formed that pertain to clusters, or aggregates, of discrete artifacts. Archaeological units at this scale are particularly appropriate for the study of subsistence, technology, exchange, and the various ways in which human groups organize themselves with respect to one another.

The term settlement has been defined in several ways by archaeologist among others largely because their experience is pooled from different parts of the world (Okpoko 1979). Settlement pattern depicts the social relation which forms the framework of a society and is necessary for our understanding of any society's economy including the location and use of resources (Okpoko 1979). Two approaches seem to dominate settlement patter studies. The first is primarily ecological and it is based on the assumption that a settlement pattern is a product of the interaction of two variables – the environment and technology. This approach merely studies how settlement pattern reflects the adaptation of the society and its technology to its environment (Okpoko 2006).

The other approach is the used of settlement patter data as a basis for making inferences about social, political and religious organization of prehistoric culture. Information can be extracted from individual structure such as building. This information would include economic, social and religious activities of the people associated with such building. According to Okpoko (1979) 'subsistence regime is one of the factors that determine the structure of individual building of a society'. In any inquiry about the social past, the first question to address is *size* or *scale*. Settlement archaeology therefore includes an array of techniques and theories dedicated precisely to understanding these scalar questions. Archaeologists generally try to address spatial concerns first in the process of decoding past human behavior.

Settlement archaeology is defined as 'the study of societal relationships using archaeological data' (Trigger, 1967:149). Settlement archaeology is also defined as the study of the selection criteria and implantation of settlements in the landscape, interrelationships between cities and their rural surroundings, the impact of human occupation on the natural environment and vice versa under past conditions. Settlement archaeology has as its aim the holistic reconstruction of the cultures of ancient settlements and urban communities and their hinterlands. Settlement archaeological research is by definition a multidisciplinary enterprise requiring expertise from the disciplines of the natural and social sciences, architecture and city planning, as well as specialized techniques related to the retrieval, recording, analysis and data bank management of archaeological data (GIS), site conservation and cultural resource management. Disciplines and interdisciplinary sub-disciplines required in addition to archaeology include geology, environmental geomorphology, archaeozoology, paleontology, paleobotany, archaeometry, ancient history, anthropology, sociology, urban geography, classical architecture and city planning. Settlement pattern describe the ways in which people distribute themselves across the landscape and can be very revealing about that culture's structure and relationships with others. The aim is to understand the nature of the activities that took place there, and of the social group that used it.

2.6 Archaeology of Conflict and Migration

Conflict archaeology is a new and interdisciplinary study of conflict and its legacies. Conflict archaeology focuses on conflict as a multifaceted phenomenon, whose variety of physical traces possesses multiple meanings that change over time. It

is not restricted to battlefields, or to large scale wars between nations, but embraces every kind of conflict and its diversity of social and cultural legacies.

Conflict archaeology combines the strengths of many different disciplines: anthropology, heritage and museum studies, cultural geography, military history and art history. Archaeological investigation of conflict primarily relies on four lines of material evidence: settlement data, injuries in human skeletal remains, wear weaponry and iconography (Lambert 1994, LeBlanc 1999). The first of these data, settlement data, is particularly useful for identifying both concern with defense and the consequences of failed (or absence of) defensive measures. The time and material resources people deem necessary for protection can help define perceptions of thereat. Defensive behavior might include a shift in village location from a valley floor with ready access to agricultural fields to a steep slope or inaccessible rock shelter requiring greater energy expenditure for day-to-day living.

Walls, forts, towers, moats and other defensive structures require investment of labour and resources for construction and maintenances, so the appearance of these features should also correlate with a perceived need for defense sufficient to warrant reallocation of resources to these ends. The burning of structures, on the other hand, is a common consequence of war. Archaeological evidence of burned structures and settlements can therefore help document actual attacks, although other possible causes of burning (accidental fires, intentional clearing) must also be considered.

Migration has also been defined as "specialized behavior especially evolved for the displacement of the individual in space" (Dingle 1980) in such a way as to "allow exploitation of different habitats as life history requirements alter or as environments change seasonally or successionally" (Dingle 1980). Faced with environmental change, an organism can either adapt, migrate (also a form of adaptation), or become extinct. "Movement is, therefore, a fundamental biological response to adversity, and all populations are spatially fluid in some measure" (Gauthreaux 1980). Population dispersal can occur (1) when the local environment is deteriorating but better conditions occur elsewhere, (2) when environmental parameters change of fering opportunities for a population in a previously uninhabited area, or when stress on resources occurs through population growth and expansion is necessary for survival. Change in the natural and/or social environment is the prime mover, and it is clear that many non-human species have the capacity to react to change by moving to a new location either for shorter (seasonal shifts) or for longer

(relatively permanent moves) periods of time. Animals migrate, then, only if they are forced to do so, and if the social and physical environment allows it. They migrate because to do so confer an adaptive advantage (usually defined in terms of inclusive fitness) on the species, population, or individual involved. "Animals move in order to place themselves in optimal conditions for as long as possible" (Sinclair 1983). Unless humans are somehow biologically unique, it follows that they are similarly dependent on their environments.

Migration is a difficult concept to define because it includes people who move for different reasons across different spaces. A migrant can be a person who moves to another city or town within a nation; a refugee who crosses an international border to escape religious or political persecution; a jobseeker who moves to another country for better economic opportunities; a slave who is forcibly moved; or a person displaced by war or natural disaster. Demographers lack a single, operational definition for migration because it occurs under different conditions. People move for different reasons. These differences affect the overall migration process. The conditions under which a migrant enters a receiver population can have broad implications for all parties involved. The expression migration experience refers to the fact that different causes for migration will produce different outcomes observable from a sociological perspective. Explanatory frameworks premised on the push-pull hypothesis tend to overemphasize the role of the individual in the migration process. Critics of this perspective argue that the decision to migrate is based on group experience, in particular the costs and benefits to the family. Rather than being an isolated calculation, an individual's decision to migrate is conditioned by multiple social, economic and political factors.

Migration has become a continuous phenomenon in the history of human societies. Migration is synonymous with the history of Africa itself. The migration of individuals and groups over time is associated with the emergence of cultures and of civilizations throughout the world. The centrality of migrations and movements of people in the historical evolution of African peoples and societies lies in war, conflict social and economic factors. Migration was a multifaceted phenomenon, which varied in nature and character, over time and in different places (Aribidesi and Falola 2009)

There are a number of reasons why people in Africa migrate or leave their original homes for places sometimes dissimilar to their prior location. Such reasons have been discussed at length by various scholars. They include wars, droughts, and floods; regional inequality of economic development and income; severe population pressure with low agricultural productivity; poverty and hunger in specific regions; the attraction of towns and cities as centers of education, higher incomes, and social amenities; the presence of affiliated ethnic groups and/or kinsmen; the presence of people from the same religious denomination; safety from persecution; and simply personal adventurism. It is not easy to determine the impact of any of these factors individually or as a whole. In most cases, they also depend on the existing political, economic, social, religious, and personal circumstances. Migration has occurred on a substantial scale many times in the history of the people of the continent, and it goes back in time to the origin of human beings. Migration and population movement in Africa can best be understood within the context of the political and historical evolution of African societies.

It is generally believed that it was population movement that disseminated the Bantu languages over the subcontinent. Two theories have been suggested to explain the Bantu expansion from the original homelands. First, it is claimed that the abandonment of hunting–gathering subsistence economy in favor of an agricultural subsistence economy led to population growth, which consequently led to migrations of people seeking new land. According to this theory, the migrations of the Bantu peoples from West Africa to central Africa are said to have involved agricultural communities, and the movement is said to have increased after banana and yam, introduced by the Indonesians, spread to the forest peoples of central Africa (Andah 1979). The second theory provides a link between the expansion of the Bantu and the beginnings of the Iron Age. The working of iron encouraged agricultural production by providing more effective tools that allowed the Bantu to dominate the peoples in the areas where they settled. It is suggested that the Bantu "were a dominant minority, specialized to hunting with the spear, constantly attracting new adherents by their fabulous prestige as suppliers of meat, constantly throwing off new bands of migratory adventurers, until the whole southern sub-continent was iron-using and Bantu-speaking (Aribidesi and Falola 2009) Factors, such as famine—leading to the search for better living conditions in the form of good farming and grazing land—

epidemics, wars and a sheer spirit of adventure could also have motivated the early Bantu movements.

2.7. Literature Review

The history of the Yoruba people is one of the most researched and most written up of any people in Sub-Saharan Africa. However, the archaeological documentation of parts of the region remains inadequate. Efforts had been made, and are still being made, by some educated elites in some of the towns in the study area to document their history in small monographs which they themselves referred to as 'jottings gathered from the chroniclers' (Igbajo Development Association, 1995). Though, there are few monographs and books written on some of the towns, most especially Ila-Orangun, yet, there is dearth of archaeological write-up before the initial effort of the author and others in the early 1990s.

The Master's Thesis of the author (Ogunfolakan 1994) gave the account of the first phase of the archaeological reconnaissance of the study area which include Ila-Orangun, Oyan, Asi, Iresi and Ajaba. He also published an article on the same work (Ogunfolakan 2006: 73-94) where he enumerated the results of the archaeological survey carried out in the area between 1992 and 1994. The article revealed that Osun northeast is rich archaeologically and called for more detailed archaeological investigations of the area so as to open the place archaeologically and to reveal its tourism potentials. The work itemized the result of the investigations town by town and site by site. In continuation of the archaeological exercise in Northeast Osun State, the author extended the scope of his study to include archaeological survey of Iragbiji, Iree, Otan-Ayegbaju, Igbajo, and Oke-Ila with a revisit to Iresi and subsequent excavation of a potsherd pavement earlier identified in the course of the first phase of the investigation. Ogunfolakan (2009), examined the issue of peoples' dispersal and how it has influenced the growth of cities and towns in this area. This work also tried to answer the question of the influence of dialect and the socio-cultural affinities of the people of the area.

In his own work, Akpobasa (1994 and 2006) also carried out archaeological investigations of one of the abandoned cities of the Ila people (Ila-Yara). According to Akpobasa (2006) Ila-Iyara was occupied prior to the 17th century when the town was abandoned. In his article, Akpobasa (2006: 98) proposes 'a case study for socio-historical considerations in settlement studies' with the objectives of considering 'a

typical Yoruba town in a developmental perspective; attempting an identification of the traditional facet of the town; and show how this facet can be described as reflecting the social history of the Yoruba people'.

Aribidesi (Aribidesi et al, 2005) in his works on Igbominaland reviewed previous works in the study area and carried out excavations of a cultural mound earlier identified by Akpobasa. He got two dates from the site, 1442-1531AD and 1545-1631AD (These dates corroborate the ones we got from Ajaba). Aribidesi *et al* (2005) used the earth science methods in the determination of ceramic production and exchange within the study area by using Instrumental neutron activation analysis (INAA) on ceramic and clay samples from the area. The result of the analysis shows that INAA can be effective in differentiating ceramics and raw clay sources in northern Yorubaland. The analysis offers tremendous potentials for examining regional interaction in Yorubaland immediately before and during the Old Oyo period (fifteenth to late eighteenth century), a time of socio-political and settlement change that led up to the collapse of Old Oyo, the Yoruba Civil War, and the large-scale settlement abandonment of the nineteenth century. The Igbomina ceramics fall into four compositional groups corresponding to distinct village units and geographic locales (Esisa, Ilere, Ipo-Erese, and Ilorin), which are tentatively linked to clay sources in these areas. The analysis also indicates that pottery vessels were moved between localities and possibly between sites in each area. Apart from these works, there is a dearth of literature on the archaeology of the study area. This present work is therefore to contribute to emerging literature on the archaeology of the study area and to arouse the interest of other scholars in the area.

CHAPTER THREE
ARCHAEOLOGICAL SURVEY

3:1. Archaeological Survey.

Archaeological survey entails a variety of procedures such as surface collection of visible materials, systematic transects, combination of systematic and random sampling according to superimposed local or regional grid. However, the value of a survey depends on the level of recording details and nature of archaeological record under survey (Ogunfolakan 2007).

In Osun northeast, series of archaeological surveys were carried out in the study area since 1992 when the author pioneered archaeological research work in the area. Though, others (Akpobasa 1994, Aribidesi 1999, Aribidesi et al, 2005) have continued to carry out archaeological research works in the same area.

The first archaeological survey by the author was aimed at documenting the archaeological features in the area with special emphasis on potsherd pavements (Ogunfolakan 1994). The second phase was meant to extend the frontiers of previous works and to examine the potsherd pavements earlier identified at Ajaba (Ogunfolakan 2007). The third phase which forms a major component of the present work was targeted at the Ajaba abandoned site. It involved documenting the archaeological data within the abandoned site. These were compared with data from previous works including the potsherd pavements earlier identified in other sites within northeast Osun and other Yoruba towns most especially Ife and Old Oyo. Excavation of a refuse mound located within the Ajaba abandoned site was also carried out.

3.1.1. Archaeological survey of Oyan, Asi, Ila-Orangun, Iresi, Ire and Ajaba

The first phase of archaeological survey took the author to Ila-Orangun, Asi, Oyan and Iresi. For the purpose of the first phase of the survey, and because of the limited financial resources at the disposal of the researcher, and the vastness of the area to be covered, (over 400 square kilometres), a simple traverse survey was used at each site visited. The sites were surveyed by simply walking over on foot, searching for and documenting cultural materials and features. This apparently was guided by information from oral information collected prior to walking round the sites. The use of oral information found useful in the location of the sites. The main roads in each of

the towns/sites visited were also found useful in the linear measurement of the sites while the prismatic compass provided the precise measurement of the site.

Archaeological reconnaissance in the forest zone is a tedious one, most especially, during the rainy season when everywhere is green and the forest becomes thicker with the trees having their foliages spreading. This is also the period when most of the potsherd pavements are exposed and in many cases washed away. In Ile-Ife, most of the terracotta or bronze heads discovered were discovered after heavy rain downpour (Eyo 1974). As such, art works are washed down from their primary context and re-deposited again and covered with soil from erosion. Probably, this is why it has become difficult to have these works of art in their primary context.

Since most of the archaeological sites in this region are in the forest zone, major survey took place during dry season, from October to March. This is the best time to enter the forest when visibility is clear to some extent. The vegetation of the northern part of the study area, that is, the Ila-Orangun and Oyan axis is of derived savanna. Therefore, visibility is made clearer due to the yearly burning of the bush around this area. According to an informant (Adeyemi 1992), the Fulani cattle herders often set the bush (elephant grass) on fire to provide green grass for their cattle during this season. Within one week of this, the ground comes up with fresh green grass for the cattle. The burning of the grass and the eating of the fresh green leaves by cattle give clearer view of what is on the surface. Though, in many cases damages were done to some artifacts by fire and cattle trampling, most especially, organic materials and inorganic material like ceramics.

The archaeological reconnaissance was also made tedious because of religious/cultural factors. For instance, one was not allowed to enter some shrines until a particular time of the day or year or until some rituals are performed. Access to some shrines and groves or sacred forest was denied because of the absence of the Chief Priest. Often, certain categories of females, like unmarried women or those who still nursing children are not allowed to move near these religious landscapes. In most cases, endless appointments were made to visit a grove or shrine without success. And in a situation where you have limited time or resources, it makes things difficult. The experience in Iree needs to be mentioned. The author had several appointments with the late Oba of Iree, Oba Omotoso. The last and successful appointment did not record the optimal success as he was hosting a crucial meeting. By the next appointment, the man had died.

Also, most of the people here are not well informed about the role of archaeology in historical reconstruction and construction. For instance, in some cases, land/site owner will require his educated son or daughter to be present before embarking on archaeological survey. To them, they trust their children and whatever such a child or children say is final. In addition, if you are unfortunate to come across recalcitrant ones, they tend to complicate issues, as they will not own up to their ignorance of what one is trying to do but will misrepresent your own idea. For example, when we were surveying the abandoned settlement features within a cocoa farm in Ajaba, the son of the owner wrongly informed his father that we were looking for gold and not for cultural remains and subsequently the latter requested for monetary gain if we have to continue our work. Not only that, the son heard that we were talking of charcoal for dating, he again wrongfully informed his father that coal has been discovered in his farmland and that his cocoa farm was going to be destroyed, this delayed our work for another one week.

As stated earlier on the area covered by the project is large (almost 400 square kilometres), and because most of the archaeological/historical sites are within built up areas, the archaeological survey was limited to systematic walking round the sites. This was done by using the main road to link the site from where we walked through the site in a pacing method of five metres interval in a north-south direction. In addition, archaeological reconnaissance was carried out in major towns and villages in the study area with emphasis on Ajaba, Igbajo, Iragbiji Iresi and Asi, A visit was also made to Ire and Otan-Ayegbaju where the presence of potsherd pavements were reported to us.

With the oral evidences taken, we were able to comb the area for possible site of archaeological importance, which will lead us to a better understanding of the history of the area vis-à-vis the pattern of space, and how they have been able to exploit the environment to their own advantage.

In continuation of archaeological survey of part of Osun northeast (Ila-Orangun, Oyan, Asaba, Asi, Iresi), reconnaissance survey in major towns and villages around the area was further conducted and in addition the pavement site at Ajaba was also excavated. Before the survey, several visits were made to familiarize ourselves with the people and topography of the area. With the principal informant (Chief Popoola) with us, we had a smooth encounter with the people and the area.

Both oral and written evidences were examined thoroughly. Thereafter, we embarked on the actual location, identification, and documentation of archaeological/cultural sites from these areas. There are peculiar problems in carrying out archaeological survey in tropical rain forest environment because of the presence of thick vegetal cover which makes ground visibility difficult. This also often hinders mobility thus impeading access to surface archaeological features. Movement and visibility during the raining season were extremely made difficult by the heavy plant undergrowth and multi-layered tree canopies in the study area most especially in the Ajaba, Iresi and Igbajo zone of the study area. But in open area within the city and villages, movement and visibility was made easy and archaeological materials were able to be identified and collected. However, erosion has greatly affected the cultural features here. The topography of the area gives ways for erosion to wash away annually, the cultural materials from the soil. Visible features like cultural/refuse mounds, city wall, possible shrine (because of the presence of '*peregun*' Dracaena sp.) were only examined and noted for further examination including excavation. It is important to note that in Yorubaland, *peregun* (Dracaena sp.) is a boundary or shrine/grove marker.

3.2 Account of archaeological survey of Oyan, Asi, Ila-Orangun, Iresi, Ire and Ajaba

In the course of the reconnaissance survey, archaeological features and sites were identified and recorded. This process was carried out site by site i.e. town by town.

3.2.1. Oyan

(i) Potsherd Pavement – This pavement made of only pottery sherds has been greatly damaged due to erosion and human activities. The remnant found in front of a dilapidated building at Ile-Jagun (Jagun's compound) in the north eastern part of the ancient town were over-grown by bush but partly exposed by erosion. The pavement is herringbone by design, and bears resemblance to that of Ile-Ife.

(ii) Town wall - Around Jagun's compound is a remnant of '*odi amonu'* (inner wall) which appears like a linear yam-heap. The ravages of time and climatic attacks have rendered invisible the mud wall structure of the town wall. The outer wall could

not be seen but my informant, Chief Adeyemi, the Jagun of Oyan, merely pointed to a spot almost 50 metres from the inner wall.

(iii) Igbo Ogun - according to the Oloyan of Oyan, Igbo-Ogun i**s** an abandoned settlement, where Epe, the ancestor of the Oyan people settled when they left Ile-Ife. It is situated along Oyan-Ila road, about five kilometres to Oyan. Unfortunately, we could not visit this 'sacred' place, as the hunters who were to take us to this site did not keep to appointment on five consecutive scheduled dates.

3.2.2 Asi

(i) Igbo-'Riro/Potsherd Pavement – Located to the southern part of Asi, off the Oyan-Ila Orangun road along Lapiti Omigbooro village road are 'Igbo Riro' (sacred grove) and a potsherd pavement. No ruins of remains of any building could be found but small mounds and elevations, which could have been fall-in building walls were found at the northern part of the pavement site. Potsherds scattered all over the grove. 'Igbo riro' (sacred grove) according to one of the informants (Olagunju 1994), is a sacred land where nobody could farm until present day. It is the belief of the people of Asi that anybody that farms there will die. According to the informant, any area where they come across objects such as bronze or brass is regarded as sacred land. Though the pavement was recently exposed as a result of road construction activities, the people of Asi have for a long time set aside part of this area as a sacred land where nobody is allowed to farm. But recently, two-thirds of this area has been tilled by farmers, leaving behind only less than 100 metres by 80 metres of the supposed sacred land. The potsherd pavement is situated within 'Igbo Riro' (sacred grove). The location of the potsherd pavement is locally referred to as **'**kere apaadi' (meaning elevation of potsherds). This indicates that the pavement area is on a peak of an undulating elevation. According to oral tradition, the present people of Asi found the pavement there and the area is referred to as '*aganju Oba Tapa'* **(**Ededele 1994) i.e. the palace courtyard of Nupe king. The king was known as Ajangidi according to Atolagbe (1994).

(ii) Igbo-Igbale (Masquerade's grove) – Located near the palace of Alasi of Asi is Igbo Igbale (Masquerade's grove) This is the grove where the annual *egungun* festival begins and ends. The grove is demarcated with '*peregun*' tree (*Dracaena fragrans).*

3.2.3 Ila-Orangun

There were three former Ila settlements before the present site of Ila-Orangun, they are Ila Kodomu (Igbo Ajagunla), Ila Yara and Ila Magbon or Para Oke. The sites of these former settlements constitute good archaeological features for the reconstruction of the unwritten history of Ila people. Ila Kodomu is to the north east of the present Ila-Orangun while Ila Yara is to the south east about 12 kilometres to Ila Orangun, Ila Magbon or Para Oke is within the present Ila Orangun and is located on the top of a hill (Oke Wosem as it is called today) to the north of the present site en route the town's General Hospital.

(i) **Ila Kodomu (Igbo Ajagunla)** – This was the first settlement site and is now overgrown with forest, as it now forms part of the Ila Forest Reserve (Adetoyi, 1994 Per. Comm.). Because of stringent traditional conditions attached to visiting the site, such as ritual performance, presence of priest, visit by night etc, this site was not investigated but noted for future archaeological work when those conditions could be relaxed or met.

(ii) Ila-Yara– Ila-Yara is to the south eastern part of the present Ila-Orangun. Features recorded there included defensive trench, (from where the abandoned site derives its name – Ila-yara (Ila Yara means Ila with the defence trench) refuse/cultural mound, grooved rock (oro n pon'ko) and a minor water fall (*ibu-Ogun* -Akpobasa 1994).

(iii) Defensive Ditch and Embankment – This defensive ditch and embankment is a circular ditch with embankment that was dug round the abandoned settlement. The total width of the ditch and embankment measured about 10.7m; the ditch alone measured about 5.3 m wide while the embankment is almost 2.20 m high. The width and height of the embankment which has continued to be weathered by both human and natural factors of destruction show how deep the trench was then, and how massive the embankment was. From Aba Ejemu (Ejemu village, a modern village within the abandoned settlement) to the point where Ayegunle road cuts across the defensive trench and embankment is almost 450 metres. From observation during the archaeological survey of Ila-Yara, the defensive wall is almost circular. This in essence bears resemblance to other Yoruba town walls as shown by the works of

geographers, historians and archaeologist alike. For example we have Owo and Ilesa walls (Afolabi, 1966b); Ife walls (Ozanne, 1969); Oyo-Ile (Agbaje Williams, 1990). Where Ejemu village of today is situated, which was once a 'city' is now partly forest, partly farmland where cocoa (*Theobroma cacao*) yam (*Dioscorea spp*.) oil palm (*Elaeis guineansis*, cassava (*Manihot esculenta*) etc. are planted. Alanwo stream, which from all indications might have served as the only source of water supply during the hey-days of Ila-Yara, still serves as a source of water for the present inhabitants of Oko Ejemu.

(iv) Mound (Oladotun Akanbi's Farm): This mound, according to oral tradition, is part of the remnants of the past activities of the past inhabitants of Ila Yara. Surface finds from this mound show that it is a cultural mound. The mound is almost 7.5 metres in diameter and abuts 3.6 metres high. To the eastern part of the '*ibu ogun'* (a minor water fall and pool) is another mound.

(v) Ibu Ogun (Ogun's water fall): To the north east of the mound at Oladotun Akanbi's farm is '*Ibu-Ogun'* minor water fall. The minor water fall comes from a small elevation of about 2 metres where a stream runs through north-south direction. It then forms a pool near a rock formation where water from the stream collects. This water pool might have served as the source of water for the people of Ila-Yara. To the south of the water fall point are hollows on the rock surface set in the form of the popular Yoruba game called *'ayo'*. The hollows are referred to as *oro pon 'ko* (Oro grinded the rock). Unfortunately, no remnants of any standing house wall could be seen. But there are some minor mounds which probably might be remnants of collapsed walls.

(vi) Ila Orangun (Ile-Ila): The present Ila is located on a high ground with an undulating topography. Here, some archaeological features were identified. These include potsherd pavement, *Peregun Awogbemi* (Awogbemi's grove), and city wall. Also, it was discovered that in each compound, there is a mound-like conical structure called *odu. Odu* is said to be the guiding 'father' of the people of Ila. According to Chief Adetoyi (1993 Per. Comm.), before settling down, each compound would have to consult *Ifa* oracle and the sacrificial prescription of the oracle for prosperity, peace and stability in the compound will be prepared and kept in a covered pot and buried in

front or in the middle of the compound. A conical mound-like structure is then constructed as a monument for this 'guidance father'. Today, the *Odu* is cemented to prevent destruction by erosion.

(vii) Potsherd Pavement – To the south east of the town at a place called Adeniji almost adjacent *Peregun Awogbemi* (Awogbemi's grove) is a potsherd pavement (Plate 3:1). The pavement is like the classical Ife potsherd pavement with a pot embedded in the middle and herringbone in design. A recent revisit to Ila-Orangun revealed that the pavement might actually be the burial site of Awogbemi. According to the present Orangun of Ila, a wicked ruler or chief was then usually buried in a big pot in a vertical position. Awogbemi was said to be Ifa priest of Orangun Agboluaje 1 who reigned between 1789 and 1845 (Adetoyi, 1994). Here at the pavement site, Awogbemi was assassinated and buried. Unfortunately, this site has just been destroyed by the construction of a modern petrol station at the site. Excavation of this site should have confirmed the information given by the Orangun of Ila. Unfortunately the whole heritage is lost, except for some earlier photographs taken.

(viii) Igbo-Atokun – This is a grove dedicated to Orangun Agboluaje 1 who was said to have been assassinated at this grove for going against the cult of *egungun* (masquerade).

(ix) Town Wall – Only a remnant portion of this town wall was observed around the ancient town of Ila-orangun. In fact, there is a quarter known as *Eyindi* (Eyin Odi) that is behind the town wall. Even before we enquired about the town wall, we first tried to locate the wall based on the name of the quarter i.e. *Eyindi* (behind the town wall) so as to show the importance of place-name in the interpretation of archaeological data from Yorubaland. Surprisingly, after searching round this quarter, a wide bank of earth was identified. The identification of archaeological features in mud is one of the most persistent problems for archaeologists as the ravages of time and climatic factors do often render mud wall structures invisible, especially in West African ancient settlements and most importantly, in sandy soil regions.

Plate 3.1. Potsherd pavement (Ila-Orangun)

3.2.4 Iree

At Iree, a potsherd pavement site located towards the western side of the town was identified by a polytechnic student who once went with the researcher on field trip. The pavement is similar to the known Ife pavements with herringbone design. The pavement site was said to be part of a former town known as Ayekale, but it was destroyed during the Fulani war of late 19th century. According to the Baale (Chief) of Ayekale, their great grandfather made the pavement. It was at a later period that they came back to resettle at the same area. They see themselves as distinct from other Iree people. It must have been that the present royal compounds form the group or one of the groups that came to subjugate the original inhabitants of the pavement area. But unlike other towns, the people of Iree did not claim direct link with Ife. According to the late Are of Iree, Oba Moses Omotoso, the people of Iree came from Ipee in Kwara State of Nigeria in the late 19th century (presumably during the Fulani war). They first settled at Oke-Ipole (Ipole Hill: Plate, 3.2) and later moved down the hill. Annually, the Iree people celebrate *Odun Oke Ipole* (Ipole Hill festival) in remembrance of their early settlement and progenitor. The festival precedes Egungun festival in the town.

3.3 Archaeological Survey of Igbajo, Iragbiji, Oke-Ila, Otan-Ayegbaju and Edemosi

In the second phase of the survey, the exercise covered Igbajo, Iragbiji, Oke-Ila, Otan-Ayegbaju and Edemosi towns (Fig. 1.3).

3.3.1 Igbajo

At Igbajo, major sites of cultural and historical heritage were visited, these include, the palace premises housing the old and the new modern palace buildings (Plates 3.3 and 3.4), Ogun Shrine, Kiriji War Site (Fig. 3.1) and other historical points. According to oral tradition, Ogun (gods of iron) was said to be the pathfinder, the watch-dog over the community, and that is why the shrine is dedicated to him. Ogun shrine is often located at the entrance of the palace, middle of market or in front of a house since Ogun is believed to be the protector of the town or family. Most of the groves and shrines in Igbajo are located at the outskirts of the town. Prominent among them are Igbo-Esile, Igbo Ojo-Gbaruku, Okuta Aruka, Igbo-Ogun, Igbo-Ore

Plate 3.2: Oke-Ipole shrine at Ire

Plate 3.3: Igbajo Old Palace building

Plate 3.4: Igbajo New palace building

(Ore grove is a prominent grove in Ile-Ife, the deity is believed to be one of the early settlers of Ife), Igbo-Oju Isao, Igbo Elegbede, Igbo-Igbale, Igbo Ita and Igbo Apon. Ogun shrine is at the front of the palace while Oduduwa shrine is to the eastern side, located at the back of the old palace building. It is interesting to note that most of the Ogun shrines in Yorubaland are always located at the entrance of the palace. Example is the Ogun shrine in Imesi-Ile or the Oke-Mogun shrine in the ancient city of Ile-Ife which is directly opposite the palace. The shrine of Osun, the goddess of the river is located at the valley known as Koto Osun (Osun's depression). Other shrines are Ajale and Oju-ori-Ijesa (point of hanging the skull of the Ijesa warrior during the Kiriji war that ended in 1886).

3.3.2 Kirirji War (1887-1896): At the Kiriji war site Igbajo (Fig. 3.1); the following spots were identified with the assistance of an informant, Chief Lemikan (1997): (a) Oke Latoosa which is believed to be the rallying point for Latosa and his warlords; (b) *Okuta Latoosa* (Plate 3.5) is a small rock shelter where Latosa is said to have lived and died. He was said to have been buried at the shelter after been killed by the Ekiti Parapo army; (c) *Igi faragbota* – (bullet proof tree) although, the tree is no more there by the time we visited the site. It was said to be a bullet-proof tree used by the Latosa army (Chief Faloye 1997). That was why it was given the name `*faragbota*' meaning 'bullet-proof tree'; (d) *Oju-Ogun* (war front) (e) *Odo Fejeboju* (river covered with blood); (f) defence trench and; (g) the peace treaty site (Plate 3.6).

3.3.3 Iresi

In the course of the survey, more archaeological sites and features were identified. These include a rock shelter known as '*Okuta aladura'* (Prayer rock). The rock shelter has become a place of prayer point for Christians. The rock shelter is a massive one almost 20 meters high and extending inwards to about 25 meters (Plate 3.8). There is evidence of constant use of the place by farmers as fire-place and modern pots were seen there. According to the principal informant, Pa Popoola (1994 per. Comm.), the shelter served as a place of abode during the Kiriji war of the 19th century. At the entrance of the route to this rockshelter is a rock boulder carved like an easy-chair (Plate 3.7). According to the informant, the rock-chair was used by the principal guard during one of the Yoruba wars.

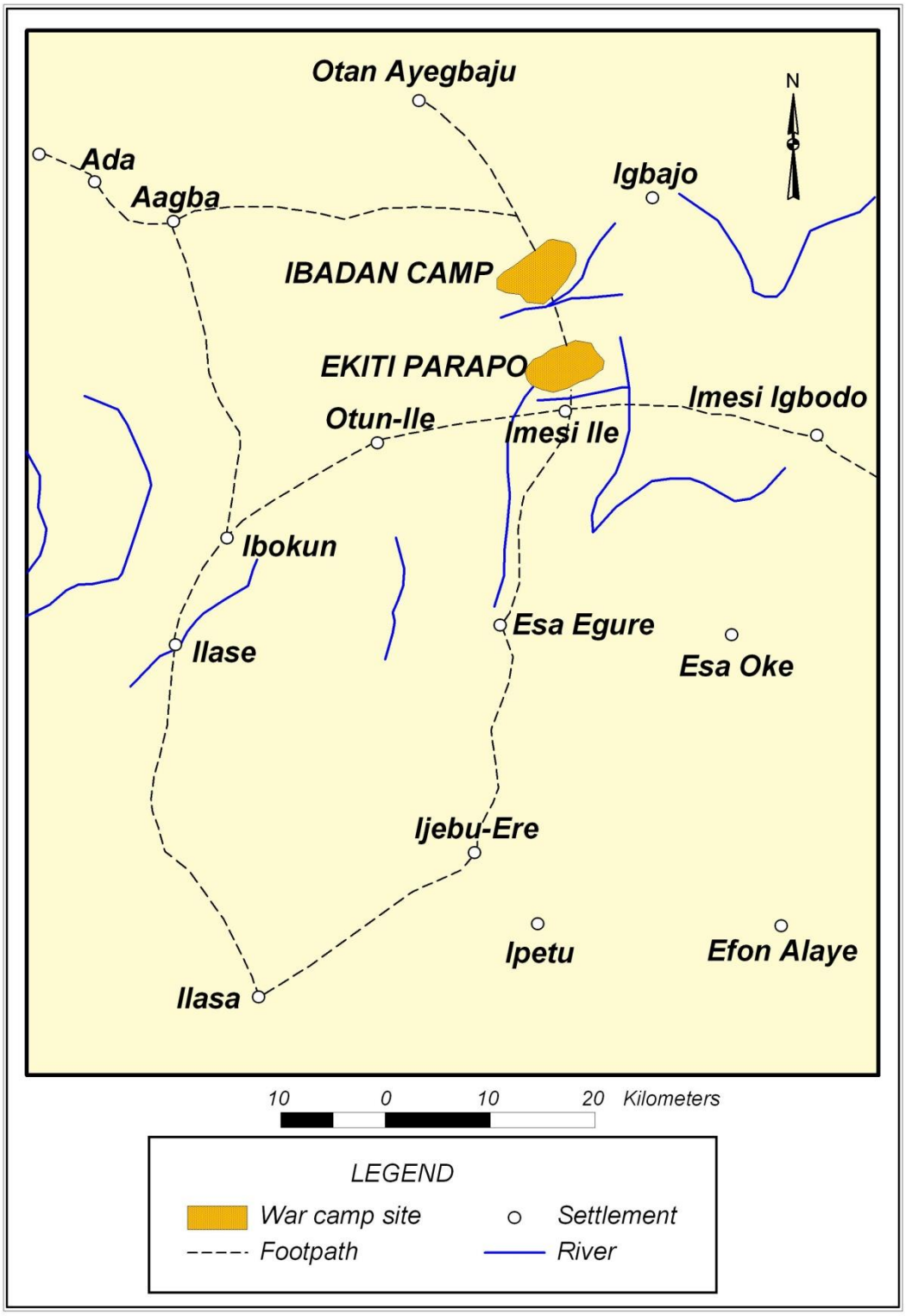

Fig. 3.1. Kiriji War Site map (Adisa Ogunfolakan, 1997)

Plate 3.5: Okuta Latoosa, Kiriji war site

Plate 3.6 **Peace Treaty Site (Point where agreement was signed by the two parties to the Kiriji war)**

3.3.4 Iragbiji

Some of the sites here include a rockshelter called *Oju'du (Oju Odu (Point of Odu,* Odu (Ifa corpus) is an aspect of Ifa divination system), *gbekan-rukan* (rock overhang), *and Okan yi lule o ku okan* (Rock boulder), pavement site and *Oke-Iragbiji* (Iragbiji hill).

3.3.4.1 ***Oju'du (****Point of Odu,* where Ifa priests are initiated to Ifa priesthood*)* is a massive rockshelter near a stream (Plate 3:9). The shelter can conveniently house almost 100 people. In fact, during our investigation of the shelter, some goods, believed to have been stolen at night and kept there were observed. Today the shelter serves as a shrine where a new *babalawo* (Ifa priest) is initiated. Also, it is the point of annual Ifa festival.

3.3.4.2 **Gbekan-ru-kan (**Rock overhang: Plate 3:10) is another feature that shows the work of nature. It derived its name, *gbekan-ru-kan* from the formation i.e. one lying on the other. It is not worshipped like others but adored by the people of Iragbiji as tourist attraction centre. A boulder is lying on another one as if a person is carrying a load on his/her head. A minor shelter is at the base of the rock. It offers shelters for farmers during rainy season.

3.3.4.3 ***Okan yi lu'le o ku okan*** (One fell down remaining one) are two historical rocks (Plate 3:11) that were said to be standing on each other before a dispute on the land separated them. According to oral tradition by Chief Muraina Oyelami (pers. comm. 1997.), there was a dispute between the people of Iragbiji and Obaagun during the reign of one of the obas, Late Oba Oloyede Dada. Many towns and villages surround Iragbiji, one of them being Obaagun which is about four kilometres north of Iragbiji. During the early reign of Late Oba Oloyede Dada, there arose a boundary dispute between the Aragbiji of Iragbiji and the Olobaagun of Obaagun on the disputed piece of land where two huge rock boulders were standing on each other.

Both the Aragbiji and the Olobaagun laid claims to the land. The then Resident Officer in charge of Ibadan Division in 1945 according to Chief Muraina Oyelami, the Eesa of Iragbiji (per. comm. 1994) set up a tribunal to decide the ownership of the land. Then, the two warring parties were invited to the disputed area.

Plate 3.7: Ijoko: The rock chair at the entrance of route to the rockshelter at Iresi

Plate 3.8: Inside of the rockshelter at Iresi

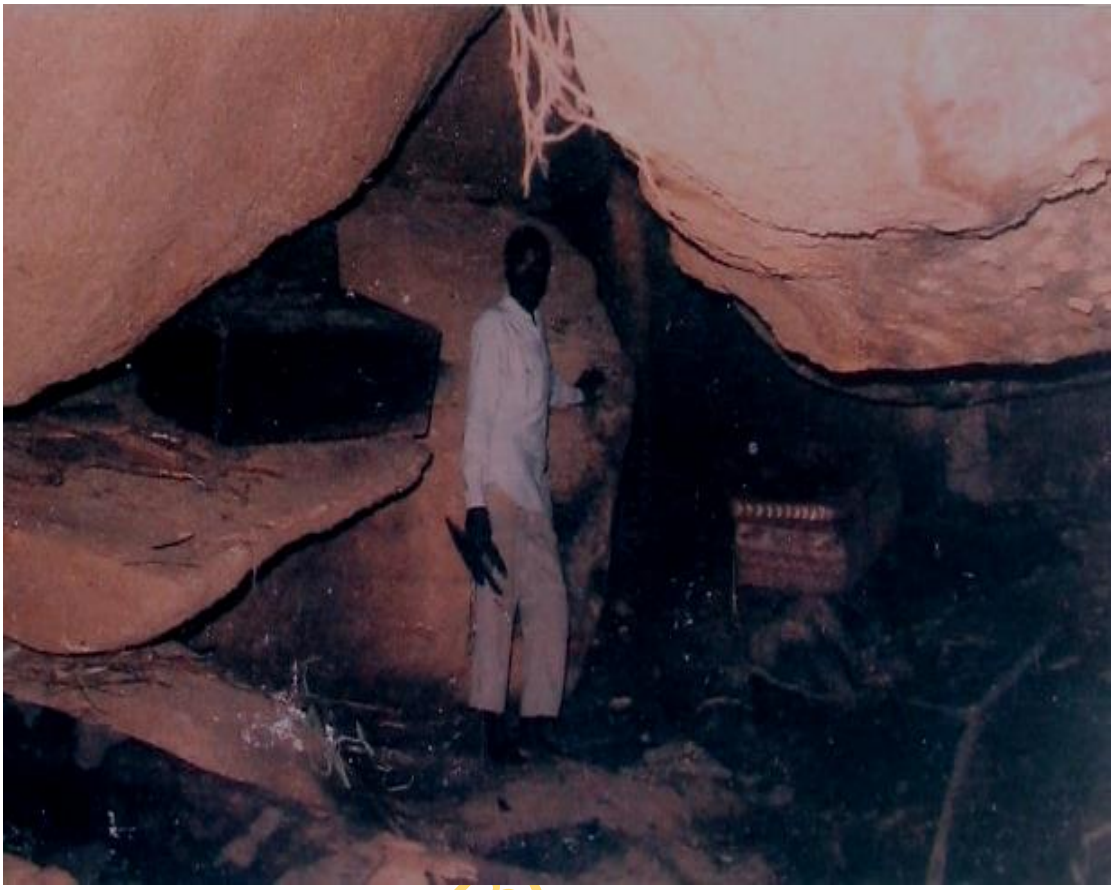

Plate 3.9: Oju'du shrine (Rockshelter at Iragbiji)

Plate 3.10: Gbekan-rukan at Iragbiji

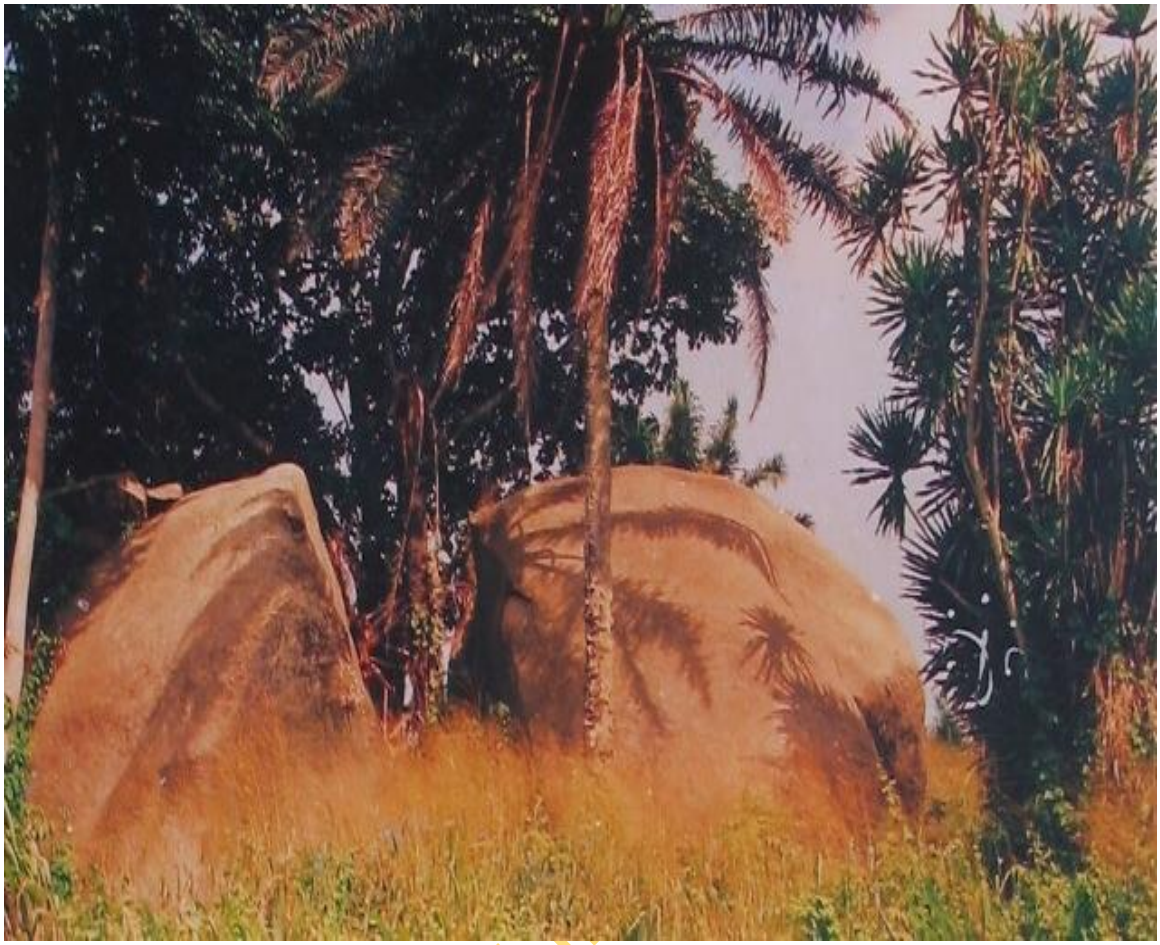

Plate 3.11: Okan yi lule o ku okan rocks at Iragbiji

The Aragbiji affirmed that without any controversy, the land belonged to him and if it was so, one rock should fall down within seven days. This was received with joy by the then Olobaagun because he believed that nothing could bring the rock down from the top of the other one. On the seventh day, when the people gathered again on this disputed land, to the amazement of all those who were present, the upper rock had fallen down on its own, according to the pronouncement of the Aragbiji. The District Officer then said in his judgment that truly the Aragbiji of Iragbiji was indeed the owner of the land. Since then, there was no more controversy over the ownership of the land and since that time, Iragbiji has been variously referred to in tradition as – *'Iragbiji Oloke meji tako tabo lori aagba, okan yi lule o ku kan'* (meaning Iragbiji land of two rock boulders, male and female, one fell down leaving the other one in the original position). Till today, the rocks are worshipped and a shrine marked with *peregun* (*Dracaenae* spp.) is indicated at the site.

3.3.4.4 Potsherd Pavement - Near the Eesa (Chief Muraina Oyelami) of Iragbiji's residence, is a building over a pavement that spreads both in front and at the right side of the building (Plate 3.12 and 3.13). The pavement was constructed in the same way as that of Ile-Ife, in herringbone design.

3.4 Geo-physical Methods of Archaeological Prospecting

Archaeological prospecting using geo-physical methods are known in many places, and are about four decades old. But in Nigeria, especially in Osun North East of Osun State, this is the first time this method is being employed to identify archaeological sites. Historically, it is known that archaeological features are buried under dust and other materials, so some sort of contrast (magnetic) between the buried materials and the sourrounding host rock may be present. This contrast can be detected by using the magnetic method (Ogunlesi 2000).

Magnetics have been used for exploration at numerous archaeological sites around the world to detect such features as buried walls and structures, pottery, bricks, roof-tiles, fired pots, buried pathways, tombs, buried entrances, monuments, inhabited sites and numerous object submerged in water such as ships, ballast stones, iron, cannon, various potsherds etc. Most of these objects were detected and mapped as a result of being more magnetic than the surrounding or covering material. A few features such as certain buried walls, and tombs were not themselves magnetic, but

Plate 3.12: A building over the Iragbiji pavement

Plate 3.13: Iragbiji potsherd pavement

displaced a uniformly magnetic soil which covers them. Still other sites, both historical and archaeological have iron objects which are easily detectable by the magnetic method.

Anomalies exist at archaeological sites as a consequence of the contrast in magnetic properties between the cultural features of interest and the surrounding medium, both of which are usually composed of natural origin such as rock or soil or every empty space. This magnetic contrast is a function of the concentration, thermal and mechanical history of magnetic mineral present in either the cultural features or its burying medium. The amount of magnetic mineral determine the magnetic susceptibility and therefore, the induced magnetization, commonly present in materials which have undergone heating is responsible for the most prominent anomalies arising from cultural features (with the exception of iron), and also, in the uniformly magnetized soils.

The use of geophysical methods in this present work was aimed at (i) establishing its relevance in archaeological study; (ii) to determine the extent or otherwise of the potsherd pavement earlier exposed in the area under investigation; (iii) to identify other archaeological features in the area; and (iv) to economise time and fund since magnetometry profiling is an inexpensive, non-destructive, and a very cost effective method of acquiring useful information about the environment especially in locating ground structures i.e. small findings which could be great archaeological interest.

In Nigeria, the use of this method is new, as it has not been applied for long. This present survey at Ajaba potsherd pavement site was conducted and interpreted with the assistance of a colleague from Germany, Dr. Fred Fielberg, who was then on a visiting lectureship at the Department of Geology, Obafemi Awolowo University, Ile-Ife with some geophysics students of the same department.

3.4.2 Data Acquisition: In magnetic survey, field procedure can be anyone or a combination of Ground survey, Aeromagnetic survey and Marine survey. For this particular work, only the ground survey was carried out. The area extent was measured to be 100 metres by 100 metres (Fig. 3.2). However, due to time constraint, only 50 metres by 100 metres were mapped. The field layout was divided into two halves; 50 metres north and 50 metres south, with the base point lying directly on the exposed potsherd pavement. Each halves was however divided into 25 grids thus

making 50 grids on the whole, with the area extent of each grid being 10 metres by 10 metres grids. Stakes and ropes were used in establishing each grid, after which traverses were then established in directions across the area of interest with each grid having 11 traverses and each traverse having 11 stations and so the number of stations in each grid totals 121.

The station towards the north was tagged positive while that towards the south was tagged negative. The traverse-traverse separations used was 1 metre and the station-station separation was also 1 metre. Such small distances were used so that archaeological materials that are small in size i.e. width and lateral extent can be delineated. The total number of stations recorded thus equals 6,050.

For this study two magnetometers were used, which consists of a chest mounted console. Each magnetometer was mounted by a person while another person takes down the readings as it is called by the person carrying the magnetometer. An important precaution was, however, taken throughout the period of the survey as everybody involved in the survey were magnetically clean i.e. no magnetic material such as chains, earrings, belts were allowed to be worn by the participants.

Before starting measurements, on each grid, the person that mounts the magnetometer and his or her recorder goes to the base point where at least 10 readings were taken and the time at which these readings were started and ended were recorded. After this, measurements were then commenced on each traverse with the first reading being the station position (i.e. the longitude and latitude) through the help of a global positioning system. Time was taken before and after readings on each of the traverse. On completing measurement on each of the grids, 10 readings were again taken at the base point and the time was noted, this was however necessary for time correction. An average of 25 to 35 minutes was spent in completing measurement on each grid. It is very important to note that for this entire survey we were always facing the south direction since the concentration of pavement is towards the south.

3.4.3 Data Processing:

Computer was used in processing the observed data (Sofer 8 package). The data for the 50 grids were typed in, in a format as shown in Appendix 1. Measurement of each grid was presented as a file i.e. the 50 grids on the field were represented as 50 files on the computer. Each of these files begins with a header and contains information such as the name of the site, the names of individuals that carried out the survey of

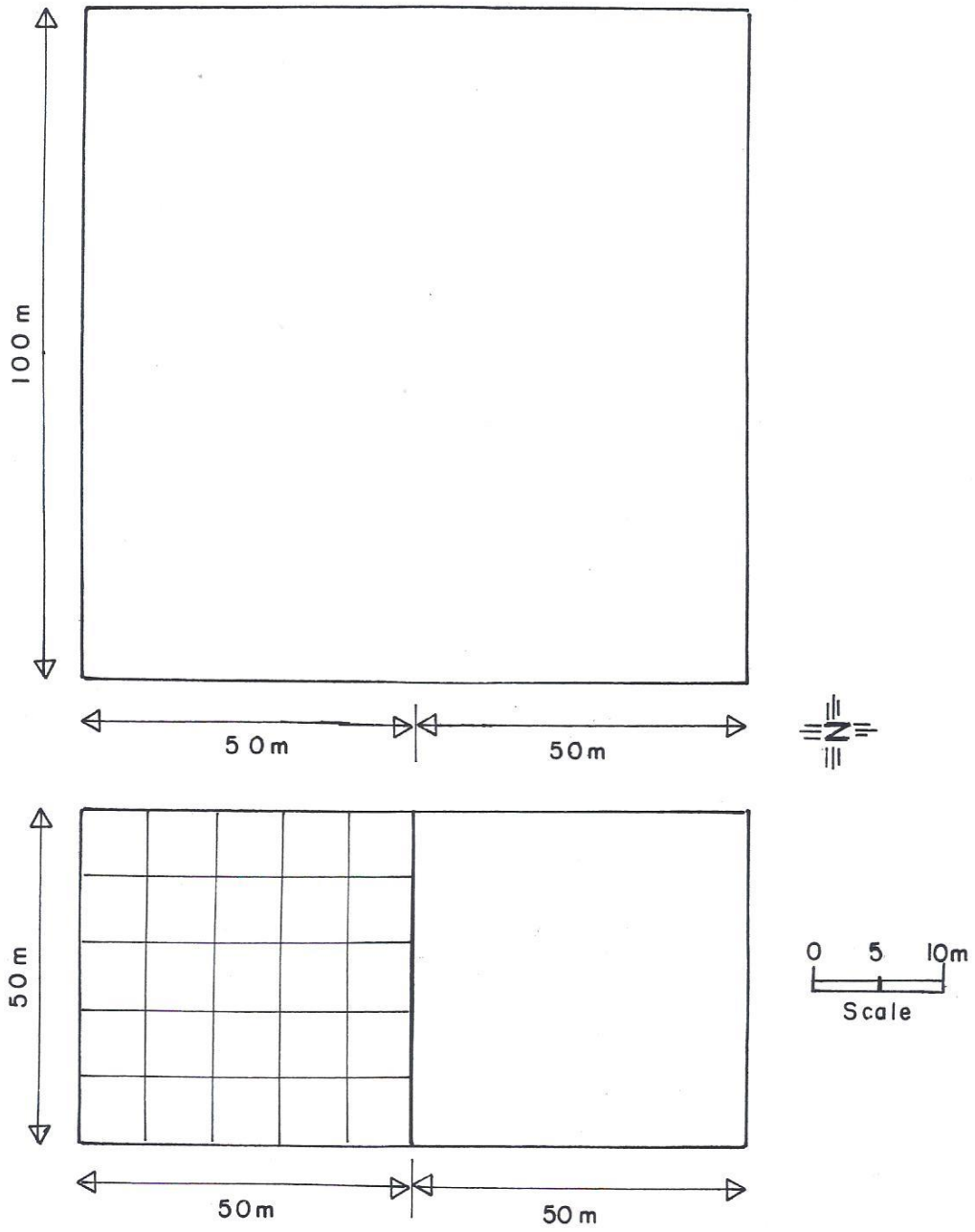

Fig. 3.2 Geo magnetic profiling of Ajaba Potsherd Pavement plan

that particular grid, the height of the sensor, the global positioning system readings, the direction being faced for each one of the grids, and since we have the x and y positions, it is important to define that our x direction is north and our y direction is east. The header of each file also contains information such as:

- x0 meaning station starting position at the beginning of each grid in x direction
- y0 meaning traverse stating position at the beginning of each grid in y direction
- dx meaning the change in the station position in y direction
- dy meaning the change in the traverse position in y direction
- nx meaning the total number of stations along each traverse in x direction
- ny meaning the total number of traverses in each grid in y direction
- bos meaning the mean magnetic readings at the base point before each grid
- boe meaning the mean magnetic readings at the base point after each grid
- ts meaning the time at which bos is taken
- te meaning the time at which boe is taken

  The recorded time were input into the computer as the global positioning system time and for processing it was converted into seconds by multiplying the observed time in hours (hh) by 3600s and that of minutes by 60s i.e. time (seconds) = hh*3600 + mm*60s.

After inputting the data in the computer, a 3D pot data files (uncorrected) were plotted. This was done by using gnu plot. Also, after imputing these fields collected data into computer, the fields were again inspected to check for typing error. Field data in magnetics as also in other geophysical methods contain a series of noise and signals. The process involved in the removal of noise to enhance the reliability of our data is what is referred to as data corrections.

3.4.4 Data Interpretation

Interpretation in magnetic, as well as other geophysical methods in investigation such as gravity seismic, electromagnetism and electrical resistivity e.t.c can be qualitative, quantitative or a combination of both. However, only the qualitative interpretation of the 3D plots is employed in this work.

Qualitative interpretation of magnetic anomalies involves the inspection of maps and profiles for patterns diagnostic of the target. The most reliable targets for magnetic prospection in archaeological sites are fired hearth, fired rock and pottery. These features produce significant magnetic fields in proportion to their bulk, and at least in the case of fired hearts, fired rock and pottery are found virtually on all archaeological sites. These sources are also important in archaeological interpretation. Qualitative interpretation of magnetic anomalies has the advantage of: a) locating the target; b) identifying the altitude of the target and indicating the extent to which identified objects are magnetized, thus it is able to suggest possible source and materials creating the anomaly.

The qualitative interpretation (i.e. inspection) of the anomalies observed on each of the 50 grids resulted in the table given below (Table 3. 1). Since the interest is based mainly on archaeological objects and as such is expected depth of investigation is expected to be shallow. However, the depth of investigation is expected to be more than the height of the sensor used (i.e. 1.5 m), and can be estimated using equations 4.10 and 4.13. Different sizes of anomaly observed from the plots ranges from spot-like, to small, big and very big sizes.

From this exercise, it has been observed that the use of geomagnetic and electro-restivity methods in archaeological investigation of the study area is relevant and economical in the sense that it is easier to take decision on where to excavate as the data revealed possible area of artifacts and structures (Appendixes III, IV and V).

3.5: Summary of Colected Oral Tradition

Oral traditions were collected from five extant settlements. The results of the data collected during the donduct of the exercise are provided below.

3.5.1: Oral History of Igbajo

As it is the case in most Yoruba towns, Yoruba oral history, especially settlement history is similar. For instance, it is either that they left Ile-Ife or a former place of abode because of chieftaincy dispute since “competition for the throne is usually not without bitterness among the Yoruba. Today losers often resort to litigation. But in the past, when the winner was eventually installed, the losers used to leave their communities out of shame or anger or the fear that they could be oppressed

Table 3.1: Table of X and Y coordinates of most promising anomalies

X	Y	GRID
-46	15	10
-5	24	11
-12	37	17
-14	33	17
12	2	27
18	19	32
6	7	36
1	22	36
34	29	39
13	49	47
15	41	47

by the winners" (Adepegba 1986). In a bid to find another settlement, they either follow the instruction of Ifa oracle or just move in the direction they felt would suite their habitation. Quite often, the immigrants either met aboriginal settlers or different sub-groups accidentally stumbling on each other after they have settled. According to one of my informants, 'smoke from fire was usually the revealing signal, indicating the presence of human settlement' (Chief Lemikan of Igbajo, personal communication 1994). This was the situation at some towns in the study area, for example, according to the Aragbiji of Iragbiji, at Iragbiji (1994), when some group of hunters went to hunt and as they were settling down, they observed smoke from a distance, they then traced the smoke only to find a group of people with whom they finally settled at the present place of abode.

In choosing settlement sites Ila-Orangun, Oyan, Asi and Oke-Ila, emphasis was laid on the instruction of Ifa oracle. But in the case of Igbajo they settled at different sites before finally settling at their present place of abode without consulting Ifa. According to Tugbiyele (1989) what attracted the settler from various places to Igbajo was "apparently the first and perhaps the most evident factor, the main stream, "okun" (ocean) which oozes clean and clear water out of the hill from the east (of the town). This stream flows through the town and it joined other springs along its way. This stream provided the early settler with fertile land for farming as the bank of the stream must have been very fertile as the yearly rain must have deposited the top soil removed from the surrounding hills in the valley". Looking at the topography of Igbajo, the settlers might have taken into cognizance the security provided by the hilly nature of the town. Evidently, this was why Igbajo became a war front during the Kiriji-Ekiti-parapo war of the late l9th century.

There are different versions of the origin of Igbajo people. All the versions claimed that different groups came to settle at Igbajo at different periods and that the Ife group dominates the royal lineage of the town. According to Chief Lemikan (personal communication 1997) Adegbola was the ancestor of the Igbajo Iloro people who came from Ife following a chieftaincy dispute. On their way he dropped dead when his horse slipped. He was succeeded by Ajiboye whom the people referred to as accidental king (because it was the sudden death of Adegbola that led to his becoming the king). Ajiboye led them to Odo-Komu and later to Moyin Akure without giving concrete reason for their departure and finally moved to the present Igbajo-Iloro site. They brought with them soil from Ile-Ife which they buried at a point marked today as

a shrine called *Motin* (Plate 3.14). Yet another version claimed that prior to the Oduduwa era, Esidale, a prince with some people left Ilare Quarter of Ile-Ife and migrated to the present Igbajo precisely Lemikan compound (Chief Lemikan, personal communication 1997).

The Oduduwa era version asserts that Esidale one of the children of Oduduwa migrated to the present site on an adventurous journey and settled at Igbajo. Later his 'footsteps' were traced through Ifa oracle by another group of Oduduwa princes who were formally given beaded `*Are*' crown to found new settlements in Yoruba land. This group of Oduduwa princes included Orangun of Ila, Oloyan of Oyan, the Alara of Aramoko, the Ajero of Ijero, the Ore of Otun-Ekiti, the Olojudo of Ido-Ekiti, the Alaaye of Efon Alaaye, the Owa of Igbajo, and the Onire of Ire-Ekiti all of whom settled first at Igbajo before moving to their different respective locations. Before their departure, they held a meeting where each sat on a stone slab. Today the point of their meeting is known as `Olokuta-mewa' (ten stone slabs). Though, the stone slabs could not be found, but a point in the town was shown as the spot of departure by the princes. Another version of Igbajo history as recorded in the book: Igbajo The Citadel of the Brave' published by the Igbajo Development Association asserts that, the Omo Ejemu first settled at the area known as Iloro while another group with crown came later to join them. But there was a misunderstanding between the new settlers and the earlier settlers and this led the later known as Omo Ejemu to call their occupied area Iloro, whilst the second group with the '*Are*' crown opted to call their own area Igbajo since their leader was Aregbajo.

From different versions of the oral history of Igbajo, it is clear that a group of people left a place and either settled at different points before the present place or that a group first settled before other group joined them. Which ever is the true version, it is clear that Igbajo is a conglomeration of different people from Yorubaland and even from Nupeland. Because there was a mutual understanding among them, they were able to live together happily as is reflected in their cognomen: Igbajo-Iloro, *Omo al'agogo m'emu, that is, Igbajo-Iloro, the child of he who announces the call for palmwine drinking with iron-gong.*

The administration of Igbajo is unique in the sense that their traditional council consists of titled chiefs from the two arms of the town that is Igbajo and Iloro. Whilst there is the Ejemu Igbajo, there is also the Ejemu Iloro, Odofin Iloro, Odofin Igbajo

Plate 3. 14: Motin shrine at Igbajo

with Owa as the head of the council. Oriki, the praise poem of Igbajo clearly demonstrates these two arms of the town: '*Igbajo-Iloro omo al'agogo m'emu* that is Igbajo-Iloro that *announces the call for palmwine drinking with iron-gong'* as earlier said. If there was not mutual understanding, they couldn't have been calling each other to drink palm wine.

Though, typical of Yoruba oral history, the first settlers were said to have come from Ile-Ife with soil brought with them and buried at a spot called *Motin*, which is located today at the center of the town which is also the location of the main market.

Also, it was mentioned that in the founding history of Igbajo-Iloro, Esile (who is now deified) played an important role as he was to become the king. His mother was said to have come from Nupeland. On being elected as the Oba, he left for Nupeland to be well prepared magically. On his return, another person had been crowned as the king. This led to his anger and he left the town in annoyance. He was said to have left for Iresi where he met Ebekun with whom he sojourned. In Iresi today, there is *Ile esile* (Esile's compound) with an *akodi*, (family hall) typical of some Yoruba royal architecture.

Looking at the *oriki* (praise poem) of different groups in Igbajo, one will readily agree with Tugbiyele submission that different groups came to sojourn in Igbajo. This evidence is attested to from the *oriki* of the Agbearaka family of Igbajo, in which they are traced to Ire (Ekiti) and that they are blacksmith, hunter and warrior:

Agbearaka di mo l'enu	He who gag a person
Eru jeje l'abe ogede	A fearful man under the banana stem
Ewa dota, mee ni toja oun lo	This is 50, I will not fight
Mogun Onire	Mogun of Ire
Omo abule s'owo	He who turns the soil into money
Omo amaha owo re 'mo	He who pacifies the child with calabash of money
Eji jeki nnaja oore	The rain stopped me from going to Oore market
Toto jeki nnaja oore	The dew stopped me from going to Oore market
Ateji ati toto	Both dew and rain
Ee jeki nnaja Ire kale	Should not allow me from selling at Ire market until the evening

Eji gbojo, ara, Ila gbede	Rain took the day, the man from blacksmith home
Omo awurin tun 'rin ro	The child of whom smelts and smiths
Omo agunfe giri bi ojoku n'Ire	the son of whom ……as if is going to rain at *Ire*
Ire loo ti mbo, loo p'oko fun mi wa	He came from Ire and got me roofing grass
Poko fun mi wa ngo r'ile fi ko	Get me grass to build a house
A kii bimo nIre ka pose owo nina	We don't give birth to a child at Ire and be miserly
Aha koto ni won fi nbu owo f'aya wo	they use big calabash to give their wife money
Aya Ire mogun, ko sowon nunu ile wa	The wife of *Iremogun*, there is no scarcity in our home
Owo oko ni nwon fi ntara se	They spend their husband's money to adorn themselves
Ogun lo n'Ire l'esin	Ogun is worshiped in Ire
Igi lasan lara oko mbo	The villagers worshiped ordinary wood
Awa lo logun, igi lasan lara oko mbo	We are the owner of Ogun, ordinary people worshiped wood
Ire mogun omo ayeyo	*Ire mogun*, the happiest son
A wule wuwo, a wule wu segi etc	He who digs and dig money, he who dig and digs beads

The *oriki* traces the place of origin of the Agbaraka family, it portrays their economic and social life (*Omo awurin tunrin ro; omo am'aha owo re'mo*). From the oriki, it is also clear that the Agbaraka family are iron smelters and smithers (*Omo a wu'rin tun 'rin ro, Omo awule wuwo, omo a wule wu segi*)) that is the child of he who digs iron-stone and smith iron, the child of one who digs soil and digs money, the child of he who digs the soil and digs beads. Even, in the *oriki* (praise poem) we are reminded of the materials of worship for the gods from each clan or family or city. Thus ogun (god of iron) is generally praised as:

M'ogun Onire	Ogun of Onire
Ire M'ogun	Ire of Ogun
Ogun alara njaja	Ogun of Alara eats dog
Ogun Onire a 'jagbo	Ogun of Ire eats ram

Ogun elekole The Ogun of Elekole

Esuu 'su gborogbo long roasted yam

Lo ma nje is what he eats

This *oriki* according to Yoruba tradition applies to anybody working with iron (ogun) that is, hunters, smithers, carvers, and drivers.

3.5.2: Oral History of Iragbiji

The town is bounded to the north by Oke Iragbiji (Iragbiji Hill) the hill (with a cave) which accommodates the famous `*Ori Oke* festival shrine (a shrine is within this cave on the hill), to the north-east by Iree town, to the north-west by Obaagun town, to the west by Ikirun, to the east by Aagba and Ororuwo towns; to the south by Egbeda village; to the south-west by Osogbo and southeast by Ibokun. Iragbiji developed on an "undulating land with an altitude of 213.36 metres and 274.32 metres above sea level" (Atoyebi, 1985:2). The town is surrounded by chains of hills. It is drained by rivers *Otara, Ladoo, Egundo, Otapete and Moori.* The central ridge of the town runs from the north-east to the south-west, and provides a well drained land for residential development.

According to the oral history, a group of hunter left Ile-Ife and settled under a tree called *Ira* (*Bridelia ferruginea*). The tree was said to have provided shade as it was widely spread over the place. The town thus derived its name from this phenomenon. Iragbiji means *Ira* (*Bridelia ferruginea*) (tree) *gba* (take) *iji* (shade) – in short, *ira* tree provides shade. Another version asserts that some group of people had settled in the area before the hunters came. The hunters were said to have observed a smoke from a distance and then traced the smoke only to find a group of people with whom they finally settled at the present place of abode. Another version of the tradition provided by the chief priest of Ifa, states that the progenitor of the Iragbiji people was a hunter who lived on the hill that over-looks the town. Their ancestor shot an antelope but it could not be killed instantly as the antelope entered a hole on the hill and the hunter followed it. He traced the antelope to the location of the present palace premises where he saw the dead antelope and eventually settled there. To commemorate this event, an annual festival is held around July when the king will go to the top of the hill for sacrifice and annual prayer to the ancestor in a small cave on top of the hill (Pate 3. 15), where prayers are offered to the ancestor.

3.5.3: Oral History of Edemosi/Ajaba

The oral history of Ede is likened to that of Ajaba as the abandoned settlement at Ajaba is assumed to be the original home of the Ede people as reflected in the following history of Ede people. Also, the people that occupied the present Ajaba town came from different towns within the study area to settle at the last half of last century (1950s). Ede as it was known before now, is an ancient town whose people are now scattered all over the major towns and villages within Osun northeast. Though, today the town is called Edemosi because of what the traditional ruler referred to as 'confusion of identity' (Edigbon of Ede 1997 personal communication). There is another town named Ede located close to Osogbo the state's capital which is usually confused with Edemosi. The spellings of the names of the two towns are the same but they are pronounced differently because of the tone marks. Ede near Osogbo is with middle tone marks on the vowels whilst the second Ede is with lower tone marks on the vowels. To address this confusion in mails sorting and delivery, Ede of the Ajaba area is now called Edemosi.

Unfortunately, no single written document is available on this ancient Yoruba town. Therefore, the study is based solely on the oral information collected from the place. The town of about 5,000 people was said to have been a big city enjoying the big trade of the north and south of the Yoruba region being a major market town centrally placed at a junction linking the north and the south and the east and the westv of the Yorubaland. According to Owolabi (personal communication 1997) Edigbon is the ancestor of the Ede people. Edigbon was said to have come from Ile-Ife, after a chieftaincy tussle which he lost. He was a hunter and warrior and powerful medicine man. Because of the magical power of the Ede people, most especially the king, Ede, their city was abandoned as a result of dispute between two powerful groups in the town. This dispute according to oral tradition, led to subtle plot against the king, such that a person died and there was nobody to bury the person. This led to *esi gigun* (a magical or medicine marked point) which resulted in people deserting the town and moving to different towns and villages in the area. They now settled at Ila Orangun in Oke-Ede, Edigbon, Aworo-Okun, Laaro, Obatufe, Ala and Odosin compounds; Imesi-Ile – Oosa Oba, Okun Iroko, Ariyo compounds; Igbajo – Ile-Eri, Ile-Salako compounds; Otan-Ayegbaju, Ikirun, Iragbiji, Iresi and others. According to Oba Adebisi Adeniyi (personal communication 1997), they decided to return to their

Plate 3.15: **The king making sacrifice to the ancestor during ori-oke festival at Iragbiji**

home in 1908 when Oba Dada Arilewoofi, Oladiipo I, brought them back, but settled at about 4 kilometres to the point of their ancient town which is today suspected to be Ajaba from the description of the king.

The claim that Edemosi people scattered around many towns and villages within the locality of Osun north east led to visiting these towns and villages to ascertain the claim of oral tradition. In Igbajo, we visited Ile-Ari and Ile Balogun Onifade and Lofemu Olori Awo compounds, where in actual fact; some of the people from these compounds maintained their relationship with their original home at Edemosi. According to Chief Salako (personal communication 2004), he visits Edemosi regularly, and has built a big house in the town with the hope of leaving Igbajo to settle at Edemosi in future. In the record of Fashiku (1995) Ede is associated with Ila-Orangun as he indicated that most of the above mentioned compounds in Igbajo came from Ila-Orangun. This may be connected with the immigration route from Ajaba to Ila and finally to Igbajo in the bid to find a defensive area to settle. In Ila-Orangun, we visited Oke-Ede, where majority of the Ede people settled.

3.5.4: Oral History of Asi

Asi is a sub-town to Oyan, about 3-4 kilometers from Oyan, just after Asaba on the Oyan-Ila-Orangun road. No single written document t is available on the early history of Oyan. This work depended solely on the oral account given by the Alasi of Asi, Oba Olagunju and some of his people most especially the chiefs and elders in the town.

According to oral account given by Alasi and corroborated by one of his chiefs, Chief Joseph Atolagbe (personal communication 1994) Olubode was the ancestor of the Asi people. He (Olubode) left Old Oyo as a result of barrenness and as a result of the fall of Old Oyo in the early part of 19th century. It was asserted that Olubode left Oyo Ile after consulting Ifa Oracle to leave home and go to another new land. He told his father who was then the reigning Alaafin, Alaafin Olunloyo but the later did not allow him to go. He again told his father who once more refused him. His father refused him the third time and the decided to leave without the consent of his father.

When he earlier consulted Ifa, the oracle advised him to settle at a place where he will hear the voice of ‘agbigbo’ birds (perons). He left and passed through many towns before finally settled at the present site. According to chief Atolagbe (personal

communication 1994), Olubode did not settle down without problems, as he was constantly attached and forced to leave the town for Ikirun. It was from this off and on that the people of Asi derived the name of the town. Asi literarily means 'emigrant'. Oba Olagunju jokingly said that the Oyan people used to refer to them as *Asi ma de Oyan*, that is, 'Asi emigrants that do not migrate to Oyan'

3.5.5: Oral History of Ila-Orangun

There are different versions of the oral history of the ancient city of Ila-Orangun. But it is common to these versions that (i) the ancestor of Ila people came from Ile-Ife; (ii) that they settled at different places before they finally settled at the present Ile-Ila (Ila-Orangun); (iii) that the progenitor of the Ila people was one of the seven children of Oduduwa and various information placed him on the second or fourth place among these children of Oduduwa. The oral history of origin of Ila centered on the popular migration story of the seven children of Oduduwa from Ile-Ife. Though, the reasons behind the migration are not clear, the fact still remains that they left Ile-Ife, to found their own domain. Some people said it was due to over-population, some said it was due to Oduduwa's old age and that he wanted his children to establish their own kingdoms before his death (Chief Adetoyi personal communication 1994).

From the various versions of the historical origin of Ila, the names of Ajagunnla and Igbonibi feature prominently. Ila oral tradition makes references to four different sites of settlement before the last and present site, Ila-Orangun. While Ifagbamila Ajagunnla was said to be the first to rule at the first site, Ila Kodomu or Igbo Ajagunnla, Igbonibi was said to be the first king to reign at the last but present site. This may be the reason why the two names enjoyed greater prominence in the tradition of origin of Ila than any other Oranguns that ever reigned in Ila.

One version of the oral tradition states that Ajagunnla left Ile-Ife with his mother, Princes Adetinrin and some emigrants and later settled at Ila-Kodomu. The other version asserted that Adetinrin was grand-daughter of Oduduwa and daughter of Okanbi that, the beauty of Adetinrin made Oduduwa to impregnate her. Realizing the evil deeds and what could follow, Oduduwa decided to terminate the pregnancy (Adetoyi 1974). Unfortunately, his people got the wind of the act before the abortion could be done and they termed it '*oro egun'* (an act of abomination). Consequently, Odudwa decided to sent Adetinrin out of Ile-Ife, moreso, it has been revealed, after

consultation with Ifa oracle that the child she was expecting would be great if she leave Ile-Ife (Adetoyi 1974).

Before her departure, *Ilaji* (half) of every item of Oduduwa properties was shared to her. In addition, she was given two cutlasses called *ada ogbo* (ogbo cutlass). The cutlasses were used in leading and directing her followers on the ways to follow. Whenever she was asked which way to follow she used to say *ogbo mo ona* that is 'ogbo knows the way'. That is why today the area and the people are known as Igbomina coined from *ogbo mo ona.*

The oral tradition further stated that Adetinrin gave birth to a male child and the mother sent message to Oduduwa saying that '*oran ti a ni egun , momo gun o'* i.e. the case that we called a curse has become a blessing (Adeoye 1988). When Oduduwa learnt of this, he was very happy and sent bacvk that the child be named Orangun coined from that words '*oran mi gun'* that is my plans worked out well Chief Adetoyi 1974).

Another version says that Fagbamila was a direct and second son of Oduduwa, that after the first son, Odudwa did not have another male child for long. He consulted Ifa oracle and appease was made to the oracle after which a male child was born again. The child was then named Ifagbamila that is, Ifa saved me and *oran mi gun*, that is, my problem is solved. Because of his love for him, a big house was built for him in the premises of the palace of which Fagbamila was thus referred to as Orangun-Ile-nla that is Orangun of the big house. Thus after migrating from Ile-Ife, the word Ila was corrupted from Nla (big) and Fagbamila was referred to as Orangun Ile Ila.

Fagbamila was said to have settled at a thick forest, later known as Ila-Kodomu and after Fagbamila the settlement was named Igbo Ajagunnla that is, Ajagunnla forest. Ajagunnla reigned there for almost 130 years (Adetoyi 1974). After his death, Amotagesi, one of his sons became the next leader and king. For one thing or the other Amotagesi moved the people from Igbo Ajagunnla to Ila Yara where he became the king. This place is referred to as Ila-Yara because of the defensive trench and embankment constructed round the town. Yara means trench or ditch/pit in Igbomina Yoruba dialectical language.

After the death of Amotagesi, succession disputes among the children arose. This went on for a long time and it later had effect on the population in that many of the inhabitants deserted Ila and scattered to various places like Ilawun and Ilase now

in Ijesaland, Ajase-Ipo, Oro and Omu-Aran all in the present day Kwara state and even down to Nupe and Bariba land (Adeoye 1988). Accoording to Chief Adetoyi, in the midst of all these disputes, two of Amotagesi's children, Arutu and his junior brother Igbonibi decided to migrate with the remaining followers to another place. They left Ila Yara for a place later called Magbon. Before leaving Ila Yara, Arutu consulted Ifa oracle who advised him to settle at any place where the *orere* staff is placed on the ground. But according to tradition, when they were going they got to a place where they took a rest and the follower who carried the *orere* unconsciously put the staff down. On realizing this, he did not tell the leader and thus they continued their journey till they got to Ila Magbon or Ila 'Kolo on the top of a hill overlooking the present Ila. At this pace, they were frequently attacked by earthworms. Arutu consulted Ifa oracle again and Ifa told him that the orere staff has been placed on the ground somewhere before they got to Ila Magbon. Arutu then asked his follower who carried the staff and the man confessed and promised to take Arutu back to the exact spot where he mistakenly placed the staff on the ground (Adetoyi1974). Arutu who could no longer move further due to old age, handed over all tradditional royal apparels like beads, crown and the staff, *opa orere* to Igbonibi his junior brother to continue the journey as he gave up the ghost.

Igbonibi took up the leadership challenge and continued the journey with the followers to the spot where the staff was said to have first touched the ground. Here they stopped and settled. This place is called Isedo in the present day Ila-Orangun according to Chief Adetoyi (personal communication 1994). According to oral tradition, Isedo is a pre-Orangun settlement. When Igbonibi got to Isedo, he met Tiimo with his family well settled. He also met Sangi and Okangi with their families each living on its own but very friendly with each other. Tiimo was said to have migrated from Obaile in Ekiti land While Sangi and Okangi came from Nupe land.

When Igbonibi arrived with his group at Isedo they were well received by Timmo, Sangi and Okangi all of whom later submitted to his lordship (Alhaji Sunmonu Adesina 1994 personal Communication). Sangi and Okangi fled Isedo with their people for an unknown destination.

3.5.6: Conclusion

From the account of the oral tradition, most of the people from the study area migrated from one place or the other before their final place of settlement. They also

migrated as a result of one factor or the other which include conflict, war, and royal/succession disputes. In their preparation to migrate, they, in most cases consulted Ifa Oracle which gave them direction on where to go or settle. Except for Asi where they claimed to have come from Old-Oyo, most of the people from this region claimed their ancestry to Ile-Ife. They also claimed to have stopped at different locations before the final and present location.

CHAPTER FOUR
EXCAVATIONS AT AJABA AND ENVIRONS

4.1. Excavations at Ajaba and Environs

This present excavation exercise is not the first in Ajaba. In 1992 a potsherd pavement site Aganju Tapa at Asi on the Oyan - Ila-Orangun road was 'traced' (the excavation then did not go beyond the pavement level) so as to understand the technology, design and orientation of the pavement (Ogunfolakan 1994). During this first phase, visits to Ajaba (Kajola) along Iresi-Ajaba road revealed also a potsherd pavement near a sacred grove (Igbo'riro). The pavement was then earmarked for further investigation including excavation. By this time, the pavement was already exposed at the middle of the road leading to Iresi from Ajaba as a result of the yearly grading of the road by heavy road machine.

Our visit to the place two years (1996) after revealed that the whole pavement earlier exposed in the middle of the road had been totally removed by the same grading of road. By July 1997, more pavements were exposed towards the northern end of the road leading to Iresi. The total removal of the pavement from the main road now gave way for erosion to create mini gullies on the road and also exposing more of the pavement and scattered sherds along the road. It was then decided that the pavement be opened with the main objective of determining its extent, design, orientation, material inclusion and subsequently determine its relevance and relationship to the abandoned site and also relate it to known pavement sites at Ile-Ife, Ila-Orangun, Iragbiji, and other known pavement sites within the study area. In 1999, excavation of this exposed pavement was carried out after a geo-magnetic and electro-restivity survey was carried out.

The Ajaba pavement according to Owaloja of Kajola, Oba Jacob Adedotun Adetoyese is part of Kajola abandoned settlement and that the whole site was initially a sacred grove but people started encroaching on the grove for their farming and most importantly for the exploitation of timber. By 1997 almost three quarter of the grove had been cultivated. A marginal portion is now left as *`Igbo-'Riro* that is uncultivable land or 'Igbo risa' (forest of demons).

4.1.1: Excavation of potsherd pavement at Asi near Oyan (Aganju Tapa –Grove of the Tapa) Excavation at Asi was the first to be carried out within the study area.

After oral historical information of Osun North East had been collected and the archaeological reconnaissance survey carried out, it was then decided to carry out a lateral excavation (scraping) of the potsherd pavement at this site (Asi). The exercise itself was meant to determine the extent of potsherd pavement around the exposed ones at this site; the orientation of the pavement; determine within that range, any other design other than the exposed one i.e. herringbone design. The exposed side of the pavement shows that the pavement was constructed in a circular form and not in straight rows as known in Ife potsherd pavement. It was also meant to prevent the total loss of information on the potsherd pavement as a result of the yearly grading of the road by heavy machine where the pavement was located and the erosion that subsequently washes away the pavement on yearly basis

The lateral excavation took three days, from 16th to 18th of February, 1994. The site was mapped out in 10 metres by 5 metres, five metres to the north (numbered 0-5) and ten metres to the east numbered A-F, (Fig. 4.1). It was laid in a grid system and divided into units of 2 metres by 1 metre each for excavation. Five units were then excavated. Part of the pavement at pit AB and BC have been exposed as a result of road construction. In fact, it was this exposure that prompted the lateral excavation of this site in order to determine the extent of the pavement. As a result of the exposure, it was decided to further open up pits BC-1 and CD-1 to determine the extent of the pavement to the east and pit AB 3-5 to the north west, EF 4-5 to the north east EF 0-2 to the south east and CD 2-3 to the centre of the site were opened.

Because of the difficulty in getting necessary instrument for the survey then, a simple survey technique was used to get different elevation of each pit using the pavement level at pit AB-1 (the exposed part) as reference point. An Empire line level instrument was used for the measurement. At the start of the excavation, the measurement reads that pit AB-4 & 5 (North West) was 9.5 cm lower than the pavement level. Pit EF-5 was also lower by 9.5 cm, pits CD-1, EF-1 & 2 and CD-3 were also brought below the pavement level by 14.5 cm. Pit CD-1, EF-1 and 2 and CD-3 were opened and scrapped to the pavement level using the Empire line level to take the range of elevation of each pit to the pavement level. These pits did not produce any cultural material except pit CD-1 which produced 12 pottery sherds.

Pits AB-4 and 5 and EF-5 were also opened and brought down by 10 cm, and no cultural material was retrieved from the pit. After scrapping down to about 14.4

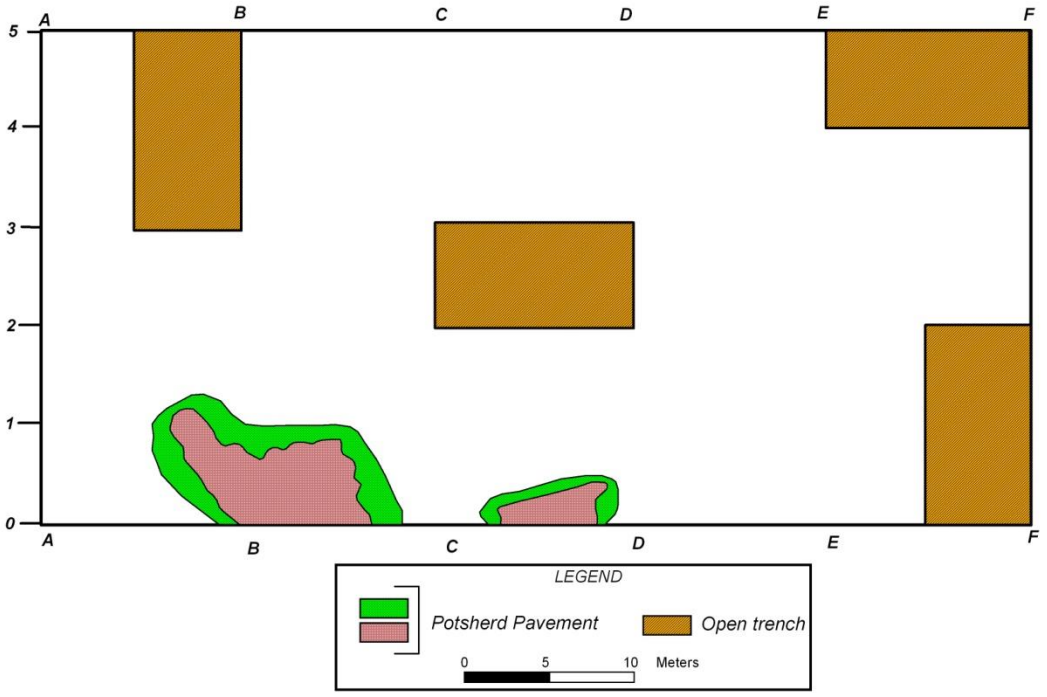

Fig. 4.1: Site plan of Aganju Tapa Potsherd Pavement (Asi) Excavation

cm, pit CD-1 revealed potsherd pavement. The 'scraping' also showed that there is an unpaved space measuring about 81 cm between the exposed pavement at pit BC-1 and the pavement at pit CD-1 (Fig. 4.1). The exercise itself was meant to determine the extent of potsherd pavement around the exposed ones at this site.

4.1.2: Excavation at Ajaba Pavement site (KJAJ)):

In furtherance to the previous excavation carried out at 'Aganju Tapa' at Asi on Oyan-Ila-Orangun road, and in order to confirm the geo-magnetic and electro-restivity data generated from Ajaba pavement site geophysical survey, it was decided to excavate the northern part of the pavement site because remnants of the pavement stretched towards this part. Certain questions became pertinent is this regard.

- What is or are the relationships of this pavement with the abandoned settlement?
- Is there any correlation with possible materials from this present exercise and the previous excavation carried out?
- Is there any link with ceramic materials from other sites identified in Osun northeast? These are the possible question the present excavation is going to profer solution.

The Ajaba pavement site is located to the north western part of Ajaba town (Fig. 4.2). It is about 200 metres to the middle of the town's market and about the same distance to a village (Aba Paanu) where the owner of the cocoa farm on which the pavement is located resides. From the appearance of the exposed pavement it appeared that the road had cut through the original pavement thus, exposing the pavement and sherds of different sizes, shapes and thicknesses. To ascertain the area covered by this pavement, the extent of damage and specifically, to confirm the data generated by the geomagnetic and electro-restivity profiling, an area of about 50 by 50 meter was cleared. The measurement cut across the road that leads to Iresi from Ajaba. A datum point was established towards the eastern part of the site. A 12 by 12 meters area was then demarcated for excavation. Since the road cuts across this pegged area, a 5 by 5 meter square was designated for proper excavation at the western section of the site with a zero point pegged to the south. The squares were then numbered 1 to 25 (Fig. 4. 3).

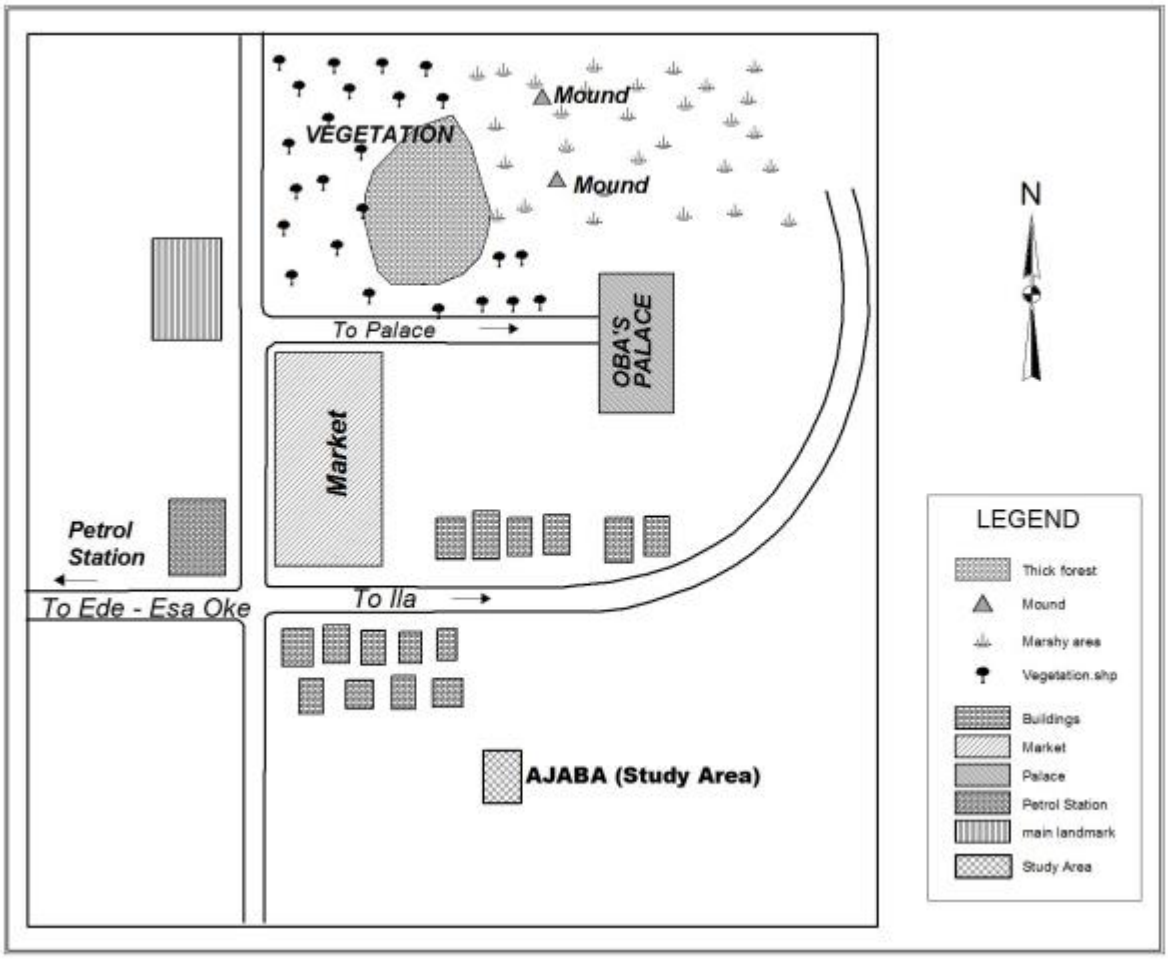

Fig. 4.2: **Sketch map of Ajaba town showing the location of the excavated mound.**

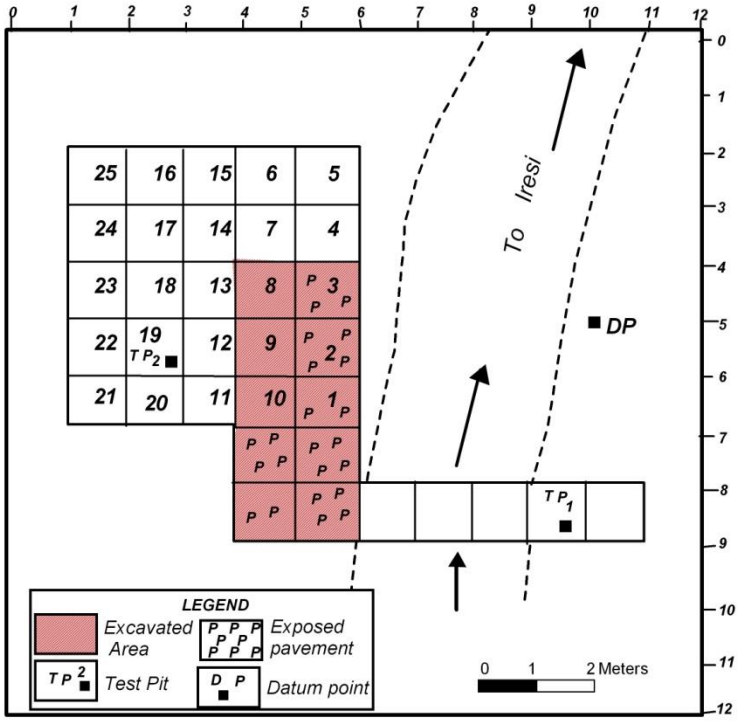

Figure 4:3: Site Plan of Ajaba Potsherd pavement excavation

After establishing the grids and datum point, the excavation then started at the spit of 10 cm exposing and going along the pavement line. At about 20 cm (spit level 2) the pavement layer was struck. Pits 1-3 and 8-10 were excavated to the pavement level. Realizing that the pavements spread towards the south, it was then decided to extend pits 1 and 10 towards this direction. These pits were tagged the extension of the previous pits 1 and 10, 11, 20 and 21. Also, at about 20 cm, the pavement layer was also struck, but it was observed that the pavement was slanting. At pit 9 and 10 the excavation went below the pavement level so as to determine other cultural materials below the pavement layer. The pit did not go beyond spit 4 (40 cm) when it got to the matrix. Also, in order to further determine the extent of the pavement, a test pit was dug towards the northwest of the pegged area, exactly on pit 17. A total of 255 potsherds, 8 lithics materials and one iron object were recovered with series of potsherds with different decorative motifs. Mat-impression, twisted cord and plain sherds dominated the motifs. No organic material was recovered. Also, a pot (ajere, perforated pottery), probably embedded (since the pavement around the pot has been destroyed) in the middle of the pavement was retrieved. It has been badly crushed by heavy traffic. The pot was in an inverted position with a small iron hoe blade (Plate 4.1) at the mouth. The stratigraphy of the western wall of the site was drawn (Fig. 4.4). It shows that the topmost layer is of top soil followed by dark brown soil with gravel, and reddish brown with fine gravel. Root and rootlets also prevail across the layer. Reddish-brown, more compact, and reddish brown are the last two layers. A total of 255 pottery sherds, eight lithic materials and one iron object were recovered. The plan showing the layout of the excavated pavement was then drawn (Fig. 4.5).

4.1.3 Excavations at Ipetumodu Iron Working Site (IPIS)

Ipetumodu is about 15 km west of Ile-Ife. The site belongs to an extinct itinerant Oyo smelting guild. The excavation of a smelting site at Baakun – Ipetumodu was carried out by a colleague from the Ife Museum in collaboration with a geochemist from Natural History Museum of the Obafemi Awolowo University, Ile-Ife (Ige and Adesina: 2008). The excavation (Ige *et al*. 2008) revealed three distinct layers. Layer I measured between 15 cm and 40 cm in thickness and composed of gritty and dark soil. The finds in this layer consist of potsherds, ores and some iron slags. Layer II was between 40 cm and 75 cm and consists of homogenous loose and

Plate 4.1 : Hoe blade at the mouth of the *ajere* pot (perforated pot) retrieved from the exposed Ajaba pavement

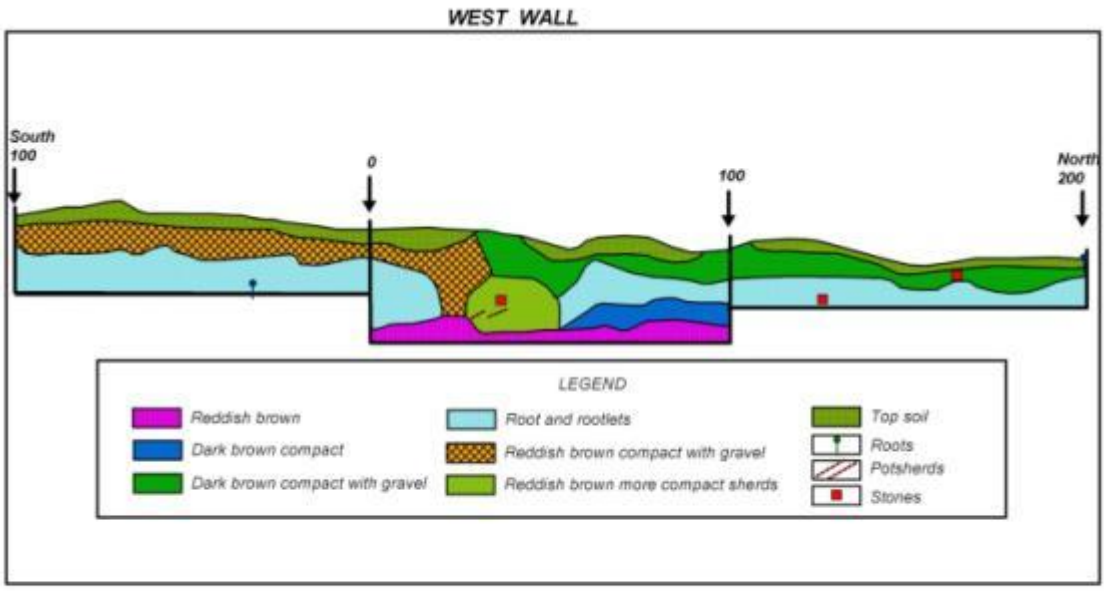

Fig. 4.4: Stratigraphy of the western flang of the excavated potsherd pavement at Ajaba

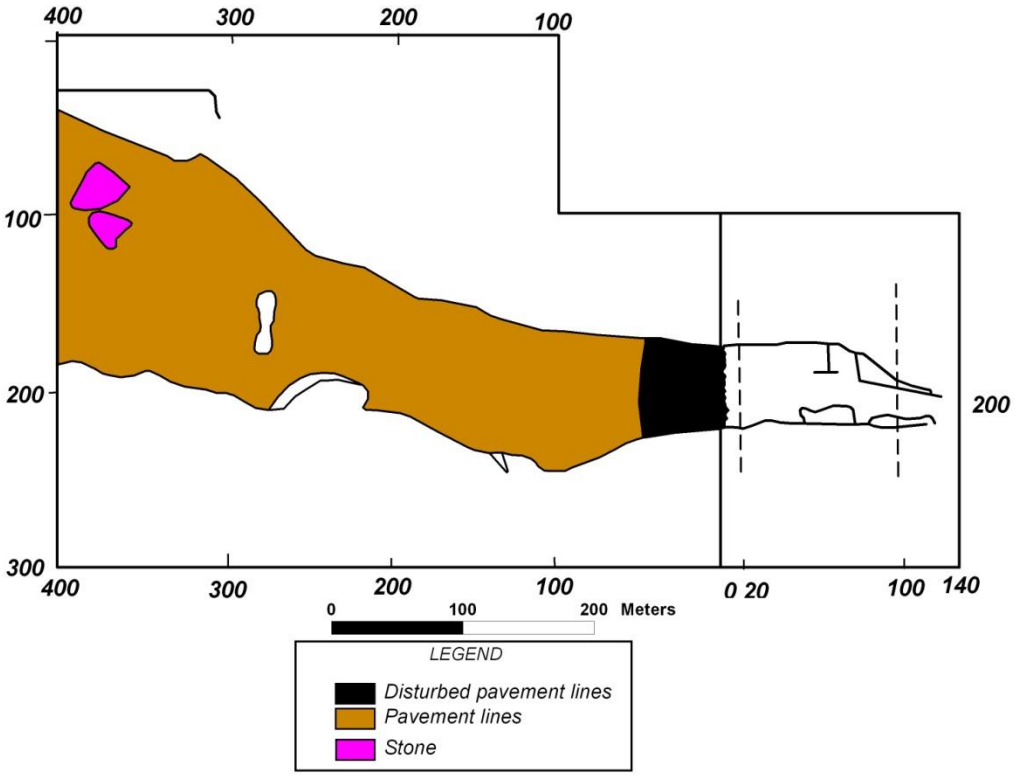

Fig. 4.5: Plan showing the exposed excavated pavement.

light brown soil containing potsherds, laterite coated pieces of iron slags and furnace lining. Layer III was between 75 cm and 1 m and it contains mostly slag lumps. The soil was compact and deep reddish brown. Finds from this level include broken pieces of tuyeres and pottery intermixed with iron slags. Below this level was the bedrock which consists of amphibolites and quartzites. From the evidence of the pottery recovered from layers I, I, and III, it appears that the industry belong to one cultural unit which is iron working industry. 225 pieces of potsherds were recovered from the excavation. The potsherd finds also include 15 pieces of complete tuyeres found encrusted together with slag in sets of two or three. Samples of sherds are brown to greyish in colour. Samples IPC 1-1, 3-2, 3-7 and 5-4 were selected and collected from the researchers for analyses.

4.1.4: Potsherd pavement at Ila-Orangun

No excavation was carried out here. Erosion and human factors have greatly exposed this pavement to destruction. Potsherds were scattered all over the site. The sherds are both coarse - and fine-grained in fabrics, are decorated and came mostly from a pot vessel. Like most of the sherds from this region, they contain mica as inclusion. The pavement in Ila-Orangun is remarkable, as the sherds were arranged to flush with the lip of a pot, similar to the Ife tradition. Seventy-two potsherds were surface collected from the site (Ogunfolakan 1994). Samples KM 1, 3, 4 were taken from this site for analysis. Unfortunately the site has been destroyed as a result of a petrol station built on the site (Plate 4.2).

4.1.5: Ajaba Mound Excavation (KJAJ RM1):

One of the earlier identified refuse mounds (KJAJ RM1) within the Ajaba abandoned settlement was excavated. It is to compliment the earlier excavation at the potsherd pavement site within the abandoned settlement complex. A 1 x 2 meters trench was marked for digging (Plate 4.3). The 1 x 2 meters was pegged because of some reasons: (1) time constraint; and (2) the surface were heavily littered with potsherds; hence, concentration of material is likely to be high. The pit was sunk on a refuse/rubbish mound over a gridded area of about 6 x 6 metres, towards the southern edge of the mound. The pit was sunk right on the peak of the mound (7^{o} 55'N & 4^{o}

Plate 4.2: **Petrol Station under construction on the Ila-Orangun potsherd pavement site**

53'E) in order to: (1) have a complete section of the geographical horizon (2) examine the vertical concentration of material and (3) establish a cultural sequence for the site. A 10 cm interval was chosen as our spit level. The trench consists of twelve spit levels, which yielded varieties of materials at each level. Before the commencement of the excavation, having gridded the site and chosen a portion to be excavated, spot height readings of the four corners of the trench were taken with the quick-set (Plate 4.3). The following readings were obtained: corner Southwest 1.10 m, Northwest corner 1.10 m, Northeast corner 1.23 m and Southeast corner 1.27 m with the central 1.17 m. As a result, the excavation proper commenced at the spit of 10 cm for convinenicy and photograph taken at the end of each spit (Plate 4.4) till it got to level 12 (112cm; Plate 4.8).

The excavation yielded varieties of material remains, both organic and inorganic. These include pottery sherds, iron objects, slag (few), cowry shells, bivalve shells, animal bones, snail shells, grinding stones, flakes, tuyere fragments, baked clay, charcoal, palm kernel and plant seeds among others. These finds were then bagged according to their provenance and material. Throughout the levels, pottery sherds was the most frequent and most abundant of the materials. Although the quantity diminishes as the pit was getting deeper. Because of the vegetation of the area and cocoa plantation, roots of cocoa tress as well as other plants within the excavation area disturbed the material in-situ as the roots perched through potsherds, breaking some of them into smaller pieces. It made the excavation process slow (Plate 4.6. Also the exercise at this point did not go smoothly, as some of the local people raised objections to our digging at the site. This they viewed as an exercise to 'mine charcoal' because one of them heard us discussing the possibility of getting charcoal for dating.

At level eight (70-80cm), there was pronounced ash intrusion at the flank of the western and southern walls, thus, lumps of charcoal specks were collected. This level also produced a human tooth and mica. The sterile layer was reached at 110-120cm below the surface with compact lateritic sediment (Fig 4. 7). This is the bottommost unit. It is a very moist, fairly compact, fairly hard, silty clay deposit contains some tiny rootlets and it is completely devoid of cultural materials. It is Yellowish brown in colour (5YR 4/6 Munsell colour chart).

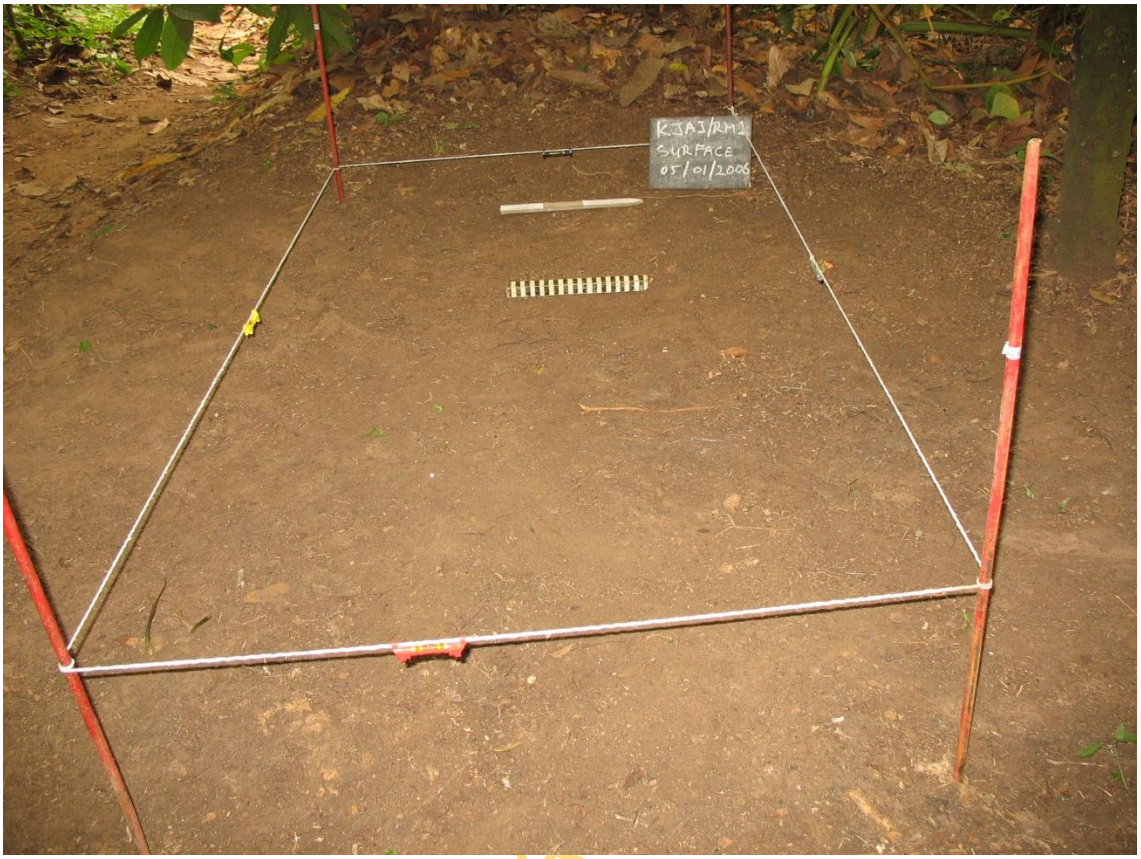

Plate 4.3: 1 by 2 metres pegged trench for excavation

At the end of the excavation and after taking soil sample for palynological analysis, the stratigraphy was drawn using the Munsel colour chart to discern the colour of each layer (Fig. 4.8). Finds were documented and sorted according to each layer (Table 5.1).

Plate 4.4: Spit level one

Plate 4.5: Excavation in Progress

Plate 4.6: Roots and rootlets occurred right from spit level one to level 10.

Plate 4.7: Sterile Layer of the Excavation

Plate 4.8: Measuring and Drawing of the Stratigraphic Units

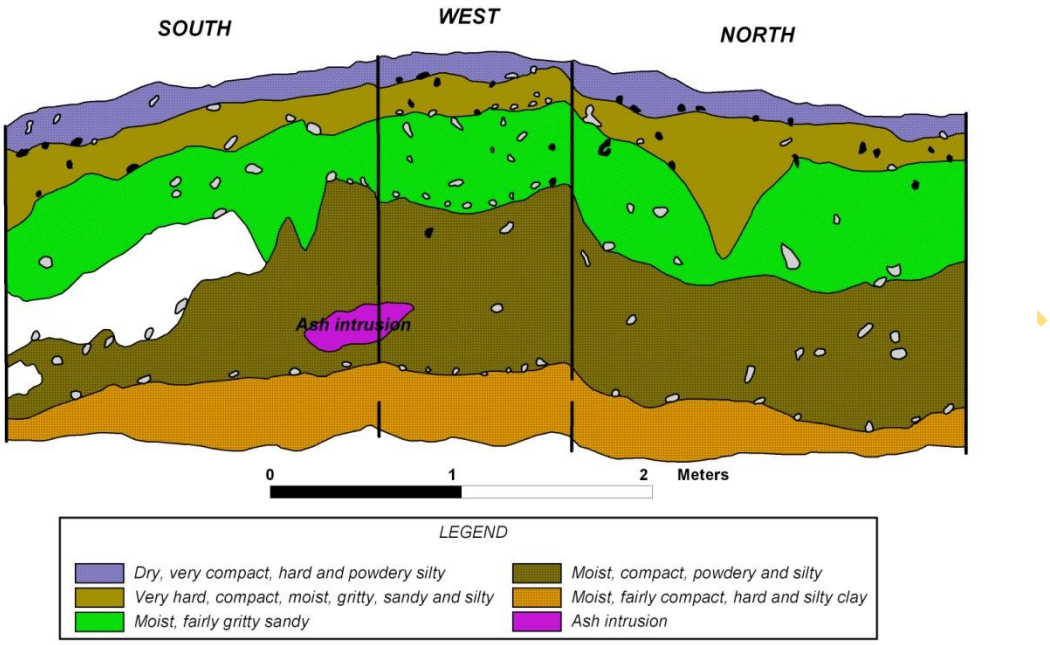

Fig. 4.6: Stratigraphy of Ajaba Mound Excavation

4.1.6: Stratigraphy Description

Layer 1: The top soil is a dry, very compact, hard, powdery silty deposit that breaks in clods. It contains abundant roots and rootless of various sizes, sits conformably on top of the uppermost cultural layer. Contains some compressed (weathered) cultural materials, especially potsherds.

Colour: The top soil is dark reddish brown in colour (5YR 2.5/2 Munsell colour chart). A thin potsherds line directly underlies it.

Layer II: The layer is a very hard, very compact, moist, gritty, sandy, silty deposit. It breaks in clods and contains some roots of varying sizes. It also contains abundant cultural materials (pottery, snail shells etc). Sits discomformably in the mid section of the north wall and contains some chunks of burnt bricks.

Colour: It is very dark grey in colour (5YR 3/1 Munsell colour chart)

Layer III: The layer is a moist, fairly gritty sandy silty deposit that contains very abundant burnt brick, some roots/ rootlet, chunks of varying sizes, charcoal specks, very abundant potsherds and broken parts of tuyeres.

Colour: It is reddish brown in colour (5YR 4/3 Munsell colour chart).

Layer IV: The layer is a moist, compact, powdery and silty deposit. It rolls between fingers when wet. It contains very abundant cultural materials (mainly pottery), some burnt brick chunks, some roots and rootlets, and snail shells among others. It is reddish brown in colour (5YR 4/3 Munsell colour chart).

Layer V: This is the bottommost unit. It is a very moist, fairly compact, fairly hard, silty clay deposit contains some tiny rootlets and it is completely devoid of cultural materials.

Colour: It is Yellowish brown in colour (5YR 4/6 Munsell colour chart).

CHAPTER FIVE
ANALYSES OF FINDS

5.1. Analyses of Finds.

Finds from this present excavation of Ajaba refuse mound 1(KJAJ RM1) were classified into organic and inorganic material. Organic materials were sorted out according to their type. Inorganic materials were sorted out according to the individual materials. Lithic, iron and ceramic materials were identified and classified. Apart from classifying ceramic into their decoration and morphological attributes, geochemical and mineralogical analysis of ceramics from previous and present i.e. Ajaba potsherd pavement and Ajaba refuse mound 1 (KJAJ PP and KJAJ RM1) excavations and materials from other sites in Osun [namely: Ipetumodu (IPC), Ikire (IKRE), Iresi (IRC) and Ile Ife (IFE 1,2,3)] were carried out. This is to enable us compare and relate their mineralogy and material contents with each other. Data derived from the geochemical and mineralogical analysis is expected to throw light on the ceramic source for Ajaba. The data derived from the analysis has also thrown light on interrelationships between the ceramic traditions from these four areas (Ipetumodu, Ikire, Ile Ife and Ajaba Kajola). Palynological analysis of soil samples collected from different layers of KJAJ RM1 was carried out to throw light on some aspects of past vegetation of the area.

5.1.1 General Artefact Inventory

Finds from KJAJ RM1 excavation consist of both organic and inorganic materials including metals (Table 5.1). As stated earlier, pottery sherds form the bulk of the finds from this excavation (3654 sherds). Other finds include iron objects (11pieces; Figs. 5.3-5.5), slag (5 pieces, Fig. 5.2), cowry shell (3), bivalve shell (13), animal bones (72; Fig. 5.1), Human tooth (1; Fig. 5.6), snail shells (175), lithics materials (63), flakes, tuyere fragment (16), baked clay/furnace fragment (96; Fig. 5.7), charcoal, palm kernel and plant seeds among others. During the excavation, finds from daily excavations were packed according to their spit levels. These finds were also separated based on the materials types (i.e. pottery, lithic and organic etc.). Each material type was also subjected to classification based on form. For instance the pottery sherds were classified according to forms and decoration. Further analysis of other finds such as iron, human tooth, snail shells, animal bones were also carried out.

Table: 5.1: General Artefact Inventory – Ajaba Refuse Mound I.

Level (cm)	Body Sherds	Rim Sherds	Undiagnostic Sherds	Perforated Sherd	Pot Lid Knob	Palm Kernel	Burnt Kernel	Snail Shell	Bivalve	Bone*	Metal Pieces**	Hearth	Slag	Lithics	Cowry	Tuyères (fragments)
0-10	371	34	-	-	2	9	-	20	-	1	-	47	2	8***	1	1
10-20	387	42	-	1	1	5	-	8	-	8^{1}	1	9	-	7^{++}	-	13
20-30	645	70	66	-	-	15	1	15	-	8^{2}	-	34	-	25^{++}	-	2
30-40	222	43	158	-	-	25	-	14	2	4	-	5	-	5^{++}	-	-
40-50	392	40	-	-	-	-	-	24	-	4^{3}	-	-	-	-	-	-
50-60	240	15	38	-	-	12	-	18	-	34	4	-	-	6^{++}	1	-
60-70	167	39	33	-	-	-	-	45	-	-	-	-	1	5^{++}	1	-
70-80	178	10	34	-	-	4	-	19	9	5	-	-	1	-	-	-
80-90	192	19	66	-	-	1	-	9	2	6	6	-	-	4^{+++}	-	-
90-100	75	4	35	-	-	1	-	2	-	2	-	1	1	-	-	-
100-110	26	2	4	-	-	-	-	1	-	-	-	-	-	3	-	-
110-120	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2898	318	434	1	3	72	1	175	13	72	11	96	5	63	3	16

(x = present; *** = Quartz or Granite flakes; + = 'Opoto' (*Ficus Capensis)*; ++ = Grinding stones present; 1 = 1 Phalanges, 1 pelvic bone and 6 fragments; 2 = 1 sternum, 1 vertebrae bone and 6 fragments; 3 = 1 Humerus and 3 fragments; +++ = Soap stone;

Plate 5.1: Jaw of an animal

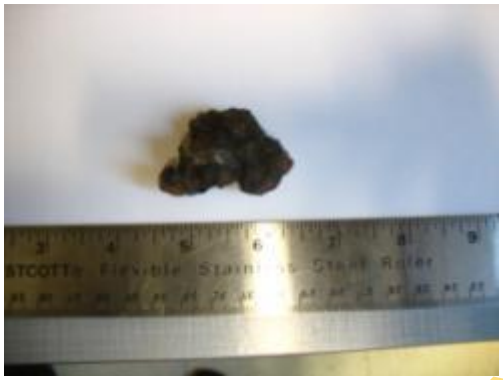

Plate 5.2: Iron slag

Plate 5.3: Iron Object

Plate 5.4 Iron Object

Plate 5.5: Comparing the Iron Objects

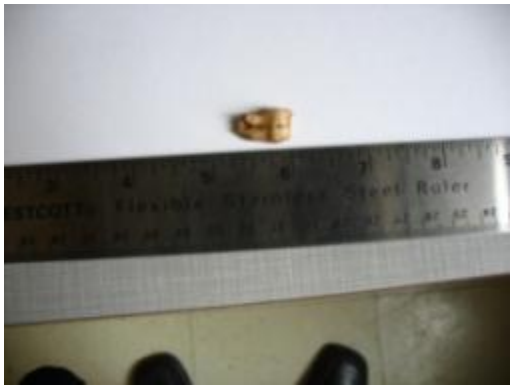

Plate 5.6: Human tooth

Plate 5.7: Baked clay/Fragment of Furnace?

5.1.2. Pottery Analyses

The nature of ethnographic ceramic research differs fundamentally from that performed by archaeologists in that the former examines whole pots in systematic context while the latter most often deal with vessel fragments from archaeological deposits (Bollong, 1994). Most often descriptive analysis is carried out without consideration for geochemical and mineralogical analysis of pottery sherds in order to relate these sherds from different sites to one another.

As observed, there is `no standard regional typological scheme developed for describing ceramic in Yoruba archaeology' (Aleru, 2006: 125). This set back is usually blamed on the inadequacy of ethno-archaeological research on Yoruba pottery' (Allworth-Jones 1996; Fatunsin 1992). Secondly most studies on Yoruba pottery have tended to focus mainly 'on procedures for pottery manufacture (forming the vessels, decoration and firing), types of raw materials, forms, types and functional attributes' (Aleru, 2006: 125). Also each researcher tends to use his/her own procedure depending on what he/she is aiming at. This has culminated into the present state of inadequate understanding of cultural relationships in Yorubaland. For a better understanding of human groupings and relations, culture process and movements of people among other things, pottery analysis from our area (Yorubaland in general and Osun North east in particular) we must proceed beyond technological and typological definitions (Aleru, 2006).

Since clay product is one of the most indestructible evidences of human existence, we therefore need to carry out thorough examination of clay products from this area and other sites within the area and Ile-Ife.

5.1.3: Pottery analysis KJAJ RM1

The bulk of the finds consist of pottery, which forms about 85.3% of the total finds compared to the non-pottery finds (14.7%). A total number of 3654 pottery materials were collected from the excavation. Of these a total of 3220 sherds were diagnostic. The pottery was classified into five major groups. These are body sherds, rim sherds, undiagnostic sherds, perforated sherds and pot lid with frequencies of 2898 (body), 318 (rim), 434 Undiagonistic sherd), 1 (perforated) and 3 (pot lid) respectively. Pottery materials occurred in all the levels, although the number pottery sherd decreases as we approached the sterile layer. Level 3 (20 cm - 30 cm) has the highest number of pottery (781) followed by level 5 (40 cm – 50 cm) with total

numbers of 432 pottery materials. Level 1 (0 cm – 10 cm) has 407 pottery while level 12 (110 cm – 120 cm) has the lowest number of 3 (Table 5.2).

5.1.4: Pottery Decoration Classification

The decoration types on the pottery materials were determined. Eighteen decoration types were discerned on the body sherds while thirteen were identified on the rim sherds. The morphological analysis was also carried out and form part of this discussion.

Plain body sherds, occurred in all levels and has the highest percentage occurrence with a total number (1088, 38.5%). This is followed by single twisted cord with a total number of 829 sherds. This amounts to 31.6% of the total body sherds. It occurs in all the levels apart from levels 10 and 12. Double twisted cord forms the third most frequently occurring decoration type. It is present in all the levels except levels 4 and 12. A total of 371 sherds were classified in this category. This is 15.1% of the total body sherds. Grooves and burnished sherds are also present in high numbers (185 and 125 respectively). Other decoration types recorded are painted, incision, bossing, scallops, circle stylus, herringbone design, carved roulette and groove/punctuate among others (Table 5. 2). Similarly, the rim sherds were also classified based on the decoration on them. Like with the body sherds, plain rims have the highest percentage occurrence (135 with 44.1%). However, unlike the body sherds, burnished rim sherds have the second largest percentage occurrence (74 sherds - 24.2%). Grooves have the third highest percentage occurrence with 25 rim sherds. This amounts to 8.2% of the total rim sherds. Other decoration types diagonised on the rims are single and double twisted cord and incision, among others (Table 5. 3).

5.1.5 Pottery Typological Classification

For cultures that produced pottery, archaeologists invariably spend a great deal of time defining ceramic "types." Each type is a series of attributes which distinguishes one group of pottery (whether whole vessels or potsherds) from all other groups of pottery, such that each type was produced in a single time and place. Ideally, the attributes used to identify types are ones that are identifiable with the naked eye, and are found on small fragments of pottery, so that the sorting of potsherds into types is quick and straightforward.

The use of a traditional ceramic typology allows one to compare different assemblages since the typology consists of a set of shared traits used by analysts. This type system permits the archaeologist to date a site without reliable chronometric data via comparison to known dated ceramic assemblages. This system also provides a basis of identifying locally produced and imported ceramics and their approximate source area. It also helps to identify the source or sources of ceramic as it relates to same group of community (Colton and Hargrave 1937).

In Yorubaland, clay transformation (pottery production) has given pottery products different names to distinguish their uses. The most important ones being, Ape (cooking pot), Amu (water-jar), isaasun (soup-pot) and oru (kettle) Ikoko (big cereal collection pot) and they are reflected all in the pottery classification of the Ajaba pottery (Fig. 5.1). Most transient of the pottery typology in Ajaba are *kolobo* (Fig. 5.1a), *isaasun* (soup pot Fig. 5.1b and c), *ape* (small cooking pot Fig. 5.1 d-f) and *ikoko* (big cooking or storage pot Fig. 5.1 g-i) and *amu* (water jar Fig. 5.1 j and k).

5.2. Geochemical and mineralogical Analysis

In drawing attribute inferences on the cultural-historical relationship among the people of Osun Northeast and between them and other parts of Yoruba land, most importantly with Ile-Ife, ceramics attributes, specifically, decorative motifs were used on one hand and geochemical and mineralogical analysis on the other. Also, the stylistic attributes of pottery are used to draw inferences on cultural historical relationship among settlements. The aim of any scientific study of ceramics should be considered from two frames of the production of pottery; (i) the technology; and (2) characteristics. A principal objective of the analysis is to elucidate the technology of pottery, the method by which clays were prepared, shaped, finished and fired (Rice 1999, Hodges 1968, Sayko 1965; Wirska (1967). In this work the aim is to use geochemical methods to answer the following questions:

(i) What are the compositional groups present in ceramics from different archaeological sites and how do they differ from each other?

(ii) What are the differences in manufacturing techniques?

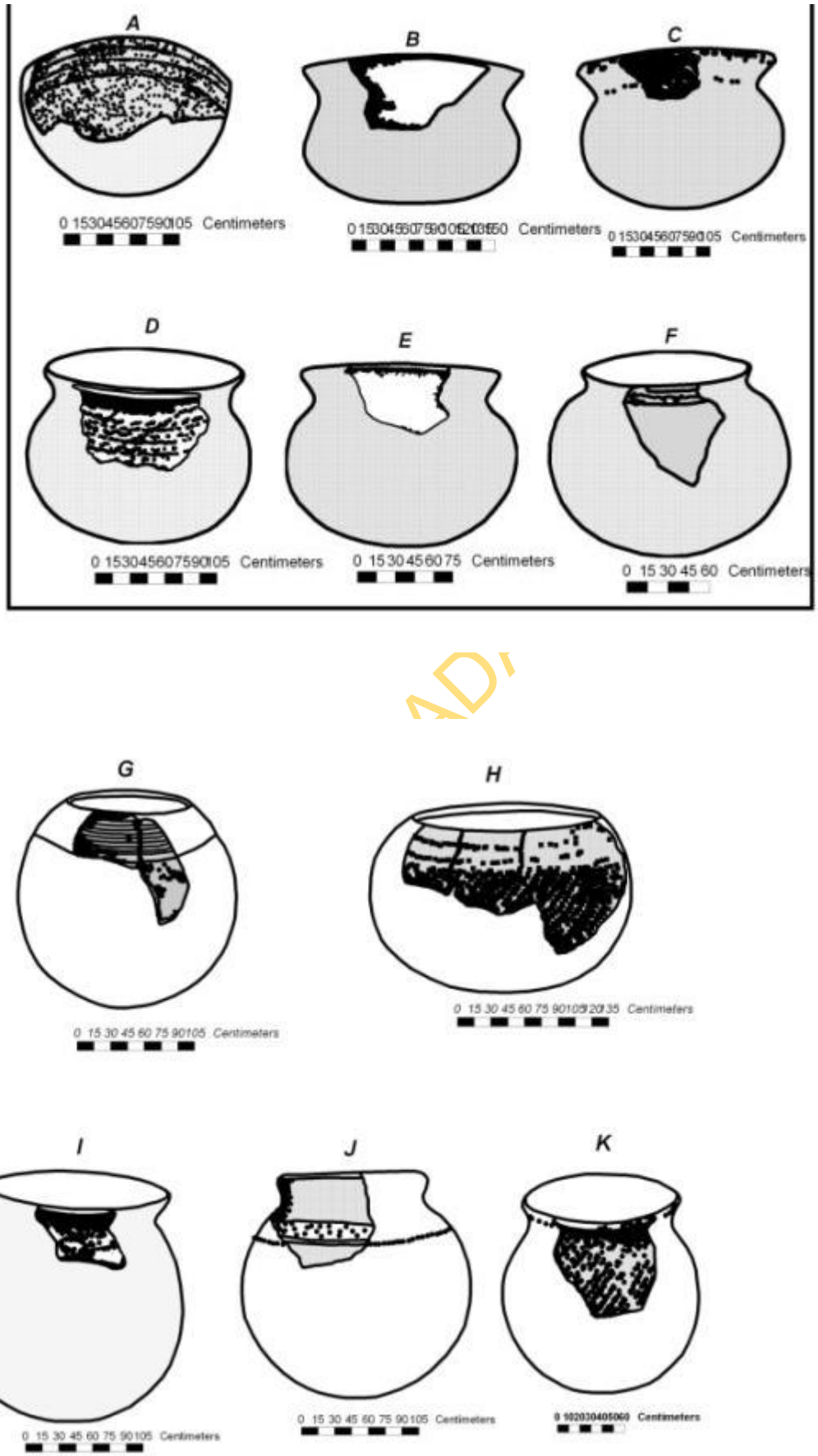

Figure 5:1: Pottery typology

Table: 5.2: Distribution of Major Pottery Decoration Types (Body)

Levels (cm)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	Total	%
Decoration Types														
Plain	179	70	313	64	92	86	91	51	100	29	10	3	1088	38.5
Burnished	6	41	24	12	9	2	1	13	11	-	6	-	125	4.4
Single Twisted Cord	136	112	248	107	96	80	-	54	33	22	4	-	892	31.6
Double Twisted Cord	17	60	78	-	90	46	31	29	12	4	4	-	371	13.1
Incision/Excision	4	-	-	-	-	-	-	3	1	-	-	-	8	0.3
Groove/Wavy Groove	13	7	13	16	20	21	32	14	28	19	2	-	185	6.5
Twisted Cord/Groove	-	-	20	23	8	-	-	2	-	-	-	-	53	1.9
Painted	-	-	-	-	-	-	2	4	2	1	-	-	9	0.3
Bossing	-	-	-	-	-	-	-	1	-	-	-	-	1	0.04
Carved Wooden Roulette-Checked Pattern	-	-	3	-	6	3	7	4	5	-	-	-	28	1.0
Wavy Groove/Twisted Cord Roulette	5	-	7	-	-	-	-	-	-	-	-	-	12	0.4
Groove/Twisted Cord	10	31	-	-	-	-	-	-	-	-	-	-	41	1.5
Scallops	-	-	2	-	-	-	2	3	-	-	-	-	7	0.2
Carved Wooden Roulette-Multiple Design	1	-	1	-	-	-	-	-	-	-	-	-	2	0.07
Boss/Twisted Cord	-	-	1	-	-	-	-	-	-	-	-	-	1	0.04
Circle Stylus	-	-	1	-	-	1	-	-	-	-	-	-	2	0.07
Herring Bone Design	-	-	-	-	-	1	-	-	-	-	-	-	1	0.04
Groove/Punctate	-	-	-	-	-	-	1	-	-	-	-	-	1	0.04
Total	371	321	711	222	321	240	167	178	192	75	26	3	2827	100

Table: 5.3: Distribution of Major Pottery Decorations (Rims)

Levels	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	Total	%
Plain	26	18	32	14	10	1	16	5	8	3	2	135	44.1
Burnished	5	14	13	7	13	6	8	1	7	-	-	74	24.2
Single Twisted Cord	-	-	7	4	-	3	4	-	-	-	-	18	5.9
Double Twisted Cord	-	4	-	-	7	2	-	-	-	-	-	13	4.2
Incision/Excision	-	-	1	-	6	-	-	-	1	-	-	8	2.6
Groove/ Wavy Groove	1	-	-	7	-	2	11	1	3	-	-	25	8.2
Twisted Cord/Groove	1	-	-	-	2	1	-	-	-	-	-	4	1.3
Groove/Twisted Cord	2	2	-	4	-	-	-	-	-	-	-	8	2.6
Boss/Twisted Cord	-	-	1	-	-	-	-	-	-	1	-	2	0.7
Wavy Groove/Twisted Cord	-	-	4	-	-	-	-	-	-	-	-	4	1.3
Excision	-	1	10	-	-	-	-	-	-	-	-	11	3.6
Wavy Excision	-	2	-	-	-	-	-	-	-	-	-	2	0.7
Twisted Cord/Punctate	-	-	1	-	-	-	-	1	-	-	-	2	0.7
Total	35	41	68	36	38	15	39	8	19	4	2	306	100

Plate 5. 8 Plain

Plate 5. 9 Carved roulette

Plate 5. 10 Plain rim/Twisted cord

Plate 5. 11: Roulette

Plate 5. 12: Groove/Wavy Groove

Plate 5. 13. Twisted cord

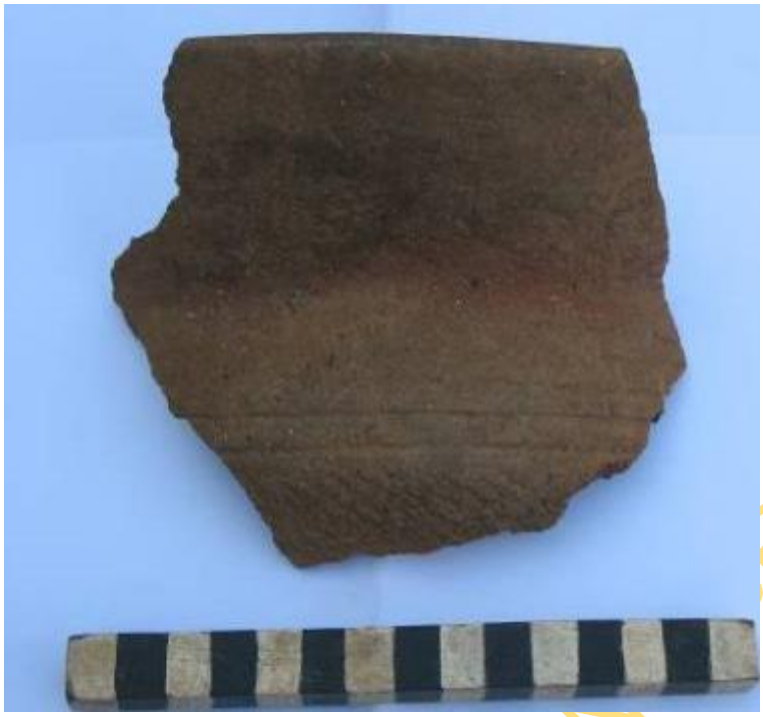

Plate 5. 14: Incision/roulette

Plate 5. 15: Plain

Plate 5. 16: Bosing/Twisted Cord

Plate 5. 17: Wavy/Groove

Plate 5. 18: Composite

Plate 5. 19 Burnished

Plate 5. 20 Burnished/Grooved

Plate 5.21 Incision

Plate 5.22: Perforated Pottery

Plate 5.23 Painted

(iii) Is conflict, war, displacement and migration a factor in technological evolution of the ceramics?

(iv) Are the clay compositions a reflection of the local geology?

Sourcing or chemical fingerprinting of archaeological materials is becoming increasingly important in our understanding of prehistory, especially in helping to reconstruct past mobility and exchange systems. Obsidian, andesite and basalts sourcing, has been a mainstay in provenance studies (Jones et al. 1997), but recent attempts to source steatite or soapstone (Allen et al. 1975; Ige and Swanson 2008), and even trees (Durand et al. 1999) have shown that these lines of inquiry can be quite informative. Despite success in many areas worldwide with sourcing pottery (Bishop et al. 1988; Lynott et al. 2000), this avenue of research has been virtually ignored by Nigerian archaeologists. A recent pilot project in the Igbomina area of the northern part of Yorubaland using instrumental neutron activation analysis (INAA) (Usman et al. 2005) is a significant contribution to the characterization of these objects. As a whole, chemical analyses of ceramic in Nigeria lag far behind the analysis of other artifact categories. It is hoped that this work will further add significant data to the technological evaluation of ancient Yoruba pottery technology.

The aim in this present analysis is to address this problem by creating a typology based on chemical properties of prehistoric southwestern Nigerian ceramics using ICP-MS and other analytical facilities. The goal of the study is similar to that of lithic sourcing, that is, to divide artifacts on the basis of where they are from. It is assumed however, that this goal will not be as straightforward as in lithic sourcing (Steponaitis et al., 1996). This is because clay is relatively common and clay sources are generally larger than obsidian source zones, thus making ceramic sourcing less accurate than obsidian sourcing in a spatial sense. Moreover clays form under a number of conditions and are often mixed with other source clays thus creating a continuous distribution of chemically varying clays across an area, unlike obsidians. Finally, raw clay is subject to a number of transformations by people before it actually becomes a pot and ultimately a sherd in the archaeological record (Arnold et al., 1991; Blackman, 1992). At the Materials and Archaeometry Unit of the Natural History Museum, Obafemi Awolowo University, Ile-Ife, there is an ongoing long-term effort to characterize the provenance of archaeological artifacts from the Yoruba area of southwestern Nigeria (Ige and Ogunfolakan, 2001; Ige and Rehren, 2003; Lankton et al., 2006; Ige and Swanson, 2008).

5.2.1. Materials and Methods (Pottery Description for geochemical analysis)

The sherd samples for the analysis are mostly from body part of pottery vessel. Rim portions of pottery vessels were also used (although this is rare). Generally, the sherds for this present analysis are decorated. Some of them are plain and burnished sherds. Fabric wise, some are coarse while some are fine-grained. Majority of them also came from potsherd pavement. Potsherd pavements are common in Ile-Ife and other Yoruba towns and even as far as Togo and Benin Republics. It is a West African cultural phenomenon. In Ile Ife and related areas the potsherd pavements are stylistically herringbone in structure. In Old-Oyo, Togo and related areas they are structurally laid flat on the ground. In order to have a good representation of the pottery geochemical analysis, sherds were collected from six different sites with three sites coming from the study area. These sites include Iresi, Ajaba and Ila-Orangun, and Ipetumodu, Ikire and Ile-Ife outside the study area.

5.2.1.1. Ile Ife

In Ile-Ife sherds each were retrieved from two different sites. These are the Iloran and Mologun ancient communities, representing aborigine, pre-Oduduwa (97 Samples IFE series) and Ita Yemoo (100 IFE FUV series) representing Oduduwa settlements. Here we also retrieved several fragments of glass making crucibles. These samples were retrieved from different layers, ranging from 14cm to 1.4 metre depth. Samples from other sites from Ile-Ife came from abundant surface scatters at Mologun, Iloran, Ita Yemoo. Most of these sherds are fine- grained in fabrics. They are mostly brown in colour although, some exhibit some dark colour. Some are decorated while some are smooth surface. In addition, majority of them have mica as inclusion. Sherds from Ita-Yemoo came from a disturbed layer of about 35cm when a foundation of a building was being dug (Plate. 5.25). It came from the line of a potsherd pavement within the foundation dug for the building (Plate. 5.26). Sherds from other parts are from pavement scatters. The sherds' thickness ranges from 0.5cm to 1.5cm.

5.2.1.2 Ajaba

For the geo-chemical analysis, samples were also taken from Ajaba. Samples are taken from the sherds from both pavement and cultural mound excavations of an abandoned settlement dated by radio carbon 14 methods to between the 13th and 17th

centuries (Ogunfolakan, 2007). Both pavement and mound are about 140 m apart. The pavement is part of the Kajola abandoned settlement and oral tradition noted that it was initially a sacred grove.

Potsherd samples from Ila-Orangun, Ikire and Iresi were retrieved from different disturbed layer ranging from 10 cm to 1.4 metre deep. Sherds from Ajaba came from excavations of both pavement and cultural mound. The pavement site was exposed at the middle of a road along Iresi-Ajaba road when the road was being graded. Both pavement and mound sites are about 240 metres apart. The mound is towards the north-eastern part of the pavement. The pavement layer is about 30cm from the surface. The mound depth after excavation is about 1.2 metres. The sherds came from different layers. Unlike sherds from Ife, sherds here are mostly of coarse in texture. They also have mica inclusions while a few are fine-grained in texture.

5.2.1.3 Iresi

Sherds from Iresi came from a rockshelter (Plate. 3.11). The morphology of some of them can be distinguished. They are mainly from pot body. One is black in colour whilst others are dark-brown.

5.2.1.4 Ila-Orangun

Sherds from this site came from pavement scatters. Erosion and human factors have greatly exposed this pavement to destruction. They are of coarse and fine grained in fabrics. They are decorated and came mostly from pot body. Like most of the sherds from this region, they contain mica as inclusion. They are brown in colour.

5.2.1.5 Iragbiji

The sherds from Iragbiji came from a pavement site. They are of fine grain in fabric. They are brown and dark-brown in colour. Only one is decorated.

5.2.1.6 Ipetumodu

Sherds from Ipetumodu came from excavation of an iron smelting site.

5.3 Geochemical Analytical Methods:

Ten thin sections were made from selected samples from each site for petrographic examination. Out of the samples about three samples representing the

Plate 5.24: Sherds for geochemical analysis from Iloran (Ile-Ife) ancient community

Plate 5.25: A building under construction at Ita-Yemoo, Ile-Ife

Plate 5. 26: Cutting through potsherd pavement during excavation of a building foundation at Ita-Yemoo, Ile-Ife

Plate 5.27: Sherds from Ajaba Pavement excavation for Geochemical analysis

Plate 5.28: Sherds from Ajaba Mound Excavation for Geochemical analysis

Plate 5.29: Sherds from Iragbiji for Geochemical analysis

Plate 5.30: Sherds from Iresi for Geochemical analysis

characteristic mineralogy were selected for geochemical analyses. In all, 21 samples were selected for major, trace and rare earth element analyses. IFE RAW1 is a sample of decomposed granite gneiss, near a clay deposit from Ile-Ife which was analysed as a possible source rock for the clay used in making Ife pots. A portion of each potsherd was ground to a particle size of 5–10 mm using a cobalt ball mill. 10 major elements, 31 trace and rare elements have been measured. Maximization of the number and range of elements was important because it was not known beforehand what types of elements or combination of elements, if any, might be important in distinguishing regional clay and pottery assemblages.

For non-refractory trace elements (Mo, Cu, Pb, Zn, Ag, Ni, As, Au, Cd, Sb, Bi, Hg, Tl, and Se), 0.25 g of each sample was leached with hot aqua regia at 95^{o}C for one hour. For refractory elements (Ba, Be, Co, Cs, Ga, Hf, Nb, Rb, Sn, Sr, Ta, Th, U, V, W, Zr, and Y) and rare earth analysis, 0.5 gm sample was fused with LiBO4/LiB2O7 and leached with nitric acid. Geochemical analyses were carried out using Inductively Couple Plasma Mass Spectrometry (ICP-MS) at ACME analytical laboratories in Vancouver Canada. Detection for trace and rare earth element analytical precision calculated from replicate analysis of one sample (IKC) is better than _1% (table 5.2). Chondrites REE were normalized after abundances of chondrites in Wakita *et al*, 1971. To assist in the creation of reference groups, a principal components analysis (PCA) was performed on the ICP-MS trace and rare earth element data. PCA is a convenient way to capture and view complex multidimensional data, such as compositional data composed of 31 different dimensions (i.e., elements) in a much smaller number of dimensions (Eekens et al. 2002.) We used PAST Software developed by Hammer *et al* 2001, updated 2006. PCA is particularly effective when the original variables are correlated, as is expected with compositional data from discrete chemical sources.

5.3.1 Results and discussion

The description of the mineralogical and geochemistry analysis is given here. The result of the analysis is also discussed.

5.3.2 Mineralogical Analysis

Sherds from Ife are grouped into two according to location. Group one consists of samples IFE 1-3. The non-plastic materials consist of broken quartz and

Table 5.4 Major element composition of pavement samples and raw materials

Sample	SiO_2	Al_2O_3	TiO_2	Fe_2O_3	MgO	K_20	CaO	Na_2O	P_2O_5	MnO
{IRC-1}	67.18	16.73	4.53	0.58	2.42	0.02	1.61	0.02	0.33	0.12
{IRC-2}	68.01	17.23	0.77	5.11	0.47	2.45	0.01	1.31	0.31	0.34
{IRC-3}	66.88	16.98	0.91	4.82	0.59	2.05	0.03	1.23	0.31	0.11
{IPC 1-1}	67.12	15.84	1.34	7.13	0.72	2.38	0.19	0.84	0.38	0.15
{IPC 3-2}	66.89	18.**33**	1.15	6.43	0.48	2.42	0.05	1.26	0.32	0.06
{IPC 3-7}	67.12	15.85	1.43	7.59	0.58	1.77	0.06	0.95	0.33	0.07
{IPC 5-4}	66.95	16.12	0.78	8.12	0.45	1.94	0.04	1.21	0.41	0.12
{IKRE1}	67.12	17.04	0.69	4.72	0.59	2.33	0.01	1.29	0.35	0.09
{IKRE3}	67.66	17.09	0.75	5.22	0.55	1.65	0.03	1.12	0.35	0.12
{KP 3}	70.12	16.79	0.74	3.56	0.32	3.14	0.12	1.31	0.29	0.14
{KPC 1}	69.98	16.96	0.88	4.65	0.34	3.13	0.01	0.94	0.41	0.18
{KPC 2}	70.12	16.12	0.76	3.88	0.31	4.11	0.12	0.96	0.27	0.17
{KM 1}	69.56	15.18	0.71	4.12	0.45	4.23	0.02	1.16	0.34	0.15
{KM3}	66.87	18.12	0.70	5.07	0.44	3.44	0.03	1.45	0.32	0.09
{KM 4}	67.12	17.99	0.64	5.88	0.34	3.12	0.03	1.94	0.33	0.11
{IFE RAW1}	69.09	17.01	0.45	2.55	0.71	3.54	0.92	1.56	0.27	0.07
{IFE 1}	68.89	17.36	1.02	3.99	0.77	1.89	0.03	1.12	0.31	0.12
{IFE 2}	68.27	17.01	0.99	4.22	0.69	2.67	0.06	0.97	0.27	0.14
{IFE 3}	69.03	17.19	0.88	3.77	0.72	2.45	0.05	1.84	0.28	0.18
{IFE FUV1}	68.77	16.12	1.24	5.12	0.68	1.56	0.06	1.43	0.25	0.15
{IFE FUV2}	67.23	16.55	1.33	4.55	0.88	2.12	0.03	1.44	0.4	0.17

Table 5.5 Trace element composition of potsherds from southwestern Nigeria

Sample	Ba	Be	Co	C	Ga	Hf	Nb	Rb	Sn	Sr	Ta	Th	U	V	W	Zr	Y
{IRC-1}	317	3	34.4	1.5	25.2	6	17.3	22.8	3	282.3	0.8	2.4	0.7	205	75.1	221.2	19.3
{IRC-2}	486	5	25.7	7.5	24.1	8.5	16.7	72.9	6	65.6	0.9	4.1	6.7	166	70.7	308.5	26
{IRC-3}	386	3	21.3	2.7	24.8	6.4	11.1	28.6	4	457.3	1	8.2	4.1	118	62	238.3	17.1
{IPC 1-1}	713	3	21.4	4.4	19.3	21.7	20.1	110.6	3	121.1	1.6	19.5	4.7	72	122.4	722.3	37.4
{IPC 3-2}	756	2	16.5	4	17.5	19	19.3	104.2	2	119.2	1.4	19	4.1	77	69.7	669.8	30.9
{IPC 3-7}	3279	2	17.7	1.8	22.4	26.2	18.5	105.1	2	461.1	0.9	1.7	1.5	88	49.2	1055	16.1
{IPC 5-4}	656	3	32.7	4.5	18	19	18.8	105.1	3	114.8	1.6	14.8	3.7	72	165.4	647.4	40.1
{IKRE1}	343	3	37.2	1.2	27.9	4.3	10.6	40.1	6	301.3	0.7	2	1.8	197	85	155	21.4
{IKRE3}	1260	5	48.6	1.1	23.6	13.5	22.9	63.2	4	646.3	1.7	13.2	1.5	152	294.6	514.7	49.2
{KP 3}	270	2	190.5	1.6	8.9	1.9	5.9	23.2	1	13.6	0.6	4.1	1	236	56	62.4	10.8
{KPC 1}	143	2	126.5	1.3	8.5	2.6	8.9	20.2	2	14.6	1	3.6	0.9	119	64.1	91.8	14.7
{KPC 2}	243	2	175	1.5	10.5	27.1	21.9	1	11.3	0.5	3.5	1	153	56.9	68.7	12.6	
{KM 1}	543	4	32.7	7.2	22.7	5.7	16	97.7	2	93.9	1.2	10.2	1.9	128	86.7	189.5	31.8
{KM3}	472	5	66.5	4.4	16.3	5.4	13.8	87	2	34.3	0.9	10.8	2.3	151	57.7	194.1	34.1
{KM 4}	498	11	56.1	8.6	22.6	7.3	26.9	1	10.2	9	40.4	2.6	8.2	2	176	78.7	251.4	43.4
{IFE RAW1}	409	2	36. 6	9.9	16.8	4.4	12.3	133.5	3	159.7	1.1	7.6	1.5	126	169.5	144.5	25.1
{IFE 1}	421	3	23.5	2.8	20.8	17.7	21.1	40.9	3	284.7	1.1	3.3	1	185	51.9	665.6	28.6
{IFE 2}	435	2	42.3	3.2	22.1	11	18.4	47	3	292.4	1.1	2.7	0.5	208	160.9	401.4	23.8
{IFE 3}	3169	2	17.4	2.3	22	41	25.1	138.2	2	313.3	1.2	3.2	2.3	106	48.2	1674	16.6
{IFE FUV1}	967	2	29.7	13.9	30.1	3.5	19.4	213.1	13	60	3	7.7	4.9	28	361	109.4	31
{IFE FUV2}	958	2	29.6	13.8	29.9	3.7	20	210.7	12	57.6	2.9	8.2	5	26	364.3	108.8	30.5

Table 5. 6 Rare earth element composition of potsherds from south-western Nigeria

Sample	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
{IRC-1}	21.5	56.5	6.75	27.6	6.04	1.49	5	0.58	4.09	0.61	1.95	0.2	1.88	0.16
{IRC-2}	49.8	97.9	13.2	55.7	10.01	2.23	7.99	0.91	5.63	0.84	2.6	0.27	2.29	0.22
{IRC-3}	26	79.1	6.55	26.4	4.38	0.9	3.43	0.42	3.21	0.51	1.88	0.19	2.07	0.2
{IPC 1-1}	72.1	156.9	16.82	64.3	10.68	1.15	8.96	1.08	6.91	1.13	3.62	0.42	3.52	0.43
{IPC 3-2}	59.8	129	14.26	54.5	9.51	1.09	7.73	0.94	6.32	0.93	3.06	0.34	2.99	0.33
{IPC 3-7}	35.4	68.3	8.72	37.9	5.82	2.19	4.45	0.4	2.88	0.43	1.49	0.13	1.51	0.15
{IPC 5-4}	52.2	113.6	12.16	47.6	8.12	1.04	7.01	0.91	6.89	1.23	4.03	0.49	3.86	0.47
{IKRE1}	30.1	59.8	9.07	41	7.63	1.75	6.22	0.63	4.31	0.63	1.91	0.16	1.58	0.12
{IKRE3}	112.5	154.6	28.13	108.6	18.1	3.88	14.73	1.64	9.73	1.48	4.3	0.49	3.06	0.42
{KP 3}	12.8	27.8	3.42	13.8	2.76	0.48	2.36	0.24	2.15	0.31	1.17	0.1	1.27	0.07
{KPC 1}	12.2	24.9	3.37	14	2.66	0.45	2.47	0.3	2.67	0.42	1.53	0.11	1.39	0.1
{KPC 2}	13.3	32.5	3.67	15.7	2.92	0.55	2.58	0.28	2.29	0.35	1.36	0.11	1.35	0.1
{KM 1}	43	82.3	10.56	41.1	7.57	1.44	6.6	0.83	5.73	0.92	3.29	0.34	2.91	0.31
{KM3}	39.3	78.7	10.63	42.3	8.1	1.6	6.97	0.91	6.59	1.07	3.72	0.42	3.82	0.43
{KM 4}	29.4	67.1	8.54	34.8	7.22	1.5	7.15	1.02	7.64	1.43	5.04	0.56	4.54	0.55
{IFE RAW1}	24.1	53.2	6.15	23.7	4.85	1.14	4.33	0.5	4.28	0.67	2.63	0.26	2.74	0.27
{IFE 1}	38.1	71.4	10.48	43.4	7.92	1.95	6.97	0.77	5.51	0.88	2.97	0.3	2.68	0.26
{IFE 2}	37.3	74.3	10.77	45.6	8.51	1.81	6.56	0.7	5.04	0.71	2.61	0.23	2.48	0.19
{IFE 3}	29.6	68.4	7.47	31.3	5.54	1.76	4.51	0.41	3.34	0.51	1.95	0.17	2.12	0.19
{IFE FUV1}	43.2	72.4	10.73	40.8	7.5	1.48	6.45	0.78	5.62	0.82	2.75	0.26	2.46	0.21
{IFE FUV2}	44.1	76.4	10.87	41.1	7.59	1.5	6.37	0.76	5.44	0.82	2.79	0.24	2.55	0.2

Table 5.7: Chondrite normalized rare earth element composition of potsherds and granite regoliths from southwestern Nigeria

Sample	La/N	Ce/N	Pr/N	Nd/N	Sm/N	Eu/N	Gd/N	Tb/N	Dy/N	Ho/N	Er/N	Tm/N	Yb/N	u/N
{IRC-1}	63.2	62.0	56.3	43.0	30.0	30.5	19.2	12.3	13.6	7.8	9.8	6.3	8.5	4.7
{IRC-2}	146.5	107.7	110.0	87.0	50.1	12.3	30.7	19.4	18.8	10.8	13.0	8.4	10.4	6.5
{IRC-3}	76.3	86.9	54.6	41.3	21.9	15.8	13.2	8.9	10.7	6.5	9.4	5.9	9.4	5.9
{IPC 1-1}	212.0	172.0	140.2	100.5	53.4	14.9	34.5	23.0	23.0	14.5	18.1	13.1	16.0	12.6
{IPC 3-2}	175.0	141.0	117.9	85.2	47.6	30.0	29.7	20.0	21.1	11.9	15.3	10.6	13.6	9.7
{IPC 3-7}	104.0	75.0	72.1	59.2	29.1	14.2	17.1	8.5	9.6	5.5	7.5	4.1	6.9	4.4
{IPC 5-4}	153.5	124.8	100.5	74.4	40.6	24.0	27.0	19.4	23.0	15.8	20.2	15.3	1 7.5	13.8
{MIFE 1}	88.5	65.7	75.0	64.1	38.2	53.2	23.9	13.4	14.4	8.1	9.6	5.0	7.2	3.5
{MIFE 3}	331.0	170.0	232.5	169.7	90.5	6.6	56.7	34.9	32.4	19.0	21.5	15.3	16.4	12.4
{KP 3}	37.6	30.5	28.3	21.6	13.8	6.2	9.1	5.1	7.2	4.0	5.9	3.1	5.8	2.1
{KPC 1}	35.8	27.4	27.9	21.9	13.3	7.5	9.5	6.4	8.9	5.4	7.7	3.4	6.3	2.9
{KPC 2}	39.2	35.7	30.3	24.5	14.6	19.7	9.9	6.0	7.6	4.5	6.8	3.4	6.1	2.9
{KM 1}	126.5	99.5	87.3	64.2	37.9	21.9	25.4	17.7	19.1	11.8	16.5	10.6	13.2	9.1
{KM3}	115.6	86.5	87.9	66.1	40.5	20.5	26.8	19.4	22.0	13.7	18.6	13.1	17.4	12.6
{KM 4}	86.5	73.7	70.6	54.4	36.1	32.2	27.5	21.7	25.5	18.3	25.2	17.5	20.6	16.2
{IC 1}	227.6	134.5	149.9	105.0	51.6	17.4	29.6	16.6	16.4	9.0	11.6	6.3	9.4	4.4
{IC 2}	175.0	119.0	110.5	78.8	47.6	12.1	32.4	23.4	25.4	15.5	21.4	14.4	17.7	12.4
{IC 3}	156.7	92.3	91.6	60.3	28.5	12.7	16.6	8.1	9.3	5.3	7.6	3.1	6.2	2.1
{IC 4}	422.0	383.0	305.3	204.7	116.5	15.6	69.8	46.2	43.4	26.5	33.5	22.8	25.3	18.5
{IFE RAW1}	70.8	54.5	50.8	37.0	24.3	26.7	16.7	10.6	14.3	8.6	13.2	8.1	12.5	7.9
{IFE 1}	112.0	78.5	86.6	67.8	39.6	24.8	26.8	16.4	18.4	11.3	14.9	9.4	12.2	7.6
{IFE 2}	110.0	81.5	89.0	71.3	42.6	24.1	25.2	14.9	16.8	9.1	13.1	7.2	11.3	5.6
{IFE 3}	87.0	75.2	61.7	48.9	27.7	20.3	17.3	8.7	11.1	6.5	9.8	5.3	9.6	5.6
{IFE FUV1}	127.0	79.5	88.7	63.8	37.5	20.5	24.8	16.6	18.7	10.5	13.8	8.1	11.2	6.2
{IFE FUV2}	129.0	84.0	89.8	64.2	38.0	0.0	24.5	16.2	18.1	10.5	14.0	7.5	11.6	5.9

mica grains, which are uniformly distributed, with a significant absence of feldspars. There is also the presence of green amphibole, which is identified to be hornblende. The second group consists of IFE FUV1 and 2. Mineralogically, they are characterized by very fine and uniformly distributed quartz crystals, mica as well as inclusions of feldspars. No other minerals could be identified.

Potsherds from Ipetumodu (IPC) are characterized by inclusions of quartz and feldspar, the latter are very few although uniformly scattered. Other mineral inclusions are hematite, tourmaline and hornblende.

Potsherds from Ikire (IKRE) are characterized by inclusions, highly weathered coarse crystals of quartz, mica and feldspars. The major non-plastic components of the Iragbiji sherds consist of abundant scattered medium size quartz and mica. There is complete absence of feldspar which is a reflection of the quartz mica bedrock geology. Other minerals include hematite, ilmenite and tourmaline.

The Ila-Oragun samples are highly enriched in fine grained quartz and large mica crystals. Archaeological potsherds from Ajaba (KPC) are characterized by abundant medium-grained mica, feldspar and quartz. Tourmaline was also identified.

In all, the predominant mineralogy of the sherds for all six sites is quartz, mica, and varying amounts of feldspar, with traces of tourmaline, ilmenite and amphiboles. Thus, there appear to be no temporal or pronounced regional changes in the mineralogy of the sherds.

5.3.3 Geochemical Description

Major, trace and rare earth element data of sherds, together with one sample of regolith from a granitic protolith are presented in Tables 5.4 – 5.7. Sample IFE RAW is used as a reference material. This is a sample from a regolith from granite gneiss bedrock.

The results of major element analysis (Table 5.5) show only small variation among the samples in spite of geographical separation. This is clearly demonstrated by the diagram SiO^2–Al^2O^3–K^2O where all samples plot close together. From the composition of trace elements, most samples are broadly similar in composition. The unsystematic variation in trace element is due to the high mobility of these elements. The lines joining the data points of the analyses for each of the sherds and the raw material have patterns showing a striking resemblance to each other. When compared to the sample of granite regolith (IFE RAW1) the sherds largely follow the elemental

patterns of the raw material. The elements mostly affected by the alteration processes in ceramics are Ca (Calcium) and the alkali metals Cs (Cesium), Rb (Rubidium), K (Potasium) and Na (Sodium) are also considered to be soluble elements and are depleted easily (Schwedt et al., 2003). The concentrations of Cs and Rb are controlled mainly by the presence of K-feldspar and mica where Cs and Rb substitute for K. The contents of elements Y (Yttrium), Th (Thorium) and Ta (Tantalum) are generally low to moderate.

The REE, Th and Sc (Scandium) are considered to be the most confident elements for provenance studies of ancient ceramics because these elements are insoluble and the effects of metamorphism, weathering and diagenesis upon them are minor. On the normalized REE diagrams, all the pottery sherds show typical granite signature when compared to the analysis of a granite regolith. Despite the differentiations due to some variation in element concentrations, most of the analyzed potsherd and raw material present chemical similarities pointing to the use of the same kind of raw materials for producing the ceramics. Moreover REE pattern of most sherds are similar to that of the raw materials. The outliers are from Ipetumodu which came from a smelting site and Ila-Orangun whose bedrock is composed of quartzites and quartz mica, amphibole schist. The distribution curves of average REE composition from each locality normalized to chondrites are quite similar to each other and display a negative Eu-anomaly and depletion toward HREE. This pattern falls close to granite-derived saprolite (Fig.5.1). The elemental concentrations obtained from ICP-MS were used as variables in the statistical treatment. We used the Pass (Hammer et al., 2001) packet, cluster analysis, and principal components analysis. In the cluster analysis, we used Euclidean distance as a measure in n-dimensional space. As a result of the cluster analysis, the samples were divided into two groups, the Ife group and the Ipetumodu group, determined from the chemical composition of these groups (Fig. 5.2). The principal component analysis (PCA) was used to identify the significant elements that contributed to each cluster. There is only one major cluster with one sample each from the IP and IF series forming a lesser cluster. Using both trace and REE at 95% confidence level all samples except IP and one IFE fall within the 95% confidence ellipse showing that the potsherd have a common history or source materials and correlate with the geologic setting.

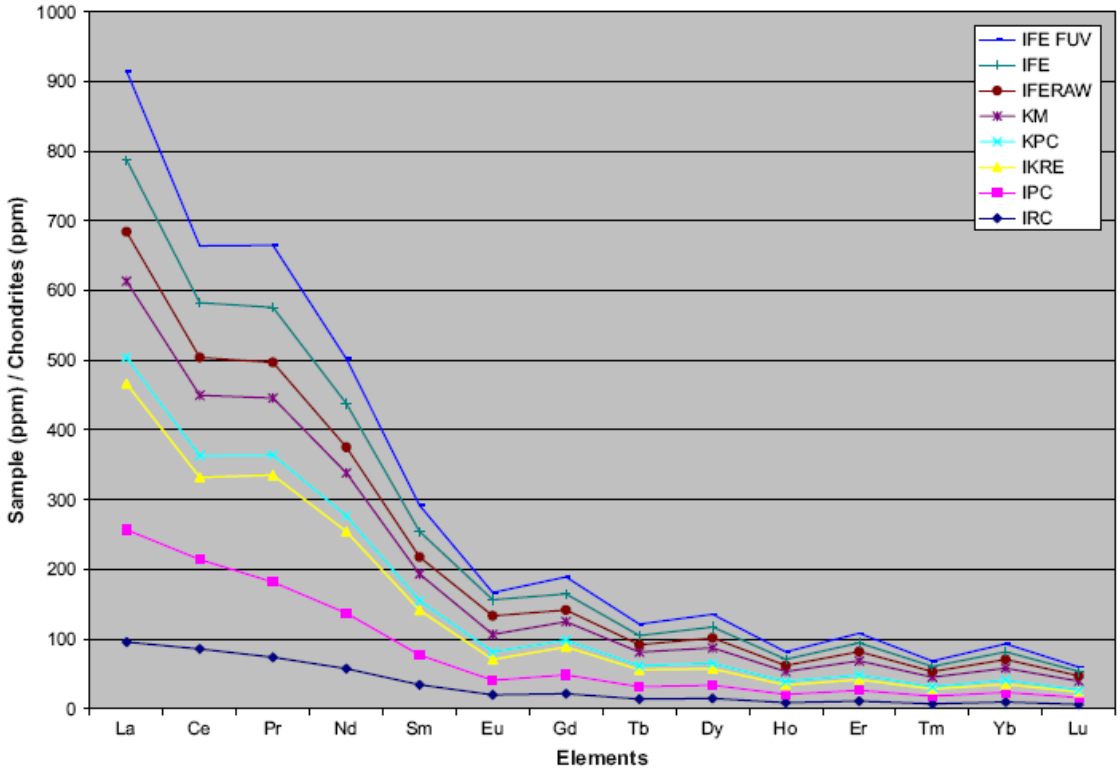

Fig. 5.2: REE patterns of sherds normalized to chondrites and compared to patterns of regolith (IFERAW) from granite.

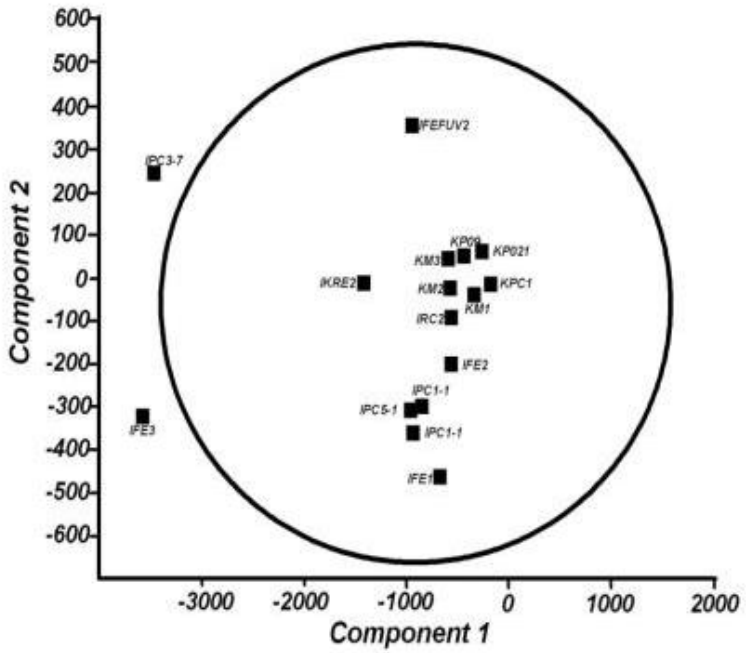

Fig. 5.3: Principal Component analysis and Cluster

5.4 Palynological Analysis

It is now very well known that archaeological investigations are more comprehensive if carried out within an environmental context; consequently, in order to ascertain the botanical environment of Ajaba and the interaction of the people with this environment, a palynological study of some of the excavated soil samples was carried out.

Since the pioneering work of Lennart von Post in 1916, there have been great advances in the application of palynology in palaeo-environmental studies and relative dating. Lennart von Post in 1925 was the first to examine fossil pollen from archaeological sites (Bryant and Holloway, 1996). Palynology subsequently has been employed with great success in many archaeological researches throughout the world.

The palynological analyses of excavated soil samples, human coprolites and fossilized honey, for example, have shed light on prehistoric diets, food preparation techniques and subsistence economies, human impact on the natural vegetation, beginning of agriculture, burial practices, and history of man-made fires, among others (Bryant 1974; Sowunmi 1985; Kirch 1996; Jensen 2004; Duffin 2008).

In Nigeria, palynological studies have been carried out, with positive results, at four archaeological off- or on-sites in Nigeria:

(1) Palynological evidence from an off-site location in the Niger delta suggests that by about 2,800 BP there was human interference with the natural vegetation in the adjacent forest zone and perhaps parts of the deltaic plains, through agricultural practices (Sowunmi 1981a).

(2) The palynological study by Sowunmi and Awosina (1991) of soil samples from both the terrace and the interior of a Late Stone Age rockshelter at Kariya Wuro, northeastern Nigeria, in the Northern Guinea-Sudan savanna zone, excavated by Allsworth-Jones (1989) indicated that the vegetation at the time of occupation was essentially similar to that of the present day. Furthermore, there seems to be continuity from the Late Stone Age up till today with regard to the exploitation of plants in the area for food and medicinal purposes (Sowunmi and Awosina, 1991).

(3) Oyelaran (1998) carried out a palynological and sedimentological study of a core from Osaru pond, which is about 1 km southwest of the Itaakpa rock shelter excavated by him in the northern part of southwestern Nigeria. He obtained a very clear evidence of an upsurge in oil palm pollen and a change in vegetation from wet forest to dry savanna, both attributable to human destruction of the forest.

(4) Pollen analysis at Ahanve, a village in the Badagry area, southwest Nigeria, gave a strong indication that the felling and burning of forest trees by humans, from some time after ca. 3,109 ±26 BP, contributed to the destruction of forest vegetation and the concomitant phenomenal rise in *Elaeis guineensis*, resulting in the extension of the coastal park savanna (Sowunmi 2004). Archaeological finds of a ground stone axe, charred palm kernels, and charcoal at a level above the one dated to 2,670 ±90 BP at a site just east of Ahanve (Alabi, 1999) seem to support this indication.

The vegetation of Ajaba is derived savanna with relict trees typical of the drier type of the rainforest. This suggests that Ajaba is within the northernmost extension of the rainforest zone.

In the immediate vicinity of the excavated mound, about 3-5m away, are *Khaya grandifolia, Chrysophyllum subnudum, Nauclea diderrichii, Ceiba pentandra, Elaeis guineensis, Raphia vinifera, Milicia excelsa, Tetracarpidium* sp. (African walnut tree), *Alstonia booeni, Draceana africana, Vernonia amygdalina, Cordia millenii, Chromolaena odorata, Cassia* sp and Amaranthaceae. There are also cultivated plants such as cocoa (*Theobroma cacao*), cassava (*Manihot* utilissima*),* yam *(Dioscorea spp),* pepper *(Capsicum spp),* banana *(Musa paradisiaca),* plantain *(M. sapientum), and* cocoyam *(Colocasia* sp.). Others are pawpaw (*Carica papaya),* orange (*Citrus sinensis*), coconut (*Cocos nucifera*) and pineapple (*Ananas comosus*). The following plants were found within a radial distance of 400-800m from the excavated site: *Blighia sapida, Cocos nucifera, Newbouldia laevis, Tectonia grandis, Carica papaya, Thaumatococcus danielli, Samanea saman, Duranta repens* (yellow bush), *Thevetia peruviana* and *Naploena sp.*

5.4.1 Materials and Methods of palynological analysis

Pollen analysis of six soil samples from levels 98 cm, 76 cm, 51 cm, 34 cm, 20 cm and 11 cm of the western wall of the excavated trench at Ajaba refuse mound was carried out (Plate 5.32). The analysis was carried out in the palynological laboratory of the Department of Archaeology/Anthropology, University of Ibadan by Mr. Oriejeme under the supervision of Prof. (Mrs) M.A. Sowunmi. The method, result and interpretation are given below.

Plate 5.31: Collection of Soil Samples from each layer for Pollen analysis in progress

5.4.2 Palynological Analysis Methods

One gram of each sample was subjected to standard pollen analysis procedures (Faegri and Iversen 1989). After acetolysis, each sample was mounted on a pair of slides. Microscopic study of the slides was done with an Olympus CH 30 microscope with an attached camera; identification and counting of palynomorphs were done under both x20 and x40 objectives. Identification of palynomorphs was done by comparing them with the reference slides collection at the Palynology Laboratory, Department of Archaeology and Anthropology, University of Ibadan. This reference collection contains about 3600 pollen slides of extant species. Photomicrographs in albums at this Laboratory as well as those in relevant literature were also used. Identification was facilitated because the grains were well preserved. Photographs of the most important palynomorphs encountered were taken at a magnification of 1000. All palynomorphs encountered were used in calculating the pollen sum. The various taxa were classified into phytoecological groups based on their present-day natural distributions (Hutchinson and Dalziel 1954, 1958, 1963, 1968, and 1972; Keay 1959). The pollen diagrams were prepared by Dr. Monique Tossou of Abomey Calavy University, Benin Republic. She used the TILIA and TILIA software (Grimm 1991) in preparing the pollen diagram.

5.4.3 Palynological Analysis Result

All palynomorphs encountered during counting were recorded. Twenty-eight forms were recognized. Of this number, 25 were pollen grains while the other three were spores. Twenty pollen types were identified, 14 of them to species level, one to genus level and five to family level. The remaining five could not be identified. Two out of the three spores were identified to species level; the other could not be identified (Plate 5.33).

Three pollen zones were delimited (I, II and III)

Zone I (98-34cm): Zone I was sub-divided into zones Ia (98-76cm) and Ib (76-34cm).

(a) At the beginning of this sub-zone the predominant species is the ornamental, *Lagerstroemia indica*, constituting 71.6% of the pollen sum. There was only a trace occurrence of another ornamental, *Casuarina equisetifolia*. *Elaeis guineensis* is 5.0%, *Alchornea spp*. constitutes 4.2% while Poaceae is 10.0% and the dry forest species, *Morus* cf. *mesozygia* is 2.5%. By the end of this

sub-zone there was a total absence of *L. indica* and a minor, relative increase in *C. equisetifolia* concomitantly with marked increases in *Elaeis guineensis* (20.0%) Poaceae (35.0%) and weeds (1.6% to 10.0%); ferns and savanna species appeared and increased to 10.0% and 5.0%, respectively. There was a slight increase in primary forest species (5.0%).

(b) Forest species and ornamentals begin a gradual increase until each reaches a peak at 14.3% and 18.3% respectively. A slight increase occurred in *Alchornea* (4.7% to 8.0%). There were marked reductions in savanna species (4.7% to 0.0%) and *Elaeis guineensis* (19.0% to 4.0%), but less decreases in ferns (9.4% to 8.0%) and Poaceae (33.3% to 24.0%). Towards the end of this zone, there is a significant reduction in Poaceae (24.0% to 5.5%), a slight decrease in *Alchornea* (8.0% to 5.6%), and a complete absence of *E. guineensis*. Ornamentals *(Delonix regia*, *Lagerstroemia indica* and *Casuarina equisetifolia*) register a slight reduction to 16.6%. Savanna species reappear and increase to 5.9%. Ferns (*Pteris mohasiensis* and an unidentified monolete) decrease (8% to 5.5%), while weeds reappear and rise to 5.5%.

Most importantly, forest elements (*Celtis* cf *brownii, Pavetta owariensis* and *Syzygium guineensis*) increase to 38.9%.

Zone II (34-20cm): The major components of this zone are ferns, Poaceae, and two secondary forest elements --*Alchornea* sp., *Elaeis guineensis*. The latter two increase from the previous 5.6 % for *Alchornea* sp. and 0% for *E. guineensis* to 18.2% and 9.1% respectively. Poaceae register a marked increase (5.6% to 36.4%) while fern spores which are hitherto absent reappear and increase to 18.2%. The forest species show a marked decrease from 38.9% to 9.1%. Ornamentals also experience reduction from 16.6% to 9.1%; while savanna species (*Grewia mollis*) and weeds disappear completely from this zone.

Zone III (20-11cm): Ferns (*Pteris mohasiensis* and *Polypodium vulgare*), Poaceae and *Elaeis* dominate this zone. Ferns reach the peak of their occurrence (33.8%), Poaceae is 29.4% and *E. guineensis* increases to 14.7% from 9.1%. Cyperaceae, which occurred only at the beginning of the column, reappears and registers 2.9%. Primary forest species continue to decrease until they reach 5.9%. Towards the end of this zone *Alchornea* decrease from 18.2% to 7.4%. Weeds are present again (1.5%).

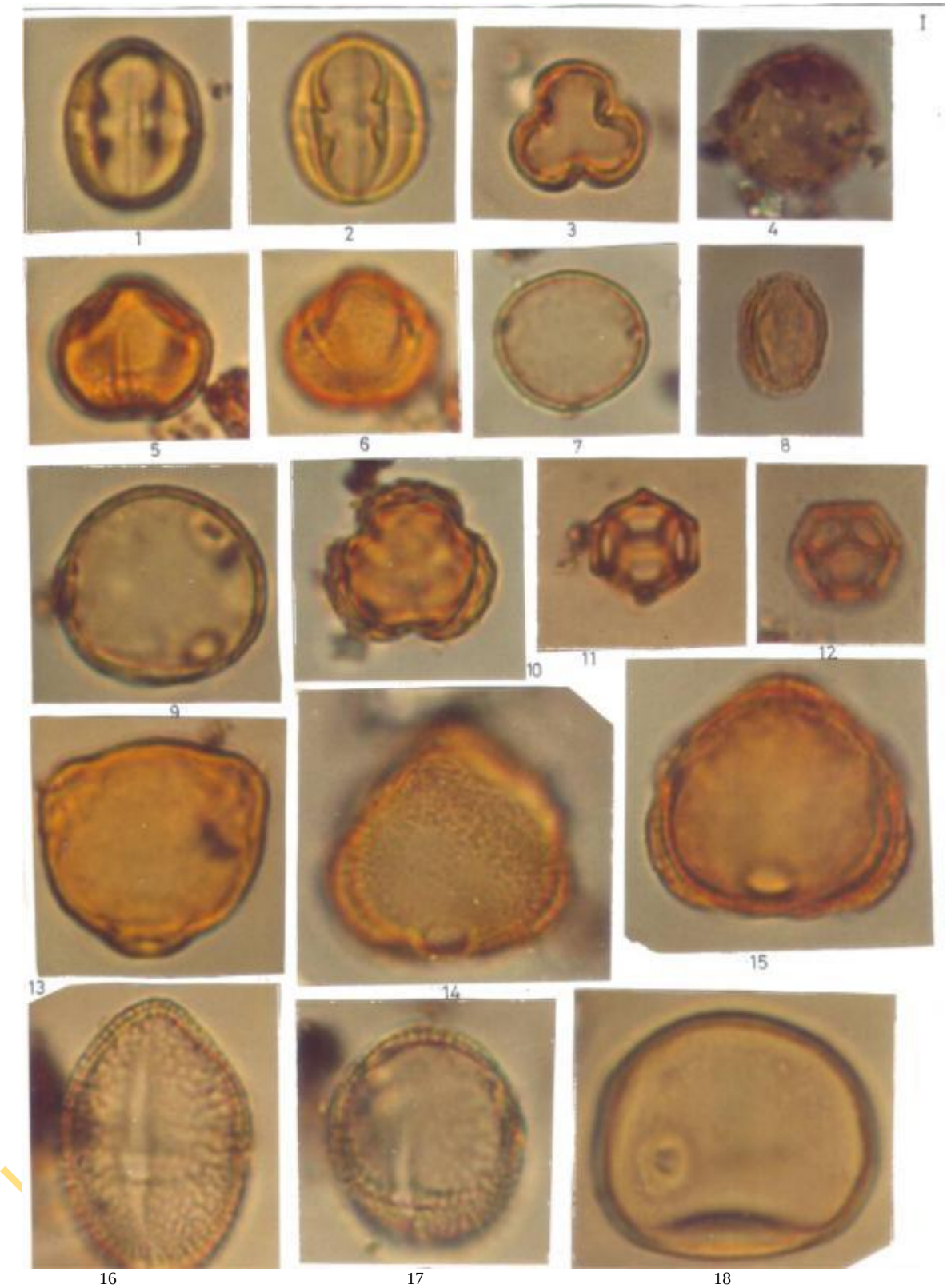

Plate 5.32: Photomicrographs of palynomorphs (all magnification x1000)
1-3: *Pavetta owariensis;*4: Amaranthaceae/Chenopodiaceae;5-6: *Alchornea* sp.7: *Celtis* cf. *brownie;*8: Unidentified;9: *Hymenocardia acida;*10: *Chromolaena odorata;*11-12: *Alternanthera repens;*13: *Casuarina equisetifolia;*14-15: *Lagerstroemia indica;* 16-17: *Grewia mollis;*18: Poaceae

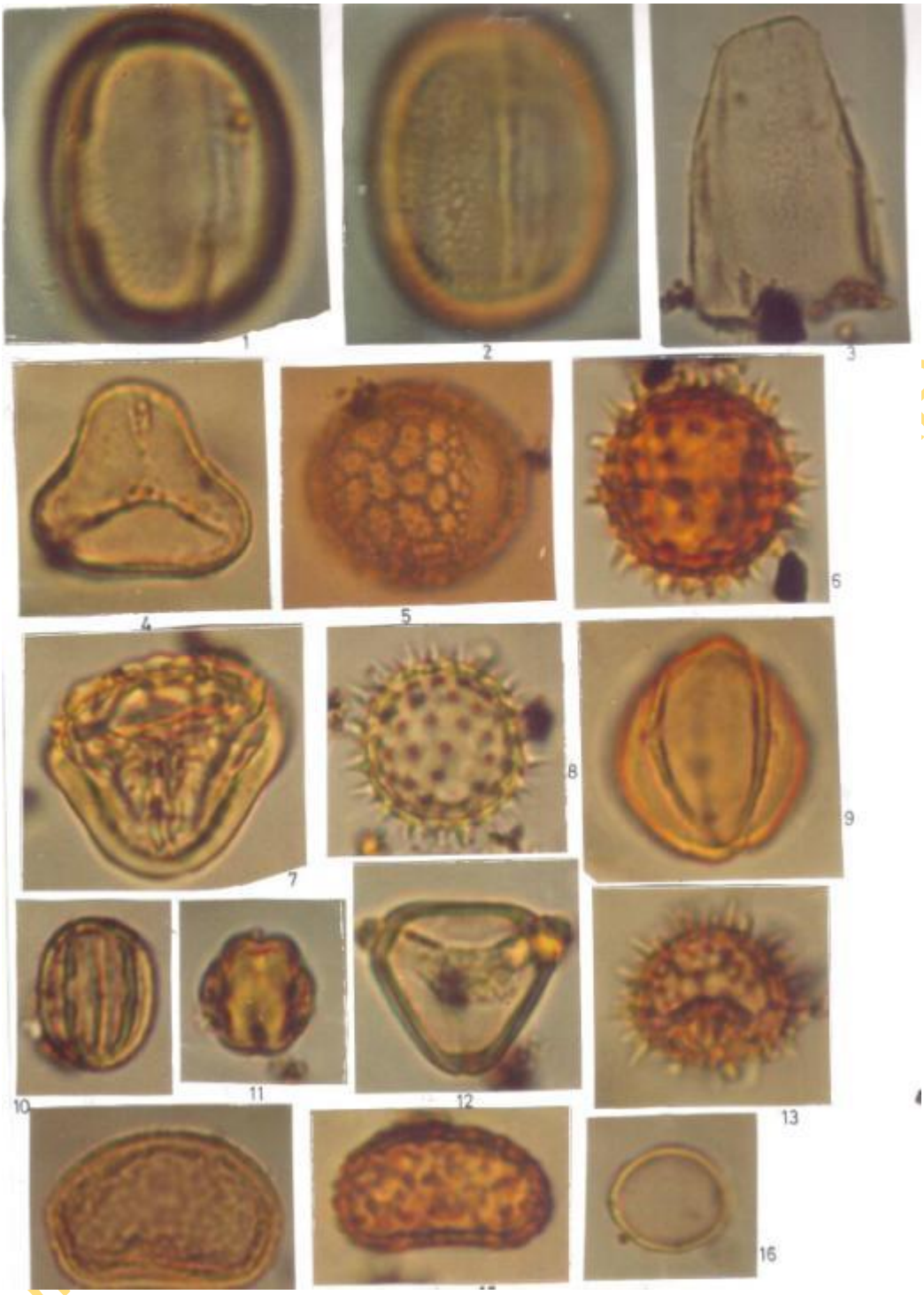

Plate 5.33: Photomicrographs of palynomorphs (all magnification x 1000)
1-2: *Pterocarpus santalinoides;* 3: Cyperaceae; 4: *Elaeis guineensis;* 5: *Delonix regia;* 6: Asteraceae; 7: *Pteris mohasiensis;* 8: *Aspillia Africana;* 9: *Lagerstroemia indica;* 10-11: Combretaceae/Melastomataceae
12: *Syzygium guineensis;* 13:Unidentifed; 14:Monolete spore; 15:*Polypodium vulgare;* 16:*Morus* cf *mesozygia*

Table: 5.8: Phytoecological groupings:

1	Savanna	*Hymenocardia acida, Grewia mollis,*
2	*Elaeis guineensis*	*Elaeis guineensis*
3	*Alchornea* sp.	*Alchornea* sp.
4	Forest	*Celtis cf. brownii, Pavetta owariensis, Syzygium guineense, Pterocarpus santalinoides* and *Morus cf. mesozygia.*
5	Poaceae	Poaceae
6	Weeds	*Aspillia africana, Chromoleana odorata, Althernanthera repens*, Asteraceae,
7	Amaranth/Chenopod	Amaranthaceae/Chenopodiaceae
8	Ornamentals	*Lagerstroemia indica, Delonix regia, Casuarina equisetifolia*
9	Ferns	*Pteris mohasiensis, Polypodium vulgare*, Monolete fern
10	Fresh water swamp	Cyperaceae
11	Combret/Melast.	*Combretum racemosum* type.

5.4.4 Palynological Analysis Discussion

The pollen analysis from zone Ia (98cm-76cm) shows that by a short period after cal. AD 1263, the landscape was dominated by the ornamental *Lagerstroemia indica* with a trace occurrence of another ornamental, *Casuarina equisetifolia*. Along with them only the pollen of one other arboreal species, characteristic of dry forests, *Morus* cf *mesozygia*, was recovered. There are comparatively low occurrences of *Elaeis guineensis, Alchornea* sp., grasses and weeds. The abundance of *L. indica* (71.6%) of the entire pollen sum at 98cm at this time shows that the trees were very close to the excavated site. Their pollen is most probably insect-dispersed, judging from the large, showy, purple flowers and the presence of wart-like processes (verrucae) on the outermost wall of the pollen grains. According to Hutchinson and Dalziel (1968), *L. indica*, is said to be a native of Asia, (probably India as the specific name suggests) and an ornamental commonly cultivated throughout West Africa today. Was the beauty of this tree when in flower so much appreciated by the people of Ajaba that they preserved it around their habitation? It is interesting to note that Tutuncu *et al*. (2007) in their study of exotic plants in Edirne, Turkey, observed that *L. indica* was an exotic plant usually found in parks and gardens there. This confirms the ornamental value of *L. indica*. The fossil record of *Lagerstroemia* goes back to the Tertiary.

Fossil leaves of *Lagerstroemia* have been described from India and the Oligocene of Japan (Pigg and DeVore, 2005). Fossil fruits recovered from the Pleistocene of Japan and found to be similar to extant *L. indica* of central China, have been assigned to that Chinese species (Pigg and DeVore, 2005). Fossil pollen of *Lagerstroemia* was reported from Pleistocene deposits of Japan, but it was not stated if it was that of *L. indica* or *L. speciosa* (Miyoshi *et al*., 1999; Fujiki *et al*., 2001 in Pigg and DeVore, 2005). The pollen of *L. indica* is medium in size (P: 33.5; E: 35.00µm), spheroidal and tricolporate; ora conspicuous and clear in polar view; exine is thick, and pattern is distinctly verrucate. (Figure 5.52, 14-15). It is opined that the fossil pollen is *L. indica*. Modern pollen of *L. speciosa*, though similar in size (P: 33.75; E: 35µm), have a thinner and comparatively less distinctly verrucate exine pattern. The modern pollen of *L. tomentosa* (P: 35; E: 3 7.5µm) are somewhat prolate-like in equatorial view. Since fossil records of *Lagerstroemia* have come from China and India, it seems logical to assume that the species originated from the Indo-

Chinese area. If, as stated above, *L. indica* is of Indo-Chinese origin, how then did it reach Nigeria or West Africa, particularly Ajaba? This and related issues will be discussed later.

One pollen grain of another ornamental, *Delonix regia*, (commonly called The Flamboyant tree or Flame of the forest on account of its bright, orange-red flowers) was recovered at 76cm below the surface. *Delonix regia*, though widely planted in Nigeria today "is a native of Madagascar" (Hutchinson and Dalziel, 1958, 481). The flowers are insect-pollinated and the pollen grains are fairly large (P: 58.3; E: 39µm) and very distinctive. Finding this one pollen grain is noteworthy. It probably stuck to the pod of the tree, which was brought home by the inhabitants of Ajaba. The dried pods of *Delonix regia* are used in making fire; furthermore these dried pods are called *sheke-sheke* in Yoruba. *Sheke-sheke* is a name given to objects which, when shaken, make rattling sounds, thus they are used as a play object by children.

There is a dramatic change in the vegetation by the end of the sub-zone. *Lagerstroemia indica* is no longer represented, while there are marked relative increases in *Elaeis guineensis* (5.0% to 20.0%), grasses (10.0% to 35.0%), weeds (1.6% to 10.0%); ferns and savanna species appeared and increased to 10.0% and 5.0%, respectively. There was a slight relative increase in primary forest species (2.5% to 5.0%).The sub-zone ended with *E. guineensis* being the dominant component. This development indicates that *E. guineensis* in effect replaced *L. indica* but not the other forest species. The presence of an increase in snail shells, presumably those of the giant snail (*Archachatina marginata*) (increase from one in 100-110cm to 19 in 70-80cm) suggests the presence of a closed forest. The pottery recovered at this time shows a significant increase, from 114 at 90-100cm to 277 at 80-90cm and 222 at 70-80cm. If increase in pottery is regarded as an index of increased population, then it can be inferred that there was a gradual growth in the population of the area during this period. The reason(s) for the total absence of *L. indica* is (are) not evident.

In Zone 1b (76 cm-34 cm), the overall development signaled a reinforcement of the trend at the end of the preceding phase with regard to expansion of primary forest vegetation and a reversal in the development of secondary forest. Of particular note are increases in ornamentals and forest species; the latter reached the peak of their occurrence in the entire column by the end of this sub-zone. Alongside these

increases was a significant reduction in grasses while *Elaeis guineensis* decreased markedly and finally disappeared from the record.

The impact of humans on the vegetation shows up very clearly in Zones II (34-20 cm) and III (20-11cm). The primary forest species decreased significantly while *Elaeis guineensis* and *Alchornea* spp. as well as Poaceae increased. Towards the end of these zones, ornamentals continued to decrease and subsequently disappeared completely while two other forest species, *Morus* cf. *mesozygia* and *Pavetta owariensis*, also disappeared. These changes are indicative of the existence of a more open forest. It is striking to note that fern spores become quite abundant reaching 18.2%. Increase in fern spores is known to be indicative of a humid environment (Morley, 1995). Such an environment would have been very conducive for forest growth but the contrast was recorded. The appearance of *Pterocarpus santalinoides*, a riverine forest species, and the re-appearance of Cyperaceae, found in fresh water swamps further indicate that the climate was not dry. Consequently, the destruction of forest vegetation most probably was due to human action.

The palynological indications are reinforced by archaeological evidence. Archaeological materials recovered were most abundant in these two zones, especially levels 20-30cm (Table 5.1). There was also an increase in palm kernel from the previous 12 in 50-60cm to 40 in 20-40cm. It is significant to note that though charcoal occurred in all the levels, it was during this phase that the only burnt kernel was recovered. There was also an increased presence of hearths - an indication of the use of fire for cooking or other domestic activities. The occurrence of burnt clay is yet another evidence of the use of fire. These developments are regarded as an indication of increased human activity, including the use of fire. The presence of a furnace fragment from level 20-30cm is another indication of the use of fire and possibly iron-working. If this were the case, trees would have been good sources of fuel. The felling of different types of trees for fuel probably accounts for the reduction in the pollen of forest trees.

From the graph in which the abundance of forest trees is compared with that of pottery (Fig. 5.9), it can be seen that beginning from 100-90cm to 80-70cm, an increase in pottery (index of population) coincides with a reduction in forest trees. Subsequently, increases in forest trees and pottery run parallel, suggestive of equilibrium between the people and forest vegetation. However, at level 30-20cm there was a significant reduction of forest trees coincident with a phenomenal rise in

pottery. This reduction in forest trees is thought to be the resultant effect of an increased human population having a greater impact on the forest vegetation. This is based on the assumption that a high pottery value is an index for high human population.

Thus both palynological and archaeological evidence combine in indicating a significant impact of humans on their environment and the intensified use of fire during this period. It can also be inferred that there probably was a change in diet, with more use made of the oil palm tree than hitherto. As said earlier, the people of this area are well noted for relishing palm wine tapped from the oil palm tree!

Palynological research in the Department of Archaeology and Anthropology, University of Ibadan, has shown that in southern Nigeria, humans created conditions which enhanced the proliferation of the oil palm, an important component of the subsistence economy during the second phase of the Late Stone Age in this region. (Sowunmi 1981b, 1985; Oyelaran 1998). The human action entailed the creation of gaps in the forest for the cultivation of crops other than the oil palm itself, using the slash-and-burn farming technique. Though the oil palm itself was not likely to have been cultivated, it most probably was selectively protected. Sowunmi (1999: 205) went further to postulate that the `fossil pollen of *Elaeis guineensis* constitutes a very good indicator of anthropogenic forest disturbance or 'an index of "palaeo-cultivation" in west and west central Africa…'

In addition, Zeven (1964: 123) noted that in modern sediments the occurrence of oil palm pollen, which can be up to 30% of the total, "reflects the cultivation of the oil palm as well as methods of land use favourable to its spread." Indeed in the surface sample from the Niger delta the oil palm pollen was 38.7% of the pollen sum (Sowunmi 1981b, 1985).

5.4.5 Ornamentals in palaeo-ecological studies

Ornamentals are plants considered to be of aesthetic value to humans. As a result, humans deliberately cultivate, nurture and protect them in areas close to the home or the immediate surroundings of a home, in order to enjoy their beauty. Thus they are closely linked with human presence and sedentism. Thus, the correct identification of their pollen and spores in fossil samples or in an archaeological context such as the present study will further strengthen the establishment of a direct link between humans and the study site. Though some ornamentals are exotic to Nigeria, many are

Table: 5.9: Figures of Tree Resources and Pottery

Depth(cm)	Tree resources	Pottery
100-90	25	114
80-70	47	222
60-50	143	293
40-30	387	423
30-20	91	781
20-10	59	429

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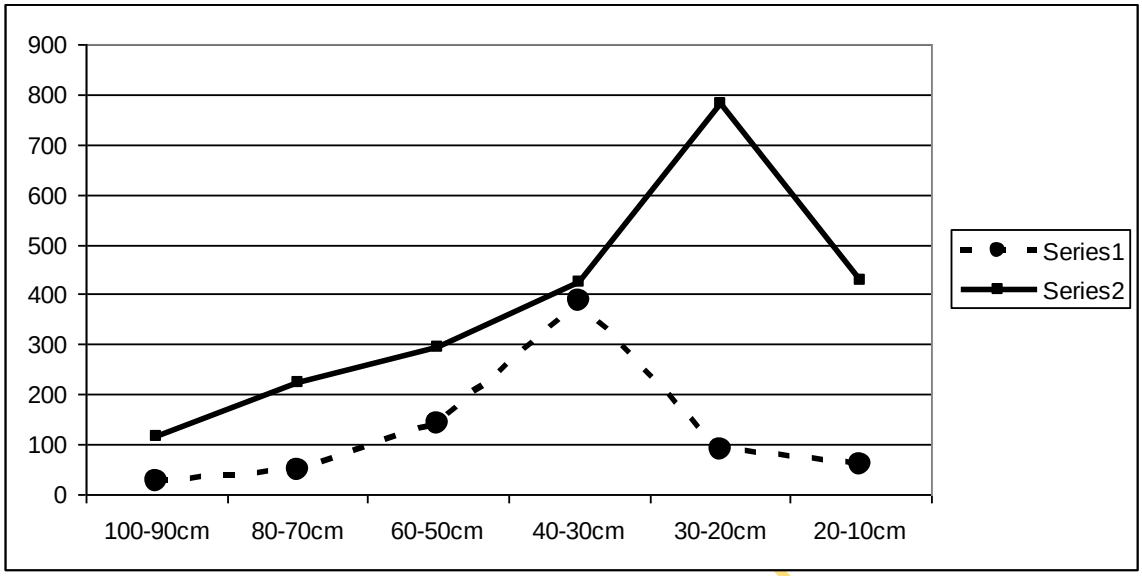
Fig. 5.4: A comparison of abundance of forest trees (forest resources) with pottery abundance (index of human population) from level 100-10cm



Percentage values of forest trees (range of 2.5%-38.7%) have been multiplied by 10 for ease of comparison with pottery figures which are in the range of 114-781. Series 1= % forest trees, Series 2=Pottery. Y axis= pottery abundance and % forest trees; X axis= depths.

indigenous. The recovery of micro- and macro-fossils of exotic plants in certain areas has proved very useful in interpreting and resolving some palaeoenvironmental difficulties. For example, the recovery and identification of the pollen grains of *Zea mays* have helped in establishing the beginning of food production (agriculture) in certain areas of South America (Piperno *et al.* 1991). The correct identification of *Casuarina* pollen provided useful information for understanding, from a palynological point of view, the introduction of exotic species and the antiquity of humans in South East Asia (Haberle, 1994).

In the present study, three woody, exotic, ornamental species, i.e. *Lagerstroemia indica* (Lythraceae) [native of Asia], *Casuarina equisetifolia* (Casuarinaceae) [native of Australia], and *Delonix regia*, (Caesalpiniaceae) [native of Madagascar], were recovered from different levels of the excavated trench. The recovery of the pollen of these plants becomes the earliest and first palynological evidence of ornamentals in Nigeria. Two of these plants – *C. equisetifolia* and *D. regia* -- are trees while *Lagerstroemia indica* is a shrub. Of significant note is the fact that these plants are all found in the forest region of Southern Nigeria today. The pollen diagram (Plate 5:44) shows that *L. indica* and *C. equisetifolia* were present at the deepest level of the pit (98 cm) and they both constituted a very high percentage (72.4%) of the pollen sum at that level. *L. indica*, in particular (71.6%) was not only present but abundant within the catchment area of the excavated site. In view of its aesthetic attraction, this abundance is suggestive of some human intervention. This suggestion is further supported by the occurrence of *Elaeis guineensis* and weeds (*Chromolaena odorata*, *Aspilia africana* and Asteraceae) in appreciable quantities. These weeds are known to be associated with human habitation (Sowunmi, 1981c). Qualitative vegetation analysis carried out by (Oriejieme, per. Comm, 2011) in the forest areas of southwestern Nigeria confirms Sowunmi's (1981b) observation. The following weeds are some of the commonest found around homes and in disturbed areas in this part of Nigeria: *Chromolaena odorata*, *Aspilia africana*, *Sida acuta*, *Ageratum conyzoides*, and *Tridax procumbens*.

Several questions arise from the presence and the pattern of occurrence of the three exotic ornamentals. If they were cultivated, by who were they cultivated – the local people or foreigners (probably colonialists)? The inferred date of the levels where *Lagerstroemia indica* was most abundant is sometime soon after AD 1263. This is very much earlier than the known arrival of Europeans in West Africa, i.e.

between the 15th and 16th centuries. This seems to rule out European cultivators. The specific name of *Lagerstroemia*, i.e. *indica*, indicates that it is Indian in origin. Furthermore some other botanical names often reflect the view that cultivated plants found in the African continent were transferred from India to Africa, for example, *Tamarindus indica* and *Sesamum indicum* (Blench, 2003), as well as *Mangifera indica* (the mango tree). However, as far as we know there are no records of the arrival of Asians in Nigeria prior to the 20th century. Is there any other possible way by which *L. indica* could have reached this part of Nigeria at such an early date? Could they have been introduced through the influence of "phantom voyagers" from Indonesia, whose coming to sub-Saharan Africa (including Nigeria) and Madagascar, according to Dick-Read (2005), much predated that of Europeans? The scholarly and comprehensive research work by Dick-Read (2005) only came to the attention of Professor Mrs. Sowunmi in a private discussion she had with Dr. Patrick Darling, recently at a conference in Britain. If the identification of *L. indica* pollen is correct, it would seem that the Ajaba people recognized its ornamental value and therefore planted and protected it for quite some time. The same explanation can be given for *D. regia* which also has very attractive flowers and which could have been brought by the "phantom voyagers". Another possible source through which could have reached tis part of Africa ight be through migratory birds. Birds such as 'pathtom voyagers' are known to have migrated from central Europ in early roosting in several parts of Nigeria including Soutwestern Nigeria before movng on in other directions. The occurrence of *C. equisetifolia* pollen in the fossil record at Ajaba is at the moment difficult to explain.

Though it may not be considered likely, it does not ruled out entirely the possibility that these three pollen types might belong to indigenous, forest species which is yet to be encountered in this palynological study. Their pattern of occurrence is similar to that of the indigenous forest species. As exemplified in the Combretaceae and Melatomaceae on the one hand and Chenopodiaceae and Amaranthaceae on the other, it is well known that certain species which belong to different families do have similar, virtually indistinguishable pollen grains.

5.5 Other Archaeological Features

An Earthwork, in the form of a wall was observed at Ajaba. This wall stretches from the back of the Oba's house (Plate 5.34) to the southwest of the

excavated mound. The height, length and width of this wall were determined (About 120 metres in length, 1.8m high and about 2.9m wide). The wall in terms of size and complexity is not comparable to defensive walls found in other parts of Yorubaland, such as Oyo Ile, Orile Owu, Orile Ijaye and Ila-Yara to mention but a few. The wall is small in size (i.e. height, width and length) and not enclosed but concentric in nature. It is relatively linear in shape. Unfortunately, the extent of the wall was to be mapped with the aid of a Global Positioning System (GPS) receiver purposefully to represent it on the map of the area as one of the archaeological features at the site but because the wall is under a thick foliage cover, the GPS receiver did not locate satellites therefore, it could not be mapped with GPS. The wall was not associated with ditches as is common in other places in Yorubaland where such defensive walls have been studied. Alternatively, it is possible that the construction of the wall might have been truncated as a result of an impending external aggression, hence the absence of visible ditches.

During the reconneiting of this wall, a complete half buried pot was found at a section on the wall (Plate 5.35). According to the Oba, the pot is a ritual pot that was recently used to offer sacrifice to the gods on behalf of a barren woman who later gave birth to a child. The morphology and decoration motif of this pot was used as an ethnographic model for identifying ritual pots among the excavated potsherds.

Plate 5.34: Section of Ajaba ditch and embarkment of Ajaba Wall

Plate 5.36: Buried Pot at a Section of Ajaba Wall

CHAPTER SIX
DISCUSSION AND CONCLUSION

6.1. Discussion

The geographical area known today as Yorubaland has serially been involved in series of conflicts, wars and displacements. This had at several times led to series of movements, realignments and dislocations. In this area, as in other parts of the world, as human beings became more sophisticated in their efforts to adapt to the environment they found themselves, they would have made use of resources provided by nature around them to manipulate the environment to meet their various needs. This would have led to socio-cultural developments and increase in population movements. Invariably, these developments would have also brought about some political and economic changes and sometimes instability. Some groups would start dominating others. In some cases, new immigrants would dominate the aboriginal peoples and where such aborigines could not cope with the new elements they would have migrated, accepted or coped with the subjugation. These actions would have led to displacements and changes in the settlement pattern.

As clearly stated by Ogundiran, (2002: 12) "soil, water, elevation and climate are potential and real natural resources that affect but do not necessarily predetermine, the patterns of settlement, the pursuit of subsistence, and making of human history". The early points of settlement for the people in the area are found in the plains or at the gentle, wide slopes of the valleys and very close to streams that support their development. But at a later stage, when the threat of war and the actual war was predominant in the region, most of the towns and villages like Igbajo, Iree, Otan-Ayegbaju and Ila-Orangun were relocated to the hilly areas. Here they were safer from external invasion. With the incursion of the Fulani Jihadist in the early decades of the 19th century Yoruba wars, relocation to hilly terrains became very rampant in the area.

Accounts of oral tradition from most of the towns in the study area indicate that people of the area migrated either from Ile-Ife or Old-Oyo and that they settled at different places before their final place of settlement. At different point of settlement, they have to relocate either as a result of conflict, chieftancy dispute, or show of magical prowess as revealed by the oral history of thee Ede people or in a bid to find a new area to settle. This migration has the 'pull and push' factors. For instance, the

people of Ede were dislodged from their settlement and were accepted in other towns within the vicinity of their former settlemment. Today, they are found in such towns as Igbajo, Ila-Orangun, Otan-Ayegbaju, Imesi-Ile, Iresi among others.

It is in the light of the above observations that archaeological and anthropological investigations carried out in areas of Northeast Osun is viewed as veritable insights into the complex consequences arising from conflicts, wars and displacements. In the context of settlement dynamics, the consequences have far reaching implications. They are visibly manifested in settlement demography and settlement pattern of the area. They are also manifested in the interrelatedness of the cultural entities of both the 'aboriginal' peoples and the immigrants. They are also temporally and spatially manifest in the abandonment and resettlement of many towns and villages in the area.

Archaeological excavations at Ajaba and its environs in Osun northeast have revealed some salient aspects of the culture and general life-ways of the people. These excavations yielded potsherds that have illuminated aspects of socio-political formation and intra-and inter-group relations between the ancient Ajaba inhabitants and their neighbours, through pottery seriation. Over the years, Old Oyo pottery has been used as a yardstick for measuring other Yoruba groups' and subgroups' interactions. Although there is debate over the use of Old Oyo pottery as model for pottery classification in Yorubaland, yet Old Oyo and Ife still hold a strong place in the socio-political formation of many Yoruba settlements. The chronological attribute of Old Oyo pottery was very useful in seriating Igbomina ceramics of which Ajaba is a component part (Usman 2003). Although Ajaba oral tradition claims affinity with Oyo Yoruba, its material culture constituents is more similar to those of the Igbomina than the Oyo. It should, however, be noted that in certain regards the Igbomina material repertoire bears some semblance with those of Oyo. In fact oral traditions of most of the Igbomina communities claimed migrations from either Oyo or Ife (Aleru 2006). The association of Ajaba with Oyo might therefore not be totally misplaced.

The interaction and migrations between some of the Yoruba groups can be determined through pottery studies. Old Oyo pottery decoration motifs which have been extensively studied have been used as yardstick for studying pottery from other Yoruba groups and sub-groups. In view of this, the results of the pottery seriation of the Igbomina sites seem to follow a sequence of analyses suggested by scholars such as Agbaje-Williams 1983, 1991; Soper 1975, 1983 and Willet 1960, 1962). Old Oyo

pottery tradition is classified into two phases. These are the 'Diogun' and the 'Mejiro' periods (Willet 1961). Soper's excavations at Old Oyo from 1973 to 1979 further divided 'Diogun' and 'Mejiro' wares into early and late ceramic types based on the decorations (Soper 1975; Usman 2003). The 'Diogun' pottery which is the earlier (dating to AD 1100 $\pm$ 110) is characterized by brush or broom making incisions, rocked-comb impressions, impressed arcs (scallops), knotted roulette and frond roulette (Agbaje-Williams 1983). On the other hand, 'Mejiro' pottery which characterized the later phases (dating to AD 1300 + 80), is characterized by carved roulette, snail shell markings, and maize cob roulette (Usman 2003).

Following the pottery seriation in Yorubaland which is greatly attributed to Old Oyo and Ife, one will expect that any settlement or regions that claimed migration from Ife and Old Oyo direction should, to a considerable extent, reflect Ife/Old Oyo pottery patterns. From the result of the excavated pottery from Ajaba, the supposed Old Oyo tradition is not predomiinant as expected. Thus, incision, carved wood and scallops have percentage of 1.57% of the total percentage of pottery decoration types on body sherds. This assertion however, does not mean that the people did not at any time interact with the people from Old Oyo. They might have interacted at a particular time, through diverse means (e.g. migration, war, marriage or trade) but it does not adequately reflect in their pottery patterns or decorations. The site has been radio carbon dated to between 13th and 17th century (1263 A.D. and 1609 A.D.).

Ajaba pottery has varieties of decoration motifs, which could make inference from pottery decorations in terms of relatively dating the site a difficult task. The pottery has combination of Old Oyo, Ife and Nupe attributes. Thus, clear affinity with a particular Yoruba group or subgroup cannot, for now, be determined. Maize cob roulette is said to be the most commonly used rouletting tool among Yoruba potters (Fatunsin 1992), yet it is totally absent at Ajaba. The Old-Oyo/Ajaba relationship is highly contestable not only from the archaeological point of view but also from the record of oral traditions. According to information gathered from oral tradition, Ajaba and its environs were under the political hegemony of Ilesa, during the reign of Obokun as the ruling monarch in Ilesa. The Obokun for a very long time did not have contact or relationship with Old Oyo. Hence, this could have accounted for the absence or low representation of Old Oyo pottery tradition at Ajaba.

There was an attempt to ascertain the relationships between the Ajaba and other Yoruba groups using pottery affinity as a criterion. This is because interactions

and migrations among the Yoruba groups may be ascertained through a study of their respective pottery. The Old Oyo pottery is used as a reference in considering pottery from other Yoruba groups or sub-groups, although this usage is still controversial. Willet (1961) classified the Old Oyo pottery into two phases, namely the 'Diogun' and 'Mejiro' phases. Based on his work at Old Oyo, Soper (1975) considered 'Diogun' and 'Mejiro' as representing the early and late phases of ceramic types, respectively, based on their decorations. While 'Diogun' pottery (dating to AD 1100 ± 110yrs) is characterised by brush or broom-made incisions, impressed arcs (scallops), knotted and frond roulette, 'Mejiro' (dating to AD 1300 ± 80yrs) is characterised by carved roulette, snail shell markings and maize cob roulette (Usman, 2003). Any settlement which had close interactions with Old Oyo is expected to have an appreciable number of these decorative motifs in its pottery. Although most of the Igbomina communities claim to have migrated either from Old Oyo or Ile-Ife (Aleru, 2006), the oral tradition about Ajaba makes a very different claim. According to the latter tradition, Ajaba wish is assumed to be the fomer settlement of the Ede people and its environs were under the political hegemony of Ilesa; and the king of Ilesa, Owa Obokun, did not have contact with Old Oyo for a very long time. This oral tradition seems not to be supported by evidence from material culture since some of the pottery sherds retrieved from this excavation bore resemblance to that of Old Oyo, Nupe and Ile-Ife.

From the morphological analyses on the rim of the pottery sherds, there is an indication that some of the pots or pottery materials represented in the pottery assemblage vary from small bowls, small and large cooking bowls (Isaasun), Amu (water pot), Ikoko (storage pot) and Ajere (perforated pot) among others. The "*Ajere*' could have been used for roasting or smoking meat or other food items (the meat or other food items like yam or plantain is placed inside the '*Ajere'* pot and placed on non-flaming fire) or for ritual purposes. Also pottery with bossing or applied decoration type may suggest trade mark or is suggestive of ritual/sacrifices container, although, the number of pottery with this decoration type is very few. The low distribution of pottery with bossing decoration type could be because of its probable usage for ritual purposes. This is because such pottery is not commonly used except for special ceremonies or to offer sacrifices, which is not an everyday event, so they are most likely to be made on request. In other words, it could be that bossing or applied decorations are meant for trade mark identification of individual potter. For

instance, Plate 5.9 shows two cross marks on the potsherds while Plate 5.16 shows an applied decoration. The pottery assemblage varied from small bowls through medium-sized and large pots to perforated pots. These pots might have been used for cooking, storage of water and food items, or for rituals.

The iron slag, hearths, tuyere, some fragment of tuyeres and furnance and furnace fragments are suggestive of iron working and the use of fire. The people probably used iron implements presumably for felling trees and for farming. However, there are no traditional or an ethnographic account to support an iron-working tradition in the area though, not far from this area is a village known as *'agbede'* (iron smith). The village is a recent one. A more extensive archaeological survey is required in order to ascertain more definitely whether there indeed was iron-working in the area.

Additionally, the iron debris is very fragmentary. The nature, scope and extent of iron working in the area are therefore still shrouded in obscurity. Or is it possible that the objects were imported into the area? It is possible that the inhabitants might have engaged in iron-working at a distant past and place, probably somewhere close to the source of raw materials.

Organic materials such as animal bones, prominent among which are the jaw and femur (Plate 6.1a & b) indicate presence of large and small animals. Other organic materials such as snail shells, bivalve, plant seed, palm kernel (charred and non-charred) could give an insight into subsistence means of the inhabitants. They could also provide information for vegetation/environment reconstruction of the study area.

The wall earlier mentioned is an important archaeological feature at Ajaba. Considering the size of the wall, the purpose or function is still difficult to ascertain. It could have functioned as farm or territorial demarcation. Defensive walls in most cases are enclosed or concentric in nature with deep ditch and considerable high bank. Ditches are regarded as a mechanism to compliment the defence nature of banks. Consequently, because of the low level or total absence of ditches around Ajaba, it is not certain that the wall was used for defensive purposes. Though, it could be that the construction of the wall was abandoned in the wake of conflict or war that ravaged the area in the 17th century.

Moving away from the traditional methods of pottery analysis, this work took a step further by carrying out geo-chemical and mineralogical analysis of pottery

Plate 6.1a: Femur of an animal (a large mammal)

Plate 6.1b: Jaw of an animal

sherds from six sites, including sherds from Ajaba. The mineralogical and chemical composition of the sherds recovered from the six archaeological sites, Ife, Ipetumodu, Ajaba, Ila-Orangun and Iragbiji, Iresi appear to reflect the geological setting of the area. The mineralogy of the ceramics from all sites is grossly similar both temporally and spatially and contains quartz, micas, and trace amounts of feldspars, amphiboles and iron oxide. The mineralogical composition indicates low temperature firing of the clay. Clays, which were used to make the sherds, are typically referred to as hydrous silicates (Deer et al., 1992). When heated above 500^{o}C, the hydroxyl component is driven off. This results in mica-like structures. If the clays are heated to approximately 900^{o}C or higher, the clays become vitreous and form porcelain. Thus the sherds in this study were probably fired above 500^{o}C but below 900^{o}C.

In the areas studied, extensive clay deposits have developed by tropical weathering of rocks of predominantly granitic composition. Other rock types are minor quartz rich schists and amphibolitic rocks. Clay deposits are abundant and there are more than 12 well-known deposits which range in size from a few meters in length to extensive deposits of a kilometre or two long. Weathered and unweathered granitic and granodioritic rocks occur quite near almost all the archaeological sites. The raw materials for making the ceramics came certainly from neighbouring areas close to sites and include clay material from a saprolite or mottled zone derived from rhyolite/granite. It is assumed that ancient people of Ajaba collected the raw materials around the area, close to the sites. The firing of the potteries in open atmosphere did not exceed 600^{o}C, as demonstrated by partial dehydroxylation of clay material seen in the occurrence of mica inclusions. In general, the contents of trace elements found in the ceramic fragments of Ife, Ipetumodu, Ikire, Igbajo, Iresi and Ajaba, can be well correlated to saprolites derived either from granites/rhyolites or to granodiorites/dacites. The contents of the rare earth elements (REE) fall in the domain of the granitic rocks and its weathered products. The trace element data suggest that the main raw materials used for the fabrication of the ceramic artifacts have a composition close to saprolite derived from acid rocks (granite/rhyolite). The rare earth element data are consistent with derivation from a granitic protolith.

The chemical compositions of the raw materials probably used for pottery production and the composition of the ancient ceramics can be successfully fingerprinted or classified by basic, geochemical techniques. It should be noted that the similarity of geology could make provenance very problematic. Also it should be

noted that some other ethnic groups especially the Nupe people could have been involved in the construction of potsherd pavement in the study area. For instance, the pavement at Oyan is referred to as 'Aganju Tapa' [Tapa's (Nupe people are referred to as 'Tapa'in Yorubaland) courtyard]. Though, as by stated by Akintoye (1971) 'among the Igbomina (of which part of the studyarea belongs) there are scattered pocket of Nupe and Fulani settlers who have now been absorbed into local society' But further work is needed to ascertain this hypothesis, as there is no identification of such pavements in Nupe land.

The result of the pollen analysis shows that not long after about AD 1263 the exotic ornamentals, *Lagerstreomia indica*, dominated the landscape of Ajaba. The abundance of *L.indica* along with traces of two other exotics *Casuarina equisetifolia* and *Delonix regia*, of which there was only a trace occurrence, suggests some form of horticulture. The dates of the levels at which they were found are earlier than those known for the arrival of foreigners, specifically Europeans, in Nigeria, but there might have been a hitherto unknown foreign influence in the occurrence of these species. This might be the first botanical evidence of ornamentals from an archaeological site in Nigeria. But the possibility of the pollen belonging to indigenous forest species must not be ruled out entirely, especially as the pattern of occurrence is similar to that of *L.indica* in particular. Following its initial abundant occurrence, *L. indica* soon decreased drastically, then increased to lower levels and disappeared completely sometime after AD 1491, for reasons which are as yet unclear. Similarly, indigenous forest species decreased too then increased, reaching a peak level. Subsequently they decreased appreciably, being mostly restricted to fringes of rivers. This later primary forest decrease, concomitantly with notable increases in early colonisers of disturbed forests, especially *Elaeis guineensis*, along with weeds and grasses is attributable to increased human activity, including the probable use of fires, presumably preparatory to slash and burn farming. This period coincided with the climax of human occupation, as evidenced by increased abundance of artifacts. The use of fire is indicated by the occurrence of burnt palm kernel, burnt clay, furnace fragments and tuyeres. Thus both palynological and archaeological evidence combine in indicating a significant impact of the Ajaba people on their environment and the intensified use of fire from about 600 years ago.

6.2 Conclusion

Oral history, written records and archaeological survey and result of data from excavations indicate some historical phases of occupation. The results of these data show that there was movement of people at different periods for different reasons. This led to settlement and resettlement of people, abandoning one site for another, changing the demographical setting of the area. In many cases, some settlements were totally deserted and abandoned and some settlements have their population increased thereby changing the socio-political and economic status of such settlements. Conflict, war and displacement led to movements of people from one place to other. These movements had effect on the demography, settlement pattern and environment which they abandoned and/or where they resettled.

The archaeological excavations at Ajaba and its environs and other places in Osun Northeast, Southwest Nigeria, provided information in regards to historical phases of occupation of the study area. As a result of conflicts, wars and displacements generally in Yorubaland, the period between the 13th and 15th centuries saw increase in population, presence of exotic ornamental plants. Decrease in primary forest as a result of human population was noted which resulted in more cultivation of their land resources. Also, destruction of forest, (as indicated by palynological analysis) probably as a result of forest slash and burning by man in his bid to prepare land for cultivation was also noted . The second phase was the period between 15^{th} and 17^{th} centuries, this period saw technological development as evidenced by potsherd pavement and the abandonment of most of sites such as Ila-Yara, Ajaba abandoned site and Oyan probably as a result of war as evidenced by defence wall and ditches. It is not unlikely that the burnt materials indicated on the southern portion of the excavated unit at Ajaba was as a result of house burning during conflict (house then was built of thatched roof which is prone to fire disaster). The third phase is the period between the 18^{th} and 19^{th} centuries when notable wars broke out in parts of Yorubaland and most especially in the study area. Among these were Jalumi War, Ikirun War, and Kiriji War in Igbajo/Imesi-Ile area (Ogunfolakan 2007). Notable war relics from this period, Defence Trench and Peace Treaty site (Plates 3. 5 and 6) are noted at Igbajo among others. Finally, from oral history, archaeological survey and excavations, the present location of most of the towns around the study area indicate relocation at different periods as a result of conflict brought about probably by slavery, royal conflict (most of the time when there is a

dispute or contest of royal stool, those that loose out usually leave the town and establish their own town) which usually lead to population movement and demographic changes. It is envisaged that further archaeological investigations in other areas around Ajaba would complement the data from this study. This is in order to have a regional overview of activities and inter/intra-regional relationship among the people that formerly occupied this place and their neighbours within and around Igbomina, and also to generate hypotheses about the socio-political formation of the people, particularly, in relation to other prominent Yoruba groups/subgroups. In Osun northeast of Osun State, Nigeria, (Fig. 1.1) conflict, war and displacements impacted on the settlement pattern of the inhabitant.

Decorating the body add aesthetic value which represents cosmological and religious concepts, and similar patterns of decoration on different pot types expresses coherent underlying perceptions, accounting for continuities in an art form (David, Sterner and Gauva 1998). These underlying 'perceptions' is what today has been the major information archaeologists are scouting for to understand. While in Ife, clay was used to produce famous images and pots for ritual purposes, in other areas and most importantly, the study area, pottery became an important aspect of utilitarian materials in their homes. Because it has remained one of the indestructible materials, archaeologists have been using pot to probe into those periods that were not known to the written world.

Pottery is a very good chronological indicator; its quantification proves crucial, not only in comparing different archaeological context but also as an aid in answering certain archaeological and historical questions. It is also good in the investigation of relationships between context and fabrics. An important part of archaeological study of pottery is the comparison of ceramic assemblages in terms of their composition.

Archaeological analysis of prehistoric and historic materials have shown a remarkable potential for tracking intra and inter-site movement of materials, most especially ceramics, therefore, interrelatedness of pottery decoration and symbolic structures justify widespread use of decoration as the prime index of ethnicity preserved in the archaeological record. Since characterization involves examination of ceramic properties, with a view to isolating material of different origin, and ultimately to establish their source hence, the need for the examination of the ceramic property. In line with this, geochemical and mineralogical analysis is imperative and this was

carried out.

Arising from this present work and others carried out by the author and other researchers from the region, (Akpobasa 1994, Usman 1995, Usman et al 2005, Ogundiran 2002) historical, anthropological and series of archaeological evidences point to the fact that there were series of settlements, abandonment and resettlement in the study area arising from war, conflicts and displacement. These exercises left series of cultural materials such as pavements, wall and ditches and potsherds as evidence of destruction which could be linked to war, conflicts and displacement.

Decorative motifs such as single twisted cord impression were common to all sites. With the exception of sherds from Ila-Orangun, those from other areas were related in terms of types, fabric and functional attributes. Some of the sherds bore striking resemblance to those documented for Old Oyo and Ile-Ife with regard to type, decoration and function. Stylistically, the potsherd pavements excavated were similar to those documented for Ile-Ife. A C-14 date of AD 1263 was obtained from charcoal at a depth of 80cm of the excavated unit. Maize cob decoration was absent from the potsherds indicating that Ajaba site was probably occupied prior to 16th century when maize was introduced into West Africa.

Human impact on the environment was noted from the 13th Century onwards. Pollen of forest species and ornamental plants of Asian origin, such as *Lagerstroemia indica*, *Casuarina equisetifolia* and *Delonix regia* were recovered from the excavations. These were abundant at the lower levels of the excavated pit. However, pollen of ornamental plants disappeared completely at the upper levels while secondary forest species and artifacts increased in abundance which was indicative of increase in human population and subsequent impact on vegetation. There was evidence of increased peopling of the area from around AD 1263. Oral and written records suggested that conflicts and war caused displacement and re-occupation of some the settlements.

6.2 **Future challenges**

In line with the challenges of this research, there is a need to carry out characterisation of organic residues in pottery vessels from the study area. This will include characterisation of the lipid fraction contained in the pottery. According to Rotlander, 1999 (cited by Giorgi et al 2010), organic residues contains biomarkers which are produced by biochemical transformation of their

original content. Analysis of organic residues in pottery can provide significant information about past cultural and technological activities. They can also provide information on pottery uses, customs and dietary habit of the people.

More geo-magnetic and electro-restivity of more sites around the study area still need to be carried out, most especially in Oyan, Kiriji War site, and also at Ajaba abandoned site.

Search for iron smelting sites need to be carried out to ascertain the source of the metallic objects found at the excavations.

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APPENDIX 1: Glossary of Yoruba Words

Yara –	Trench
Ila-Yara -	Ila -of Defence trench
Agbado –	Maize/Corn
Eerun –	Dry Season
Agbado Eerun –	Dry season maize/corn
Agbado Ojo –	Raining season maize/corn
Apaadi –	Pottery sherd
Apaadi Luwo –	Luwo potsherd
Omi-Eku –	Residual water from palm-oil production
Olokun –	Yoruba goddesses of ocean/river
Aro –	A chieftaincy title in Ife
Oriki -	Praise poem/cognomen
Awigbo -	Hearsay
Awigbo baba itan -	Hearsay, the father of history
Igbi-'riro -	Sacred grove
Ota Ebora -	Stone of the demon
Oke -	Hill
Odun-Oke -	Hill festival
Oba –	King
Ile-Esile -	Esile's compound/house
Aladura –	Christian/Prayer group
Ijoko -	Seat
Okan yi lule o ku okan-	One fell down remaining one
Gbe kan ru kan -	Carrying one over another
Ira -	A type of tree
Iji -	Shade
Ajere -	Perforated pot meant of drying meat
Itele -	Underlay

APPENDIX II: LIST OF INFORMANTS

Name	Place	Gender	Age	Date of Interview	Occupation
Chief Adeyemi, Jagun of Oyan	Oyan	Male	80+	1992/1997	Farmer
Oba (Dr) N.B. Omotoso	Oyan	Male	75	1992/97	King
Mr. S.O. Olaniyi	Oyan	Male	65	1992/97	Farmer
Mr Olagunju	Oyan	Male	60+	1992/97	Civil servant
Oba Peter Olagunju	Asi	Male	80+	1992/94	King
Prince A. Olagunju	Asi	Male	60+	1992/97	Teacher
Lamidi Ededele	Asi	Male	70+	1992/97	Farmer
Pa Atolagbe	Asi	Male	90+	1992/97	Farmer
Oba O. Fasade	Igbajo	Male	60+	1992/2006	King
Chief James Adesina	Igbajo	Male	70	1992/1996	Farmer
Chief Adegbite	Igbajo	Male	70+	1992/94	Rtd. Civil Servant
Chief Olabode Faloye	Igbajo	Male	70+	1992/94	Farmer
Mrs Modupe Adesina	Igbajo	Female	60+	1992/94	Trader
Chief Ezekiel Ayepola	Igbajo	Male	80+	1992/94	Farmer
Pa I.O. Fatanmi	Igbajo	Male	90	1992/94	Farmer
Joseph Faloni	Igbajo	Male	90	1992/94	Farmer
Oba Timothy Oyebode	Iragbiji	Male	80+	1992/97	King
Chief Muraina Oyelami	Iragbiji	Male	60+	1992/2006	Traditional chief/Artist
Alhaji Afolabi Dayiola	Iragbiji	Male	80+	1992/94	Traditional chief
Opatola O Sangodoyin	Iragbiji	Male	50+	1992	Artist
Oba Moses Omotoso	Ire	Male	70+	1992/97	King
Isaaac I. Omotoso	Ire	Male	80	1992/97	Farmer
Joseph Ojo	Ire	Male	80	1992/97	Farmer
Alhaji Kadiri Afolabi	Ire	Male	60+	1994/97	Farmer
Prince A.A.Adetoyi	Ila-Orangun	Male	80+	1992/94	Rtd C. Servant

Alhj Sumonu Adesina	Ila-Orangun	Male	80+	1992/94	Farmer
Aafa Tiamiyu	Ila-Orangun	Male	70+	1992/94	Farmer
Oba Sikiru Odugbemi	Iresi	Male	30+	1992/2006	King
Pa Joshua Popoola (Baba Gosi)	Iresi	Male	80+	1992/2006	Gold Smith/farmer
Adeleke Iyiola	Ajaba	Male	70	1992/2006	Farmer
Pa Adebisi Bakare	Ajaba	Male	90	1992/2006	Farmer
Oba Adedotun Adetoyese	Ajaba	Male	90+	1992/2006	King
Oba Adebisi Adeniran	Ede	Male	60+	1992/2006	King
Prince A. Ogunwole	Ede	Male	60	1992/2006	Farmer
Prophet G. Jolayemi	Ede	Male	90+	1992/2006	Farmer
Chief Salako	Ede	Male	80+	2004	Businessman/farmer
Emebosa Oriejieme	Ibadan	Male	30+	2006	Lecturer

Appendix III Geo-Magnetics reading data File 1-50

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# Facing Direction:South
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#            ts(0)    ts(1)    hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm
             15 21    15 23    15 26  15 29  15 33  15 35  15 37  15 39  15 42  15 44  15 46
#   stno     Bt0      Bt1      Bt2    Bt3    Bt4    Bt5    Bt6    Bt7    Bt8    Bt9    Bt10
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    -41    32921    32898    32899  32892  32901  32899  32833  32848  32874  32839  32875
    -42    32903    32886    32897  32888  32884  32890  32833  32880  32866  32879  32879
    -43    32889    32903    32905  32896  32888  32894  32902  32869  32876  32865  32805
    -44    32897    32893    32895  32899  32905  32891  32871  32864  32862  32876  32806
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    -47    32900    32888    32898  32889  32901  32829  32858  32859  32862  32865  32871
    -48    32896    32888    32897  32883  32900  32839  32867  32872  32865  32894  32865
    -49    32906    32893    32898  32909  32901  32843  32879  32876  32879  32882  32879
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##################################################
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#         ts(0)    ts(1)    hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm
          09 47    09 50    09 53  09 55  09 58  10 00  10 05  10 07  10 09  10 11  10 14
#stno      Bt0      Bt1      Bt2    Bt3    Bt4    Bt5    Bt6    Bt7    Bt8    Bt9    Bt10
   0     32892    32892    32896  32896  32885  32886  32897  32888  32892  32897  32898
  -1     32895    32897    32890  32894  32892  32899  32890  32900  32890  32890  32893
  -2     32890    32892    32895  32900  32882  32889  32891  32891  32892  32899  32898
  -3     32894    32899    32896  32898  32890  32891  32897  32899  32903  32903  32900
  -4     32896    32904    32898  32902  32897  32886  32894  32891  32888  32900  32897
  -5     32890    32902    32902  32892  32902  32890  32893  32893  32897  32889  32899
  -6     32891    32899    32901  32899  32894  32889  32894  32896  32891  32897  32895
  -7     32899    32897    32897  32899  32895  32888  32890  32890  32897  32896  32900
  -8     32893    32892    32902  32893  32895  32888  32894  32889  32900  32898  32899
  -9     32899    32898    32881  32897  32897  32890  32891  32885  32897  32892  32895
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##################################################
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    -11    32878    32890   32894   32890   32897   32908   32904   32906   32920   32919   32923
    -12    32886    32892   32896   32890   32893   32911   32902   32889   32917   32926   32922
    -13    32887    32892   32883   32899   32899   32903   32909   32893   32900   32923   32925
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##################################################
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##################################################
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# Y direction:East
# Facing Direction:South
#  x0    y0    dx    dy    nx    ny      BOs      BOe     hh mm   hh mm
  -30    30    -1    1     11    11     32856    32873    08 51   09 19
#          ts(0)     ts(1)   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
           08 58     08 59   09 01   09 03   09 05   09 07   09 09   09 10   09 12   09 14   09 16
#  stno    Bt0       Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
   -30    32872     32876   32878   32881   32879   32873   32879   32884   32879   32883   32881
```

-31	32874	32871	32879	32880	32884	32878	32879	32886	32881	32883	32888
-32	32860	32877	32874	32876	32883	32881	32884	32878	32885	32884	32881
-33	32868	32865	32877	32877	32879	32874	32882	32882	32881	32883	32880
-34	32870	32881	32877	32877	32879	32874	32884	32880	32885	32881	32881
-35	32870	32874	32877	32880	32881	32879	32883	32888	32877	32882	32878
-36	32875	32875	32882	32881	32878	32877	32883	32886	32880	32884	32888
-37	32879	32878	32881	32879	32882	32880	32884	32882	32880	32883	32872
-38	32874	32875	32880	32880	32881	32879	32881	32886	32881	32877	32883
-39	32872	32875	32883	32881	32884	32879	32881	32886	32884	32883	32883
-40	32872	32880	32882	32884	32881	32886	32884	32883	32880	32889	32882
	08 59	09 01	09 03	09 05	09 07	09 09	09 10	09 12	09 14	09 16	09 18

```
##################################################
# Site :   KAJOLA                        file20.dat
# Date :   18_12_1999
# Group :  Alpheaus   and Vic
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.090, lat 04 53.853
# X direction:North
# Y direction:East
# Facing Direction:South
#                    x0    y0    dx    dy     nx    ny      BOs      BOe      hh mm   hh mm
                    -40    30    -1     1     11    11    32874    32890    09 19   09 45
#              ts(0)   ts(1)  hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh
              09 21   09 23  09 25   09 28   09 30   09 32   09 34   09 36   09 38   09 40   09
#       stno     Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt
  -40    32883   32882   32885   32892   32895   32888   32894   32896   32891   32887   32897
  -41    32882   32885   32885   32891   32891   32887   32889   32886   32891   32893   32897
  -42    32882   32887   32889   32887   32882   32887   32895   32885   32891   32893   32897
  -43    32881   32887   32890   32891   32892   32888   32890   32885   32894   32893   32897
  -44    32886   32893   32887   32897   32889   32884   32890   32885   32892   32896   32901
  -45    32883   32887   32886   32886   32883   32885   32889   32891   32896   32898   32902
  -46    32885   32886   32882   32889   32889   32880   32881   32890   32894   32901   32897
  -47    32883   32881   32889   32884   32890   32890   32889   32892   32899   32900   32899
  -48    32880   32887   32891   32889   32891   32889   32880   32899   32896   32900   32901
  -49    32882   32887   32889   32894   32888   32889   32892   32896   32897   32901   32903
  -50    32888   32889   32889   32892   32894   32887   32893   32900   32899   32906   32901
         09 23   09 25   09 27   09 30   09 32   09 34   09 36   09 38   09 40   09 42   09 44

##################################################
# Site :   KAJOLA                        file21.dat
 # Date :   18_12_1999
 # Group :  Alpheaus   and Vic
 # Instrument : PPM G826
 # Height of sensor :   1.5m
 # GPS Reading:long 07 55.150 ,lat 04 53.870
 # X direction:North
 # Y direction:East
 # Facing Direction:South
 #  x0    y0    dx     dy     nx     ny     BOs      BOe      hh mm   hh mm
     0    40    -1      1     11     11    32904    32921    13 48   14 17
 #       ts(0)   ts(1)  hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
         13 52   13 54  13 56   13 57   13 59   14 01   14 03   14 05   14 08   14 10   14 13
 #stno    Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
     0   32899   32905   32895   32909   32892   32879   32899   32884   32897   32896   32898
    -1   32902   32903   32910   32918   32906   32883   32918   32900   32904   32883   32891
    -2   32903   32908   32908   32902   32889   32903   32908   32906   32907   32906   32904
    -3   32899   32907   32907   32909   32904   32904   32885   32904   32902   32905   32898
    -4   32903   32907   32907   32911   32904   32907   32912   32904   32901   32901   32906
    -5   32909   32907   32912   32903   32902   32885   32900   32902   32908   32911   32891
    -6   32903   32911   32907   32909   32912   32907   32899   32911   32913   32912   32897
    -7   32906   32906   32916   32916   32898   32905   32906   32904   32905   32915   32904
    -8   32908   32905   32904   32912   32907   32912   32908   32904   32912   32907   32895
    -9   32899   32912   32911   32908   32904   32906   32906   32908   32909   32893   32894
```

-10	32910	32911	32913	32907	32909	32907	32909	32903	32903	32904	32905	8
	13 54	13 55	13 57	13 59	14 01	14 03	14 05	14 07	14 10	14 12	14 15	

```
##################################################
# Site :   KAJOLA                          file22.dat
# Date :   18_12_1999
# Group :  Alpheaus   and Vic
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.146 ,lat 04 53.885
# X direction:North
# Y direction:East
# Facing Direction:South
```

# x0	y0	dX	dY	nx	ny	B0s	B0e	hh mm	hh mm
-10	40	-1	1	11	11	32920	32911	14 18	14 49

#	ts(0)	ts(1)	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm
	14 21	14 23	14 25	14 27	14 33	14 35	14 37	14 39	14 41	14 43	14 45
# stno	Bt0	Bt1	Bt2	Bt3	Bt4	Bt5	Bt6	Bt7	Bt8	Bt9	Bt10
-10	32923	32921	32932	32937	32938	32926	32932	32928	32917	32930	32933
-11	32930	32928	32930	32935	32934	32927	32932	32922	32920	32926	32918
-12	32926	32930	32930	32925	32938	32924	32928	32919	32923	32916	32926
-13	32928	32920	32924	32934	32931	32937	32933	32922	32924	32920	32917
-14	32925	32925	32918	32937	32928	32929	32933	32926	32927	32930	32928
-15	32926	32930	32932	32935	32932	32935	32921	32933	32926	32933	32935
-16	32924	32922	32921	32932	32939	32932	32931	32935	32917	32926	32928
-17	32923	32933	32935	32928	32934	32938	32932	32935	32933	32932	32920
-18	32903	32913	32915	32936	32937	32930	32933	32923	32933	32924	32929
-19	32926	32933	32924	32933	32932	32929	32932	32928	32931	32937	32925
-20	32933	32938	32935	32925	32931	32933	32925	32937	32928	32931	32924
	14 23	14 25	14 27	14 33	14 35	14 37	14 39	14 41	14 43	14 45	14 47

```
##################################################
# Site :   KAJOLA                          file23.dat
# Date :   18_12_1999
# Group :  Alpheaus and Vic
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.140 ,lat 04 53.884
# X direction:North
# Y direction:East
# Facing Direction:South
```

# x0	y0	dx	dy	nx	ny	B0s	Boe	hh mm	hh mm
-20	40	-1	1	11	11	32911	32899	14 49	15 14

#	ts(0)	ts(1)	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	
	14 52	14 54	14 56	14 58	15 00	15 01	15 03	15 05	15 07	15 09	15 11
# stno	Bt0	Bt1	Bt2	Bt3	Bt4	Bt5	Bt6	Bt7	Bt8	Bt9	Bt10
-20	32921	32915	32928	32924	32909	32916	32917	32917	32925	32921	32923
-21	32922	32915	32921	32920	32921	32918	32920	32924	32912	32908	32917
-22	32919	32916	32924	32920	32914	32917	32909	32926	32919	32916	32925
-23	32915	32925	32928	32926	32930	32919	32916	32925	32913	32923	32920
-24	32922	32920	32927	32925	32923	32916	32915	32918	32918	32903	32921
-25	32931	32917	32922	32931	32923	32913	32921	32926	32908	32917	32902
-26	32925	32925	32921	32920	32921	32930	32926	32921	32901	32922	32912
-27	32910	32913	32922	32915	32926	32918	32921	32917	32917	32920	32917
-28	32923	32918	32921	32910	32932	32918	32918	32916	32919	32905	32918
-29	32903	32920	32924	32913	32913	32919	32924	32923	32915	32908	32922
-30	32920	32916	32922	32916	32924	32924	32922	32918	32914	32913	32917
	14 54	14 56	14 58	15 00	15 01	15 03	15 05	15 07	15 09	15 11	15 13

```
##################################################
# Site :   KAJOLA                          file24.dat
# Date :   18_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
```

#stno	Bt0	Bt1	Bt2	Bt3	Bt4	Bt5	Bt6	Bt7	Bt8	Bt9	Bt10
30	32928	32935	32920	32921	32934	32925	32934	32910	32924	32931	32928
29	32930	32936	32920	32938	32936	32922	32930	32930	32931	32936	32935
28	32928	32935	32900	32933	32934	32911	32931	32931	32931	32929	32938
27	32931	32925	32920	32933	32943	32934	32928	32929	32931	32934	32935
26	32933	32932	32916	32929	32932	32934	32932	32929	32932	32930	32934
25	32934	32931	32912	32930	32930	32914	32928	32909	32928	32931	32937
24	32931	32923	32920	32928	32930	32905	32923	32909	32931	32927	32935
23	32929	32926	32930	32926	32928	32932	32919	32920	32914	32923	32924
22	32928	32922	32931	32931	32931	32890	32919	32907	32923	32927	32925
21	32924	32927	32913	32930	32879	32891	32925	32913	32924	32924	32932
20	32910	32913	32885	32898	32903	32920	32903	32912	32921	32928	32921
	10 01	10 04	10 07	10 09	10 12	10 14	10 16	10 19	10 22	10 25	10 27

```
#####################################################
# Site :   KAJOLA                          file34.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading at base point:
# X direction:North
# Y direction:East
# Facing Direction:South
```

#	x0	y0	dx	dy	nx	ny	B0s	B0e	hh mm	hh mm
	30	10	1	1	11	11	32863	32872	09 25	09 49

#	ts(0)	ts(1)	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm
	09 27	09 30	09 32	09 34	09 37	09 38	09 40	09 42	09 43	09 45	09 47

#stno	Bt0	Bt1	Bt2	Bt3	Bt4	Bt5	Bt6	Bt7	Bt8	Bt9	Bt10
30	32863	32864	32864	32864	32864	32865	32864	32865	32864	32864	32862
31	32862	32863	32867	32865	32866	32867	32867	32866	32865	32867	32867
32	32862	32862	32866	32865	32862	32868	32867	32869	32868	32869	32869
33	32859	32861	32862	32862	32864	32862	32875	32869	32865	32865	32866
34	32858	32858	32861	32862	32862	32867	32867	32862	32864	32867	32866
35	32862	32864	32865	32860	32862	32863	32861	32869	32865	32864	32867
36	32860	32861	32860	32860	32861	32862	32867	32862	32862	32861	32863
37	32858	32859	32864	32860	32860	32861	32862	32859	32861	32863	32863
38	32859	32860	32860	32859	32858	32859	32859	32858	32859	32862	32863
39	32859	32859	32856	32859	32857	32857	32863	32861	32860	32861	32861
40	32869	32859	32857	32859	32857	32857	32859	32858	32860	32859	32861
	09 29	09 32	09 34	09 36	09 38	09 40	09 41	09 43	09 44	09 46	09 48

```
#####################################################
# Site :   KAJOLA                          file35.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading :long 07 55.162, lat 04 53.834
# X direction:North
# Y direction:East
# Facing Direction:South
```

#	x0	y0	dx	dy	nx	ny	B0s	B0e	hh mm	hh mm
	50	10	-1	1	11	11	32942	32947	10 27	10 58

#	ts(0)	ts(1)	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm
	10 30	10 33	10 36	10 38	10 40	10 43	10 46	10 48	10 51	10 53	10 55

# stno	Bt0	Bt1	Bt2	Bt3	Bt4	Bt5	Bt6	Bt7	Bt8	Bt9	Bt10
50	32930	32932	32937	32935	32936	32931	32908	32938	32935	32938	32939
49	32933	32934	32929	32927	32930	32924	32933	32936	32936	32937	32936
48	32931	32932	32930	32912	32921	32912	32934	32936	32934	32934	32934
47	32936	32935	32934	32934	32934	32931	32928	32931	32928	32934	32933
46	32933	32928	32924	32930	32921	32933	32930	32930	32924	32933	32926
45	32934	32937	32935	32937	32934	32925	32934	32925	32932	32921	32936
44	32936	32934	32934	32936	32935	32930	32936	32931	32926	32919	32935
43	32935	32930	32928	32902	32933	32928	32935	32933	32933	32936	32935

```
# GPS Reading:long 07 55.131 ,lat 04 53.884
# X direction:North
# Y direction:East
# Facing Direction:South
#                  x0  y0      dX      dY      nX      nY      BOs     BOe       hh mm     hh mm
                  -30  40      -1       1      11      11     32922   32918      14 45     15 11
#        ts(0)   ts(1)   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
         14 48   14 50   14 52   14 54   14 56   14 57   15 00   15 01   15 02   15 04   15 07
#stno     Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
 -30    32935   32937   32932   32938   32933   32934   32935   32929   32924   32926   32933
 -31    32937   32933   32931   32932   32938   32938   32936   32935   32941   32927   32927
 -32    32938   32934   32933   32934   32936   32936   32939   32932   32935   32930   32929
 -33    32932   32937   32937   32934   32935   32938   32936   32937   32923   32928   32930
 -34    32936   32932   32937   32934   32936   32935   32933   32928   32939   32931   32932
 -35    32938   32934   32939   32933   32936   32935   32934   32927   32933   32930   32928
 -36    32933   32933   32932   32932   32938   32938   32933   32932   32936   32930   32934
 -37    32935   32934   32938   32936   32936   32925   32938   32932   32938   32932   32930
 -38    32935   32932   32936   32938   32935   32936   32932   32931   32926   32929   32930
 -39    32937   32934   32936   32938   32943   32938   32933   32931   32937   32931   32928
 -40    32936   32935   32942   32933   32937   32935   32935   32932   32925   32932   32930
        14 50   14 52   14 54   14 56   14 57   14 59   15 01   15 02   15 04   15 06   15 08

##################################################
# Site :   KAJOLA                          file25.dat
# Date :   18_12_1999
# Group :  Amoo Kunle and Alpheaus
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.120 ,lat 04 53.887
# X direction:North
# Y direction:East
# Facing Direction:South
#                        x0   y0   dx   dy   nx   ny   BOs     BOe     hh mm
                        -40   40   -1    1   11   11   32918   32917   15 12
#        ts(0)   ts(1)   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
         15 15   15 17   15 19   15 22   15 24   15 27   15 28   15 30   15 34   15 35   15 37
#  stno   Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
   -40   32936   32929   32929   32930   32928   32929   32926   32933   32928   32925   32930
   -41   32936   32934   32936   32932   32927   32926   32930   32924   32929   32927   32923
   -42   32934   32931   32926   32932   32938   32935   32932   32918   32923   32922   32924
   -43   32936   32933   32934   32931   32930   32927   32930   32927   32928   32924   32923
   -44   32933   32933   32927   32934   32931   32931   32929   32927   32925   32927   32928
   -41   32941   32931   32932   32930   32939   32930   32929   32931   32926   32921   32924
   -46   32935   32937   32932   32935   32934   32935   32933   32932   32927   32927   32925
   -47   32938   32935   32928   32932   32931   32929   32931   32926   32923   32925   32922
   -48   32931   32935   32929   32929   32928   32934   32928   32923   32931   32929   32922
   -49   32936   32933   32939   32931   32934   32929   32929   32927   32924   32927   32922
   -50   32941   32934   32932   32934   32934   32932   32936   32926   32926   32925   32920
         15 16   15 19   15 21   15 24   15 27   15 28   15 30   15 33   15 35   15 37   15 38

##################################################
# Site :   KAJOLA                          file26.dat
# Date :   18_12_1999
# Group :  Alpheaus  and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.134 ,lat 04 53.846
# X direction:North
# Y direction:East
# Direction:South
#                x0   y0  dx   dy   nx   ny   BOs     BOe     hh mm     hh mm
                 0    0   1    1   11   11   32894   32879   17 10     17 52
#          ts(0)   ts(1)   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
           17 15   17 18   17 22   17 26   17 28   17 31   17 34   17 38   17 41   17 44   17 48
#    stno   Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
```

```
      0    32898   32891   32886   32884   32883    32883  32881   32888   32888   32898   32887
      1    32891   32893   32884   32891   32887    32886  32888   32885   32880   32885   32885
      2    32893   32890   32887   32883   32877    32888  32875   32888   32889   32877   32870
      3    32899   32907   32888   32888   32874    32879  32885   32871   32891   32885   32879
      4    32889   32893   32897   32890   32888    32873  32881   32884   32891   32898   32888
      5    32889   32889   32888   32893   32888    32879  32874   32880   32887   32891   32888
      6    32898   32885   32891   32878   32879    32873  32878   32876   32879   32884   32881
      7    32889   32895   32888   32880   32874    32877  32871   32898   32898   32878   32888
      8    32883   32891   32888   32881   32880    32875  32875   32887   32886   32878   32878
      9    32886   32897   32888   32884   32890    32888  32879   32884   32900   32888   32888
     10    32891   32890   32875   32883   32885    32883  32888   32887   32899   32877   32878
           17 17   17 21   17 25   17 28   17 30    17 34  17 37   17 41   17 44   17 47   17 52

##################################################
# Site :   KAJOLA                        file27.dat
# Date :   18_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.139 ,lat 04 53.840
# X direction:North
# Y direction:East
# Direction:South
#  x0     y0     dx     dy     nx     ny      BOs      BOe      hh mm    hh mm
   0      0      1      1      11     11      32886    32885    18 02    18 28
#      ts(0)   ts(1)  hh mm   hh mm  hh mm hh mm  hh mm   hh mm   hh mm   hh mm  hh mm
       18 02   18 10 18 12    18 14  18 16 18 17  18 19   18 20   18 22   18 24  18 25
#stno   Bt0     Bt1    Bt2     Bt3    Bt4    Bt5    Bt6     Bt7     Bt8     Bt9    Bt10
  10   32891   32896  32884   32890  32884  32889  32893   32875   32883   32881  32862
  11   32886   32883  32880   32884  32881  32885  32877   32884   32884   32884  32872
  12   32883   32886  32871   32886  32874  32888  32868   32885   32874   32882  32879
  13   32887   32879  32897   32879  32886  32882  32870   32875   32873   32875  32876
  14   32885   32886  32888   32876  32872  32881  32875   32873   32871   32865  32875
  15   32882   32888  32874   32873  32876  32876  32877   32879   32882   32879  32870
  16   32886   32888  32881   32879  32871  32876  32871   32877   32876   32873  32874
  17   32884   32884  32886   32881  32878  32884  32876   32880   32874   32878  32877
  18   32881   32878  32875   32872  32878  32873  32872   32877   32876   32875  32873
  19   32879   32883  32883   32879  32881  32882  32869   32878   32869   32870  32873
  20   32887   32878  32873   32872  32874  32869  32865   32870   32866   32878  32875
       18 03   18 12  18 14   18 15  18 17 18 19  18 20   18 22   18 24   18 25  18 27

##################################################
# Site :   KAJOLA                        file28.dat
# Date :   18_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.145 ,lat 04 53.834
# X direction:North
# Y direction:East
# Direction:South
#              x0     y0     dx     dy     nx     ny      BOs      BOe      hh mm    hh mm
               20     0      1      1      11     11      32885    32871    18 28    18 48
#           ts(0)   ts(1)  hh mm   hh mm  hh mm  hh mm   hh mm   hh mm   hh mm   hh mm  hh mm
           18 30   18 31  18 33   18 34  18 36  18 38   18 39   18 41   18 42   18 44  18 46
#   stno    Bt0     Bt1    Bt2     Bt3    Bt4    Bt5    Bt6     Bt7     Bt8     Bt9    Bt10
      20   32881   32892  32880   32863  32877  32884  32860   32871   32878   32859  32857
      21   32887   32876  32869   32879  32879  32872  32858   32868   32864   32858  32860
      22   32873   32873  32868   32871  32872  32879  32874   32872   32867   32863  32863
      23   32885   32875  32879   32875  32860  32873  32869   32878   32866   32864  32864
      24   32879   32875  32874   32877  32881  32870  32859   32884   32868   32864  32867
      25   32875   32871  32879   32872  32875  32882  32871   32872   32866   32869  32873
      26   32883   32868  32866   32880  32866  32868  32868   32871   32870   32869  32862
      27   32863   32874  32873   32869  32874  32872  32871   32868   32875   32869  32869
      28   32875   32877  32869   32873  32874  32874  32875   32871   32873   32867  32871
```

```
      29    32888   32878   32873   32877   32885   32866   32863   32872   32872   32869   32870
      30    32877   32881   32880   32882   32880   32871   32872   32867   32856   32876   32875
            18 31   18 33   18 34   18 36   18 37   18 39   18 40   18 42   18 44   18 45   18 47

##################################################
# Site :   KAJOLA                          file29.dat
# Date :   18_12_1999
# Group :  Alpheaus and Vic
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.148, lat 04 53.828
# X direction:North
# Y direction:East
# Direction:South
#                 x0    y0    dx    dy    nx    ny     B0s      B0e     hh mm   hh mm
                  40    0     -1    1     11    11     32876    32873   18 25   18 50
#         ts(0)   ts(1)   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
          18 27   18 29   18 31   18 33   18 35   18 37   18 39   18 40   18 42   18 44   18 45
# stno     Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
   40    32897   32876   32874   32860   32869   32884   32885   32883   32885   32872   32897
   39    32887   32888   32870   32870   32874   32874   32889   32889   32875   32882   32888
   38    32890   32870   32868   32862   32874   32908   32918   32884   32884   32880   32880
   37    32884   32895   32878   32857   32886   32921   32879   32880   32923   32917   32898
   36    32890   32892   32881   32862   32881   32913   32888   32890   32908   32922   32874
   35    32878   32875   32869   32877   32869   32928   32889   32884   32913   32881   32872
   34    32886   32876   32880   32869   32879   32899   32894   32887   32931   32893   32867
   33    32873   32871   32879   32881   32884   32886   32876   32889   32876   32883   32877
   32    32891   32869   32869   32877   32870   32891   32883   32880   32885   32878   32879
   31    32884   32884   32888   32878   32882   32903   32881   32885   32880   32896   32886
   30    32886   32887   32878   32878   32874   32914   32900   32890   32874   32891   32876
         18 29   18 31   18 33   18 35   18 37   18 39   18 40   18 42   18 44   18 45   18 47

##################################################
# Site :   KAJOLA                          file30.dat
# Date :   18_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.164 , lat 04 53.848
# X direction:North
# Y direction:East
# Facing Direction:South
#     x0    y0    dx    dy    nx    ny     B0s      B0e      hh mm   hh mm
      50    0     -1    1     11    11     32868    32876    17 56   18 25
#         ts(0)   ts(1)   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
          17 59   18 01   18 04   18 07   18 10   18 12   18 16   18 18   18 20   18 22   18 23
# stno     Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
   50    32851   32869   32858   32862   32898   32875   32850   32873   32866   32879   32870
   49    32863   32854   32866   32858   32892   32901   32844   32870   32863   32872   32883
   48    32858   32857   32863   32862   32921   32924   32859   32862   32876   32884   32886
   47    32850   32860   32868   32865   32890   32883   32858   32862   32875   32878   32876
   46    32854   32859   32857   32850   32900   32893   32869   32874   32875   32875   32873
   45    32845   32861   32856   32852   32880   32872   32873   32867   32876   32871   32881
   44    32845   32850   32853   32851   32897   32881   32873   32880   32878   32874   32877
   43    32860   32863   32851   32863   32878   32877   32874   32892   32874   32885   32879
   42    32847   32852   32865   32872   32878   32890   32866   32898   32874   32884   32882
   41    32860   32861   32858   32885   32908   32882   32877   32874   32868   32879   32881
   40    32853   32862   32861   32880   32877   32897   32878   32878   32884   32881   32882
         18 01   18 03   18 06   10 09   18 12   18 16   18 18   18 20   18 22   18 23   18 25

##################################################
# Site :   KAJOLA                          file31.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
```

```
# Height of sensor :   1.5m
# GPS Reading at base point:
# X direction:North
# Y direction:East
# facing Direction:South
#                    x0   y0   dx   dy   nx   ny    BOs     BOe     hh mm   hh mm
                     0    10    1    1    11   11    32872   32880   09 49   10 28
#        ts(0)   ts(1)   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
         09 50   09 51   09 53   09 57   10 02   10 04   10 08   10 12   10 17   10 20   10 24
# stno    Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
  0      32870   32876   32872   32873   32875   32876   32874   32877   32878   32888   32875
  1      32870   32873   32873   32873   32873   32871   32876   32877   32876   32874   32879
  2      32871   32872   32870   32874   32871   32876   32874   32875   32873   32876   32879
  3      32871   32870   32870   32870   32871   32871   32877   32876   32876   32875   32882
  4      32865   32871   32869   32871   32870   32873   32872   32875   32879   32879   32876
  5      32867   32869   32871   32869   32868   32871   32872   32879   32879   32879   32880
  6      32867   32872   32869   32869   32871   32872   32875   32876   32881   32878   32875
  7      32861   32866   32869   32869   32871   32872   32872   32877   32875   32877   32877
  8      32868   32869   32868   32870   32872   32872   32874   32876   32876   32873   32877
  9      32869   32866   32868   32870   32871   32872   32875   32874   32879   32880   32876
 10      32869   32869   32869   32871   32867   32870   32875   32875   32878   32876   32875
         09 51   09 53   09 55   10 01   10 04   10 07   10 11   10 16   10 19   10 23   10 26

#####################################################
# Site :   KAJOLA                          file32.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading at base point:
# X direction:North
# Y direction:East
# Direction:South
#                  x0   y0   dx   dy   nx   ny    BOs     BOe     hh mm   hh mm
                   10   10   1    1    11   11    32881   32892   10 26   11 11
#        ts(0)   ts(1)   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
         10 36   10 38   10 42   10 45   10 50   10 54   10 58   11 01   11 03   11 06   11 08
#  stno  Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
    10   32880   32888   32882   32883   32886   32883   32881   32888   32886   32887   32889
    11   32884   32888   32883   32883   32880   32884   32879   32882   32884   32888   32882
    12   32884   32880   32884   32880   32879   32883   32887   32885   32881   32883   32885
    13   32880   32880   32879   32882   32880   32886   32883   32879   32881   32887   32882
    14   32879   32881   32880   32880   32882   32885   32883   32883   32881   32883   32885
    15   32879   32877   32879   32878   32881   32878   32882   32882   32883   32883   32880
    16   32880   32882   32877   32882   32887   32884   32879   32887   32884   32874   32880
    17   32877   32879   32873   32880   32882   32880   32882   32881   32884   32881   32883
    18   32882   32876   32876   32879   32881   32884   32883   32881   32881   32877   32883
    19   32879   32879   32878   32881   32879   32879   32885   32883   32883   32883   32883
    20   32880   32876   32875   32877   32880   32885   32882   32879   32886   32882   32880
         10 38   10 41   10 44   10 49   10 53   10 57   11 01   11 03   11 06   11 08   11 10

#####################################################
# Site :   KAJOLA                          file33.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading at base point:
# X direction:North
# Y direction:East
# facing Direction:South
#                    x0   y0   dx   dy   nx   ny    BOs     BOs     hh mm   hh mm
                     30   10   -1   1    11   11    32908   32943   09 56   10 27
#      ts(0)   ts(1)   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
       09 59   10 02   10 03   10 07   10 10   10 12   10 14   10 16   10 20   10 22   10 25
```

42	32932	32938	32931	32935	32933	32925	32933	32934	32933	32936	32939
41	32936	32935	32930	32933	32936	32934	32933	32926	32916	32932	32935
40	32925	32931	32927	32925	32936	32921	32931	32930	32928	32936	32935
	10 33	10 35	10 38	10 40	10 42	10 45	10 48	10 51	10 53	10 55	10 57

```
#####################################################
# Site :   KAJOLA                          file36.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.145,lat 04 53.865
# X direction:North
# Y direction:East
# Direction:South
#                      x0   y0   dx   dy   nx   ny    BOs    BOe     hh mm  hh mm
                       10   20   -1   1    11   11    32878  32876   13 06  13 38
#          ts(0)   ts(1)    hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm
           13 09   13 12    13 15  13 18  13 20  13 23  13 25  13 27  13 30  13 33  13 36
# stno      Bt0     Bt1      Bt2    Bt3    Bt4    Bt5    Bt6    Bt7    Bt8    Bt9    Bt10
   10      32871   32873   32860  32867  32870  32869  32861  32873  32877  32862  32871
    9      32864   32876   32872  32869  32871  32868  32869  32872  32863  32866  32865
    8      32867   32866   32862  32869  32869  32869  32866  32873  32876  32866  32867
    7      32870   32868   32878  32873  32871  32872  32866  32876  32875  32864  32865
    6      32872   32877   32861  32868  32868  32874  32870  32860  32877  32862  32862
    5      32873   32873   32886  32878  32869  32873  32867  32873  32878  32870  32859
    4      32870   32874   32873  32876  32879  32878  32875  32875  32877  32868  32860
    3      32876   32877   32861  32873  32871  32873  32877  32879  32879  32868  32866
    2      32869   32877   32866  32875  32875  32872  32865  32874  32874  32871  32866
    1      32870   32875   32864  32873  32872  32869  32870  32879  32880  32869  32864
    0      32879   32886   32875  32876  32872  32871  32876  32877  32888  32874  32869
           13 11   13 15   13 17  13 20  13 22  13 25  13 27  13 29  13 32  13 35  13 38

#####################################################
# Site :   KAJOLA                          file37.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.145, lat 04 53.860
# X direction:North
# Y direction:East
# Facing Direction:South
#                      x0     y0     dx     dy     nx     ny     BOs    BOe     hh mm  hh mm
                       20     20     -1     1      11     11     32875  32878   12 39  13 07
#          ts(0)   ts(1)    hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm
           12 40   12 42    12 44  12 46  12 48  12 51  12 54  12 57  12 59  13 02  13 04
#  stno     Bt0     Bt1      Bt2    Bt3    Bt4    Bt5    Bt6    Bt7    Bt8    Bt9    Bt10
    20      32867   32877   32886  32874  32882  32870  32872  32871  32868  32875  32876
    19      32864   32873   32872  32870  32881  32881  32869  32867  32868  32866  32863
    18      32867   32870   32866  32862  32876  32869  32882  32867  32869  32872  32868
    17      32866   32868   32868  32873  32874  32871  32877  32872  32868  32875  32871
    16      32872   32866   32874  32870  32871  32870  32868  32875  32870  32873  32865
    15      32867   32868   32877  32864  32870  32869  32867  32871  32864  32871  32869
    14      32872   32864   32876  32876  32879  32871  32874  32873  32867  32869  32872
    13      32871   32875   32868  32877  32877  32871  32876  32872  32863  32868  32869
    12      32876   32876   32870  32871  32872  32871  32871  32868  32872  32868  32878
    11      32873   32871   32873  32875  32876  32871  32870  32877  32877  32875  32878
    10      32878   32875   32879  32874  32878  32879  32876  32881  32879  32875  32875
            12 42   12 44   12 46  12 48  12 50  12 53  12 56  12 59  13 01  13 04  13 05

#####################################################
# Site :   KAJOLA                          file38.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
```

```
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.147 ,lat 04 53.855
# X direction:North
# Y direction:East
# Direction:South
#                  x0    y0    dx    dy    nx    ny       BOs       BOe      hh mm  hh mm
                   30    20    -1     1    11    11     32880     32874     12 03  12 36
#          ts(0)   ts(1)   hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm
           12 05   12 07   12 10  12 15  12 19  12 23  12 25  12 29  12 31  12 33  12 35
# stno     Bt0      Bt1     Bt2    Bt3    Bt4    Bt5    Bt6    Bt7    Bt8    Bt9    Bt10
    30    32868   32868   32879  32875  32887  32871  32883  32875  32868  32869  32867
    29    32872   32871   32885  32863  32867  32867  32865  32864  32865  32868  32867
    28    32872   32867   32871  32870  32865  32860  32868  32864  32852  32868  32868
    27    32871   32867   32872  32864  32870  32864  32871  32872  32872  32866  32869
    26    32870   32865   32870  32865  32870  32863  32872  32872  32870  32868  32870
    25    32874   32868   32871  32865  32871  32861  32880  32866  32873  32865  32864
    24    32874   32873   32878  32865  32870  32867  32883  32878  32875  32865  32868
    23    32868   32872   32869  32870  32865  32869  32875  32871  32886  32868  32869
    22    32866   32863   32870  32864  32862  32862  32878  32865  32889  32869  32871
    21    32872   32870   32884  32863  32868  32871  32890  32867  32874  32872  32868
    20    32871   32874   32871  32864  32868  32871  32875  32868  32868  32873  32875
          12 07   12 09   12 14  12 19  12 22  12 25  12 28  12 31  12 33  12 35  12 37

#####################################################
# Site :   KAJOLA                          file39.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading :long 07 55.141 ,lat 04 53.852
# X direction:North
# Y direction:East
# Direction:South
#                    x0    y0    dx    dy    nx    ny     BOs     BOe     hh mm   hh mm
                     40    20    -1     1    11    11   32957   32945   12 45   13 32
#          ts(0)   ts(1)   hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm
           12 48   12 53   12 55  12 58  13 01  13 04  13 10  13 13  13 17  13 20  13 24
#  stno     Bt0     Bt1     Bt2    Bt3    Bt4    Bt5    Bt6    Bt7    Bt8    Bt9    Bt10
    40    32937   32946   32943  32941  32950  32933  32946  32943  32937  32935  32939
    39    32938   32954   32959  32933  32927  32934  32951  32942  32936  32927  32927
    38    32951   32943   32944  32928  32927  32928  32935  32942  32933  32923  32937
    37    32955   32947   32945  32938  32937  32931  32940  32936  32940  32942  32931
    36    32946   32947   32948  32941  32953  32930  32943  32956  32931  32924  32938
    35    32953   32952   32946  32942  32938  32923  32942  32932  32954  32929  32943
    34    32963   32954   32948  32951  32946  32951  32932  32938  32923  32941  32926
    33    32957   32952   32946  32940  32944  32943  32938  32946  32943  32935  32941
    32    32960   32957   32949  32940  32948  32950  32934  32935  32946  32932  32938
    32    32952   32945   32948  32942  32945  32956  32942  32929  32942  32938  32929
    30    32955   32946   32948  32940  32946  32937  32933  32944  32932  32938  32927
          12 52   12 55   12 58  13 01  13 04  13 09  13 13  13 16  13 20  13 23  13 27

#####################################################
# Site :   KAJOLA                          file40.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.160 ,lat 04 53.864
# X direction:North
# Y direction:East
# Direction:South
#              x0    y0    dx    dy    nx    ny     BOs       BOe       hh mm   hh mm
               50    20    -1     1    11    11   32941     32957     12 11   12 45
#          ts(0)   ts(1)   hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm  hh mm
```

	12 13	12 16	12 19	12 21	12 24	12 28	12 30	12 32	12 36	12 38	12 41
# stno	Bt0	Bt1	Bt2	Bt3	Bt4	Bt5	Bt6	Bt7	Bt8	Bt9	Bt10
50	32951	32950	32945	32953	32934	32956	32946	32951	32938	32947	32954
49	32958	32954	32953	32943	32949	32949	32958	32949	32937	32930	32954
48	32941	32950	32929	32928	32942	32951	32941	32936	32952	32953	32954
47	32939	32941	32931	32926	32926	32948	32938	32948	32960	32948	32956
46	32936	32938	32910	32934	32935	32928	32952	32936	32954	32928	32951
45	32937	32946	32939	32922	32940	32939	32951	32956	32959	32949	32955
44	32949	32949	32948	32925	32948	32951	32944	32944	32958	32957	32949
43	32941	32936	32952	32935	32945	32948	32958	32939	32960	32954	32955
42	32924	32932	32942	32939	32947	32953	32945	32954	32945	32956	32963
41	32946	32946	32929	32947	32947	32946	32945	32943	32955	32957	32955
40	32948	32948	32948	32943	32946	32942	32952	32939	32933	32948	32938
	12 16	12 19	12 21	12 24	12 28	12 30	12 32	12 35	12 38	12 40	12 43

```
##################################################
# Site :   KAJOLA                          file41.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :  1.5m
# GPS Reading at base point:
# X direction:North
# Y direction:East
# Facing Direction:South
```

#	x0	y0	dx	dy	nx	ny	BOs	BOe	hh mm	hh mm	
	0	30	1	1	11	11	32897	32894	14 50	15 25	
#	ts(0)	ts(1)	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm
	14 52	14 54	14 56	15 00	15 05	15 07	15 09	15 11	15 14	15 18	15 22
# stno	Bt0	Bt1	Bt2	Bt3	Bt4	Bt5	Bt6	Bt7	Bt8	Bt9	Bt10
0	32885	32896	32895	32896	32894	32895	32901	32897	32895	32892	32888
1	32899	32897	32897	32890	32896	32896	32902	32892	32901	32889	32874
2	32893	32892	32893	32896	32895	32897	32893	32900	32890	32889	32893
3	32895	32890	32900	32891	32896	32896	32894	32892	32892	32900	32889
4	32899	32896	32896	32898	32896	32896	32898	32898	32893	32895	32887
5	32896	32880	32899	32899	32896	32895	32894	32894	32898	32892	32890
6	32895	32898	32898	32899	32894	32898	32897	32895	32895	32894	32887
7	32897	32890	32898	32897	32893	32897	32898	32897	32886	32887	32891
8	32893	32893	32896	32895	32893	32900	32892	32897	32895	32890	32895
9	32893	32892	32892	32896	32893	32894	32890	32895	32891	32892	32891
10	32887	32898	32890	32891	32895	32891	32895	32889	32888	32892	32891
	14 54	14 56	14 59	15 04	15 06	15 09	15 11	15 14	15 17	15 21	15 26

```
##################################################
# Site :   KAJOLA                          file42.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading at base point:
# X direction:North
# Y direction:East
# Facing Direction:South
```

#	x0	y0	dx	dy	nx	ny	BOs	BOe	hh mm	hh mm	
	10	30	1	1	11	11	32894	32879	15 26	15 57	
#	ts(0)	ts(1)	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm
	15 30	15 31	15 33	15 35	15 37	15 40	15 44	15 47	15 49	15 51	15 52
# stno	Bt0	Bt1	Bt2	Bt3	Bt4	Bt5	Bt6	Bt7	Bt8	Bt9	Bt10
10	32889	32887	32889	32892	32884	32884	32891	32884	32894	32894	32888
11	32888	32889	32894	32890	32886	32890	32887	32889	32883	32887	32887
12	32890	32887	32890	32890	32886	32880	32886	32894	32883	32888	32887
13	32885	32886	32888	32892	32883	32890	32888	32891	32891	32888	32888
14	32889	32887	32891	32888	32883	32885	32889	32884	32886	32891	32889
15	32884	32876	32889	32889	32884	32883	32886	32887	32883	32888	32888
16	32883	32882	32883	32883	32883	32880	32900	32887	32885	32882	32884

```
   17      32880   32880   32887   32885   32879   32886   32885   32884   32884   32880   32881
   18      32880   32883   32880   32883   32880   32886   32881   32880   32882   32871   32880
   19      32879   32875   32872   32877   32876   32887   32884   32879   32877   32879   32879
   20      32877   32880   32885   32875   32878   32876   32879   32877   32879   32873   32876
           15 31   15 33   15 35   15 37   15 39   15 44   15 47   15 49   15 51   15 52   15 55

##################################################
# Site :   KAJOLA                          file43.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading at base point:
# X direction:North
# Y direction:East
# Facing Direction:South
#                 x0    y0    dx    dy    nx    ny     BOs     BOe    hh mm   hh mm
                  30    30    -1    1     11    11    32861   32869  15 08   15 30
#          ts(0)  ts(1)    hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh m
           15 09  15 11    15 13   15 15   15 17   15 19   15 21   15 22   15 23   15 25   15 2
#  stno     Bt0    Bt1      Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt1
     30    32855  32858   32852   32854   32853   32854   32853   32853   32849   32853   3285
     29    32852  32848   32853   32854   32855   32850   32857   32855   32853   32854   3285
     28    32849  32851   32847   32841   32854   32853   32856   32850   32853   32853   3285
     27    32850  32851   32846   32856   32850   32854   32851   32853   32854   32850   3285
     26    32849  32848   32852   32857   32852   32852   32855   32850   32853   32851   3285
     25    32851  32847   32851   32846   32852   32853   32857   32854   32853   32850   3285
     24    32853  32850   32845   32855   32851   32849   32853   32853   32852   32855   3285
     23    32853  32855   32853   32856   32853   32851   32852   32854   32857   32852   3285
     22    32851  32854   32857   32859   32855   32851   32857   32853   32855   32854   3285
     21    32855  32856   32858   32860   32856   32853   32855   32852   32853   32849   3285
     20    32856  32855   32855   32853   32854   32855   32852   32853   32854   32852   3284
           15 11  15 13   15 15   15 17   15 19   15 20   15 22   15 23   15 25   15 27   15 2

##################################################
# Site :   KAJOLA                          file44.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading at base point:
# X direction:North
# Y direction:East
# Facing Direction:South
#                       x0    y0    dx    dy    nx    ny    BOs     Boe     hh mm   hh mm
                        40    30    -1    1     11    11    32869   32865   15 30   15 52
#         ts(0)   ts(1)   hh mm   hh  mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm   hh mm
          15 32   15 34   15 35   15 37   15 39   15 40   15 42   15 44   15 45   15 47   15 49
# stno     Bt0     Bt1     Bt2     Bt3     Bt4     Bt5     Bt6     Bt7     Bt8     Bt9     Bt10
    40    32847   32846   32852   32851   32853   32847   32849   32851   32845   32850   32850
    39    32852   32848   32854   32854   32852   32849   32848   32850   32850   32852   32848
    38    32851   32849   32855   32842   32853   32849   32849   32854   32848   32851   32850
    37    32851   32849   32853   32850   32847   32855   32848   32849   32853   32848   32855
    36    32848   32849   32851   32851   32854   32849   32850   32851   32853   32850   32850
    35    32853   32856   32853   32850   32849   32852   32848   32851   32852   32848   32852
    34    32852   32851   32855   32854   32852   32854   32850   32853   32854   32850   32850
    33    32852   32851   32855   32854   32852   32851   32850   32851   32849   32853   32852
    32    32851   32854   32855   32855   32851   32851   32851   32849   32847   32848   32853
    31    32847   32859   32853   32852   32848   32848   32842   32850   32852   32848   32850
    30    32849   32852   32852   32853   32852   32845   32843   32850   32852   32851   32851
          15 34   15 35   15 37   15 38   15 40   15 42   15 44   15 45   15 47   15 49   15 51

##################################################
# Site :   KAJOLA                          file45.dat
# Date :   19_12_1999
```

```
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.162 , lat 04 53.879
# X direction:North
# Y direction:East
# Facing Direction:South
#                 x0    y0    dx    dy    nx    ny      BOs      BOe     hh mm    hh mm
                  50    30    -1     1    11    11     32865    32859    15 52    16 14
#         ts(0)   ts(1)    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm
          15 54   15 56    15 58    15 59    16 00    16 01    16 03    16 06    16 07    16 09    16 11
#  stno    Bt0     Bt1      Bt2      Bt3      Bt4      Bt5      Bt6      Bt7      Bt8      Bt9      Bt10
    50   32851   32853    32847    32851    32850    32847    32845    32853    32846    32845    32840
    49   32850   32850    32847    32846    32846    32844    32845    32842    32844    32847    32849
    48   32852   32846    32845    32847    32850    32846    32845    32847    32848    32843    32843
    47   32853   32851    32850    32850    32850    32844    32852    32845    32841    32846    32845
    46   32856   32850    32850    32850    32850    32848    32844    32846    32845    32841    32845
    45   32851   32849    32850    32844    32844    32846    32843    32848    32848    32845    32852
    44   32852   32847    32850    32846    32848    32847    32843    32847    32846    32850    32843
    43   32851   32846    32850    32843    32842    32843    32844    32849    32845    32843    32845
    42   32847   32848    32849    32846    32842    32841    32844    32845    32838    32843    32847
    41   32849   32847    32846    32841    32846    32842    32841    32842    32844    32842    32847
    40   32840   32845    32847    32847    32840    32824    32839    32843    32843    32842    32841
         15 56   15 58    15 59    16 00    16 01    16 03    16 05    16 07    16 09    16 11    16 13

#####################################################
# Site :   KAJOLA                          file46.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.149 ,lat 04 53.861
# X direction:North
# Y direction:East
# Facing Direction:South
#           x0    y0    dx    dy    nx    ny      BOs      BOe     hh mm    hh mm
            0     40     1     1    11    11     32876    32862    16 54    17 31
#         ts(0)   ts(1)  hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm
          17 03   17 05  17 07    17 09    17 11    17 13    17 15    17 17    17 23    17 27    17 29
#  stno    Bt0     Bt1     Bt2      Bt3      Bt4      Bt5      Bt6      Bt7      Bt8      Bt9      Bt10
     0   32867   32869   32870    32854    32858    32863    32860    32867    32864    32867    32851
     1   32868   32856   32863    32862    32861    32866    32866    32857    32860    32863    32851
     2   32867   32860   32863    32866    32860    32861    32854    32862    32852    32857    32864
     3   32872   32869   32859    32855    32854    32862    32862    32863    32860    32858    32861
     4   32864   32868   32868    32865    32858    32867    32861    32866    32867    32860    32864
     5   32867   32865   32863    32859    32857    32863    32862    32860    32855    32859    32867
     6   32871   32861   32865    32859    32859    32860    32861    32862    32859    32852    32859
     7   32868   32864   32862    32869    32855    32858    32860    32864    32856    32860    32853
     8   32865   32862   32866    32867    32870    32855    32865    32863    32858    32856    32856
     9   32868   32860   32864    32866    32869    32856    32862    32865    32858    32855    32859
    10   32868   32865   32870    32865    32868    32860    32862    32868    32864    32855    32847
         17 05   17 07   17 09    17 11    17 13    17 15    17 17    17 20    17 27    17 29    17 30

#####################################################
# Site :   KAJOLA                          file47.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.149 ,lat 04 53.872
# X direction:North
# Y direction:East
# Direction:South
#           x0    y0    dx    dy    nx    ny      BOs      BOe     hh mm    hh mm
            10    40     1     1    11    11     32883    32877    16 20    16 54
```

```
#         ts(0)   ts(1)   hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm
          16 21   16 26   16 29    16 33    16 36    16 39    16 42    16 44    16 46    16 48    16 50
#  stno    Bt0     Bt1     Bt2      Bt3      Bt4      Bt5      Bt6      Bt7      Bt8      Bt9      Bt10
    10   32872   32868   32874    32874    32874    32873    32874    32867    32867    32866    32875
    11   32875   32865   32874    32867    32871    32862    32865    32864    32869    32867    32872
    12   32871   32856   32873    32862    32856    32870    32867    32869    32866    32862    32866
    13   32868   32869   32874    32873    32872    32872    32868    32865    32871    32852    32868
    14   32867   32858   32869    32870    32872    32865    32872    32868    32867    32865    32865
    15   32870   32852   32867    32867    32878    32871    32868    32868    32870    32865    32869
    16   32867   32864   32863    32869    32870    32871    32867    32869    32868    32868    32868
    17   32864   32862   32863    32868    32868    32874    32868    32867    32865    32864    32863
    18   32862   32852   32862    32863    32863    32871    32872    32873    32868    32870    32868
    19   32862   32864   32857    32864    32868    32867    32868    32866    32868    32866    32867
    20   32861   32859   32848    32859    32868    32867    32860    32869    32863    32863    32866
          16 26   16 29   16 32    16 36    16 39    16 42    16 44    16 46    16 48    16 50    16 52

##################################################
# Site :   KAJOLA                          file48.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading :long 07 55.146,lat  04 53.861
# X direction:North
# Y direction:East
# Facing Direction:South
#                    x0    y0    dx    dy    nx    ny    BOs       BOe     hh mm   hh mm
                     30    40    -1    1     11    11    32853     32866   16 14   16 43
#      ts(0)   ts(1)   hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm
       16 21   16 23   16 25    16 27    16 29    16 31    16 33    16 34    16 36    16 38    16 40
#   stn Bt0     Bt1      Bt2      Bt3      Bt4      Bt5      Bt6      Bt7      Bt8      Bt9      Bt10
     30 32843   32844    32841    32846    32850    32849    32850    32851    32846    32851    32852
     29 32841   32843    32844    32848    32850    32847    32846    32853    32852    32846    32852
     28 32845   32843    32847    32845    32851    32851    32847    32850    32848    32853    32844
     27 32847   32844    32847    32849    32848    32850    32852    32854    32853    32854    32847
     26 32847   32846    32861    32853    32852    32850    32849    32853    32848    32851    32857
     25 32847   32847    32850    32852    32851    32849    32847    32849    32851    32856    32848
     24 32847   32849    32851    32852    32848    32852    32851    32848    32851    32855    32848
     23 32844   32845    32852    32851    32850    32846    32848    32855    32853    32851    32852
     22 32847   32844    32849    32850    32851    32850    32851    32850    32851    32852    32848
     21 32847   32845    32848    32851    32849    32845    32847    32846    32859    32853    32847
     20 32845   32849    32850    32850    32852    32849    32852    32847    32851    32849    32851
        16 23   16 25    16 27    16 29    16 31    16 33    16 34    16 35    16 38    16 40    16 41

##################################################
# Site :   KAJOLA                          file49.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55.163,lat 04 53.881
# X direction:North
# Y direction:East
# Facing Direction:South
#                 x0    y0    dx    dy    nx    ny       BOs       BOe     hh mm   hh mm
                  40    40    -1    1     11    11       32860     32855   16 43   17 05
#         ts(0)   ts(1)   hh mm     hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm    hh mm
          16 45   16 47   16 50     16 52    16 54    16 55    16 56    16 58    17 00    17 01    17 03
# stno     Bt0     Bt1     Bt2      Bt3      Bt4      Bt5      Bt6      Bt7      Bt8      Bt9      Bt10
    30   32841   32840   32848    32841    32840    32837    32834    32834    32839    32836    32835
    31   32848   32841   32838    32841    32840    32841    32841    32842    32845    32839    32837
    32   32841   32838   32841    32846    32839    32841    32842    32844    32840    32840    32838
    33   32838   32841   32842    32845    32841    32848    32847    32840    32844    32844    32840
    34   32841   32840   32838    32843    32837    32842    32842    32841    32842    32841    32839
    35   32849   32840   32843    32839    32842    32840    32837    32835    32838    32839    32845
```

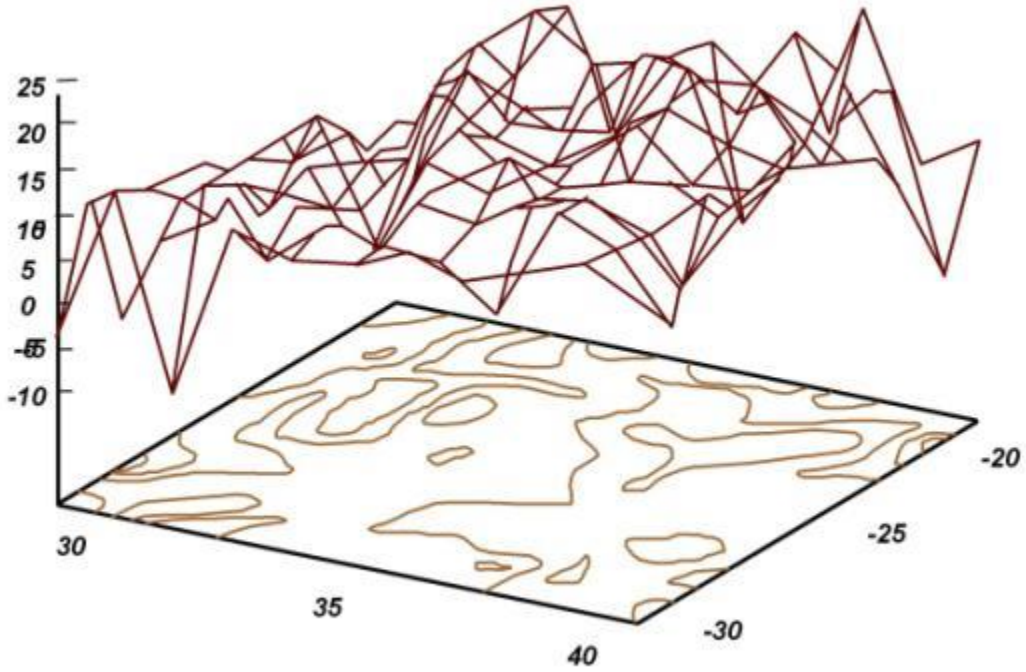
36	32845	32841	32842	32845	32843	32840	32840	32843	32837	32837	32838
37	32842	32839	32841	32849	32839	32840	32836	32845	32835	32838	32840
38	32842	32840	32839	32842	32838	32842	32843	32840	32842	32838	32847
39	32843	32842	32832	32844	32844	32836	32839	32839	32842	32844	32842
40	32845	32842	32833	32843	32840	32838	32838	32843	32846	32849	32849
	16 47	16 49	15 52	16 53	16 55	16 56	16 58	17 00	17 01	17 03	17 04

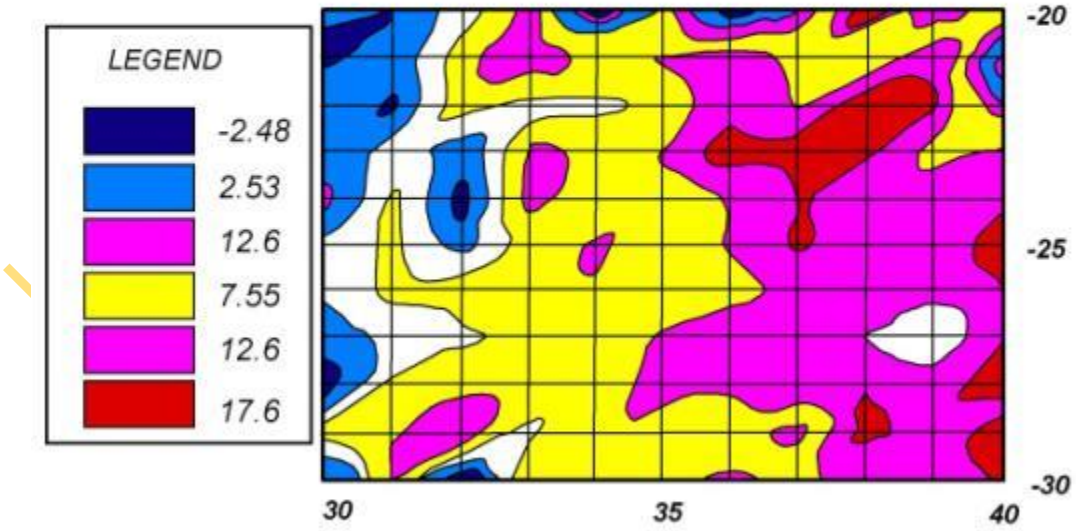
```
##################################################
# Site :   KAJOLA                          file50.dat
# Date :   19_12_1999
# Group :  Amoo Kunle and Kemi Jeje
# Instrument : PPM G826
# Height of sensor :   1.5m
# GPS Reading:long 07 55 180 ,lat 04 53.892
# X direction:North
# Y direction:East
# Facing Direction:South
```

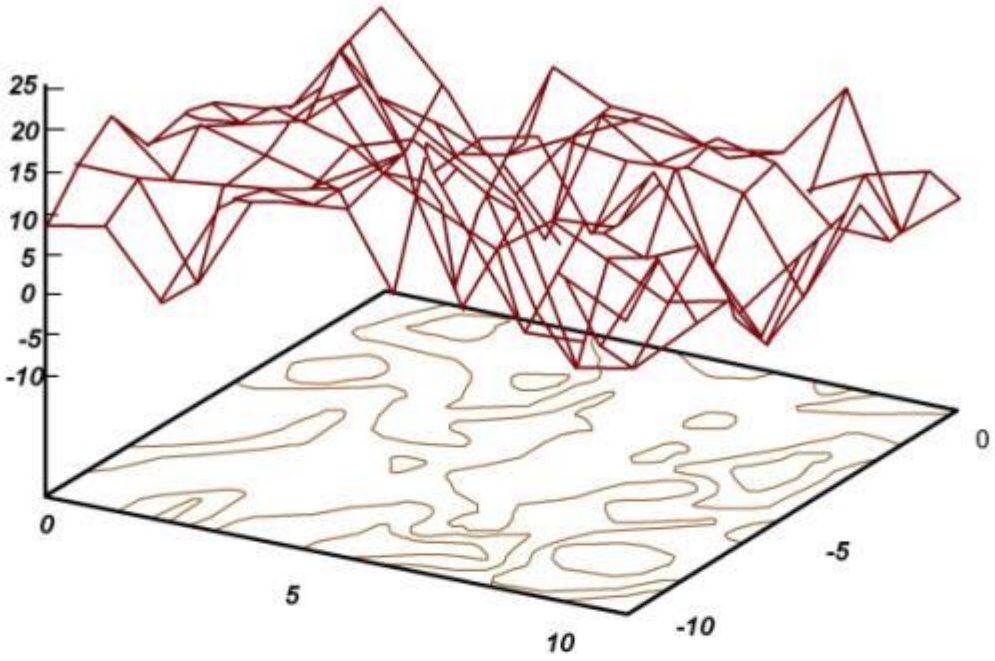
#	x0	y0	dx	dy	nx	ny	BOs	BOe	hh mm	hh mm
	50	40	-1	1	11	11	32854	32849	17 05	17 26

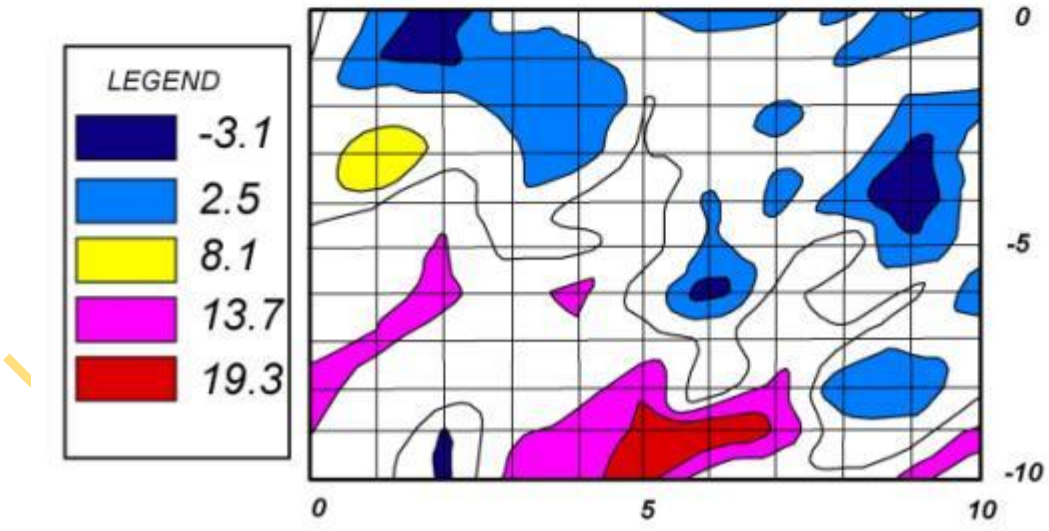
#	ts(0)	ts(1)	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm	hh mm
	17 07	17 09	17 11	17 13	17 14	17 16	17 18	17 19	17 20	17 22	17 24
# stno	Bt0	Bt1	Bt2	Bt3	Bt4	Bt5	Bt6	Bt7	Bt8	Bt9	Bt10
50	32841	32837	32839	32838	32834	32833	32832	32827	32835	32834	32831
49	32838	32835	32831	32835	32835	32834	32835	32835	32837	32831	32829
48	32833	32839	32832	32833	32836	32835	32835	32835	32832	32832	32831
47	32836	32838	32832	32835	32836	32834	32835	32832	32837	32835	32827
46	32836	32835	32831	32829	32835	32834	32833	32835	32832	32837	32835
45	32836	32836	32834	32830	32832	32832	32833	32833	32834	32833	32834
44	32838	32833	32831	32832	32831	32834	32838	32831	32831	32837	32833
43	32836	32834	32838	32836	32831	32833	32836	32835	32832	32830	32836
42	32840	32836	32831	32835	32832	32834	32838	32834	32833	32831	32835
41	32836	32838	32834	32836	32827	32836	32834	32834	32840	32831	32830
40	32840	32835	32836	32830	32831	32831	32838	32835	32834	32835	32832
	17 09	17 10	17 12	17 14	17 15	17 17	17 19	17 20	17 22	17 24	17 25

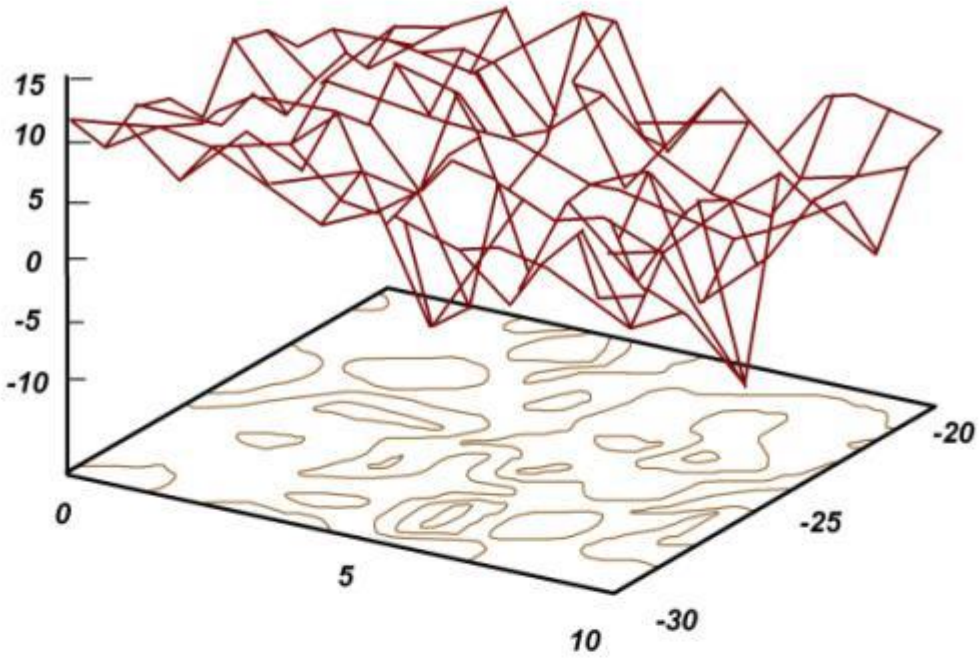
Appendix IV Graph data Geo-magnetic reading File1-50

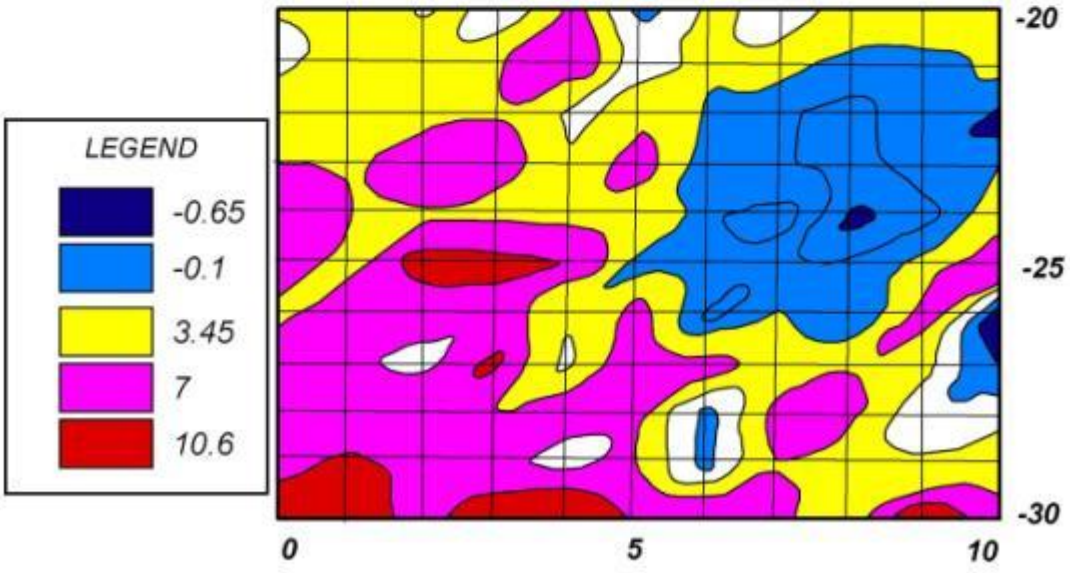


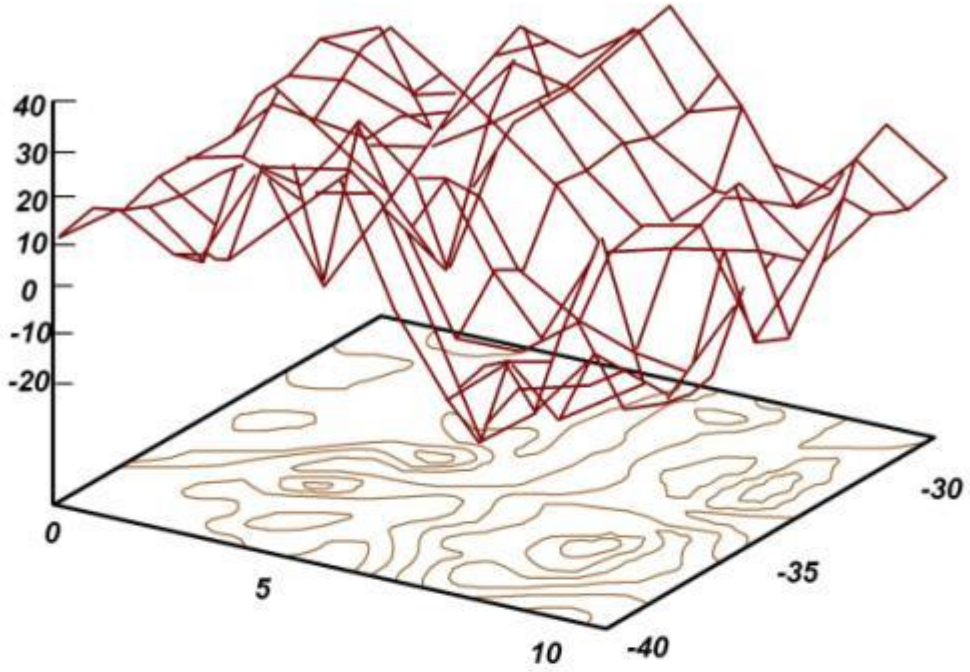



25
20
15
10
5
0
-5
-10
0
5
10
-10
-5
0


LEGEND
-3.1
2.5
8.1
13.7
19.3
0
-5
-10
0
5
10


15
10
5
0
-5
-10
0
5
10
-20
-25
-30


LEGEND
-0.65
-0.1
3.45
7
10.6
-20
-25
-30
0
5
10


40
30
20
10
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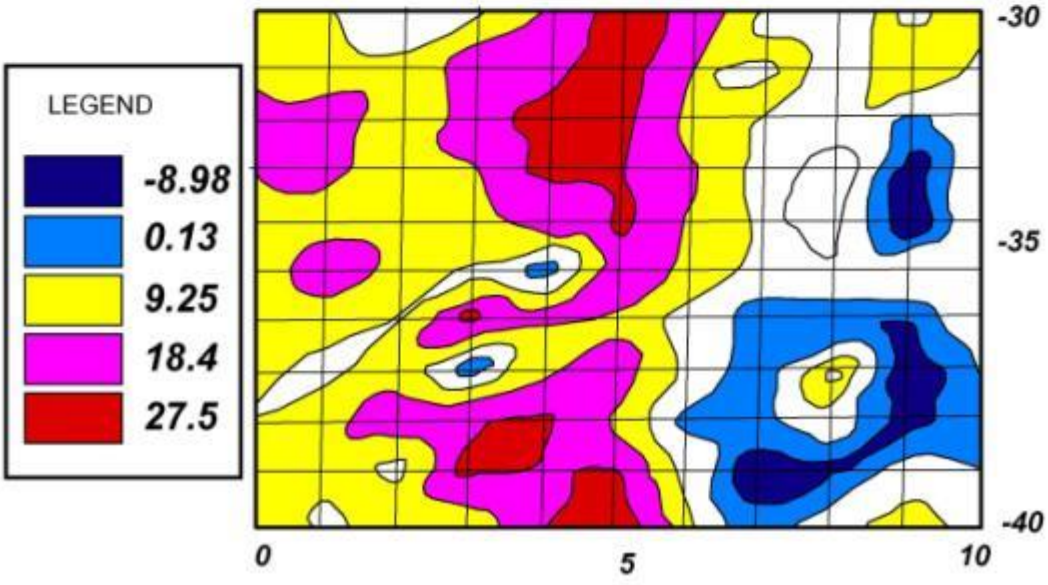
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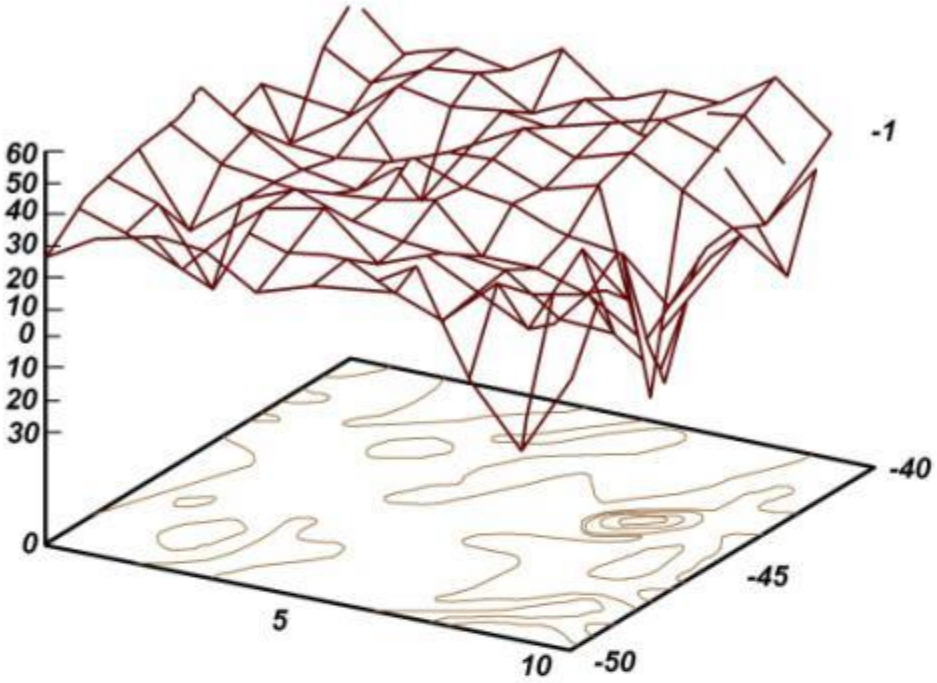
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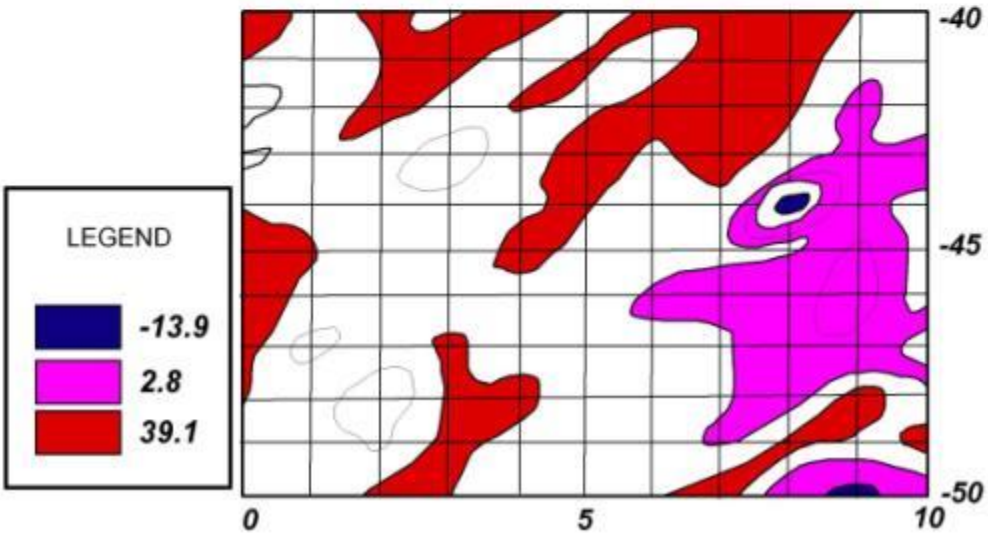
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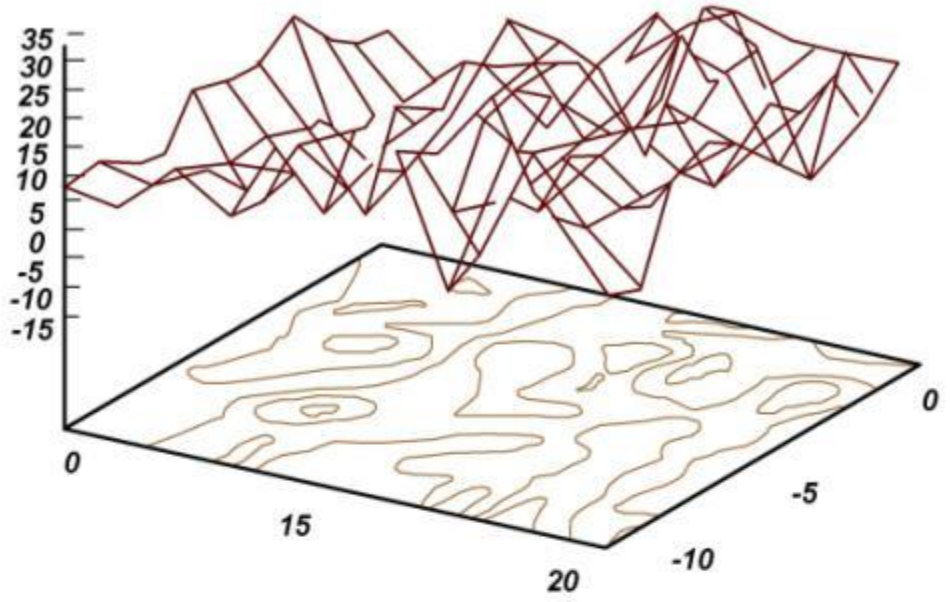
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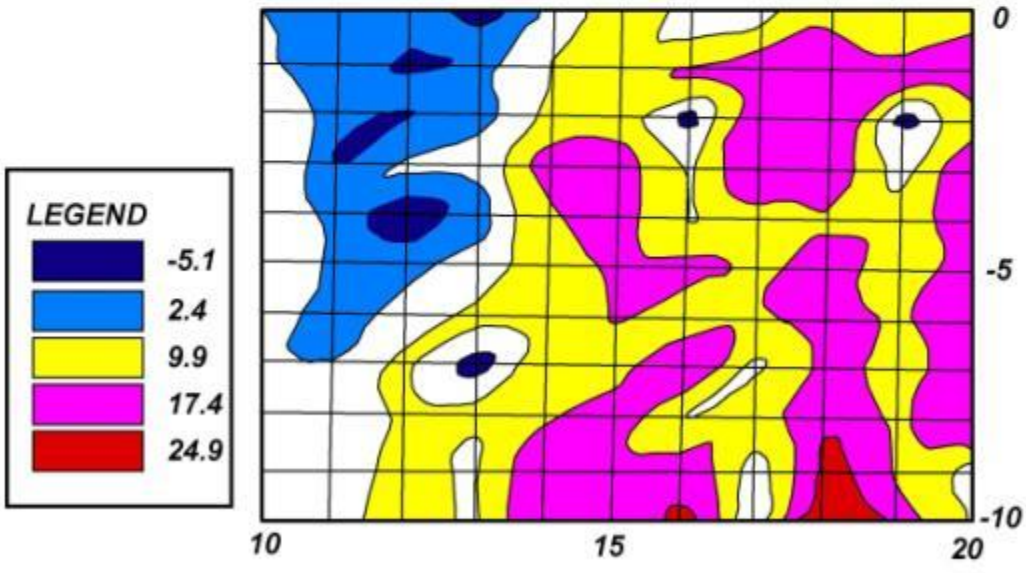
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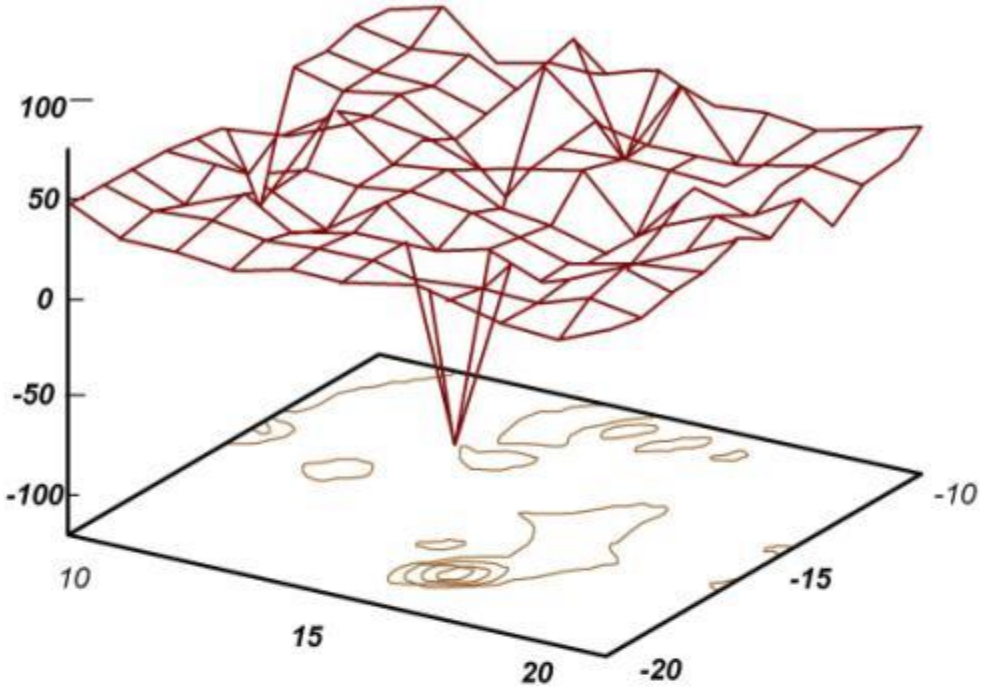
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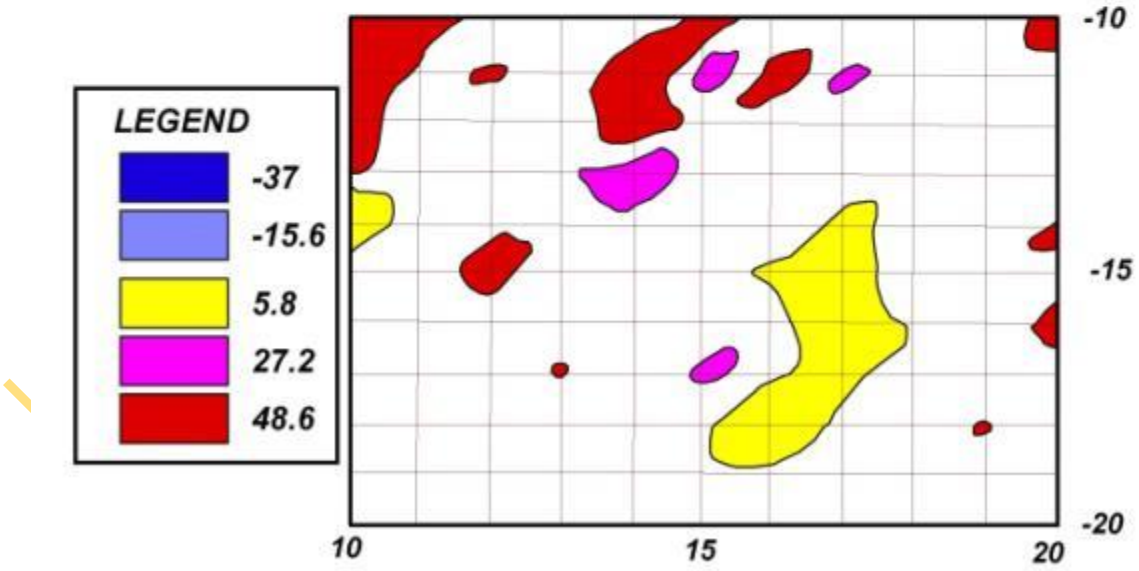
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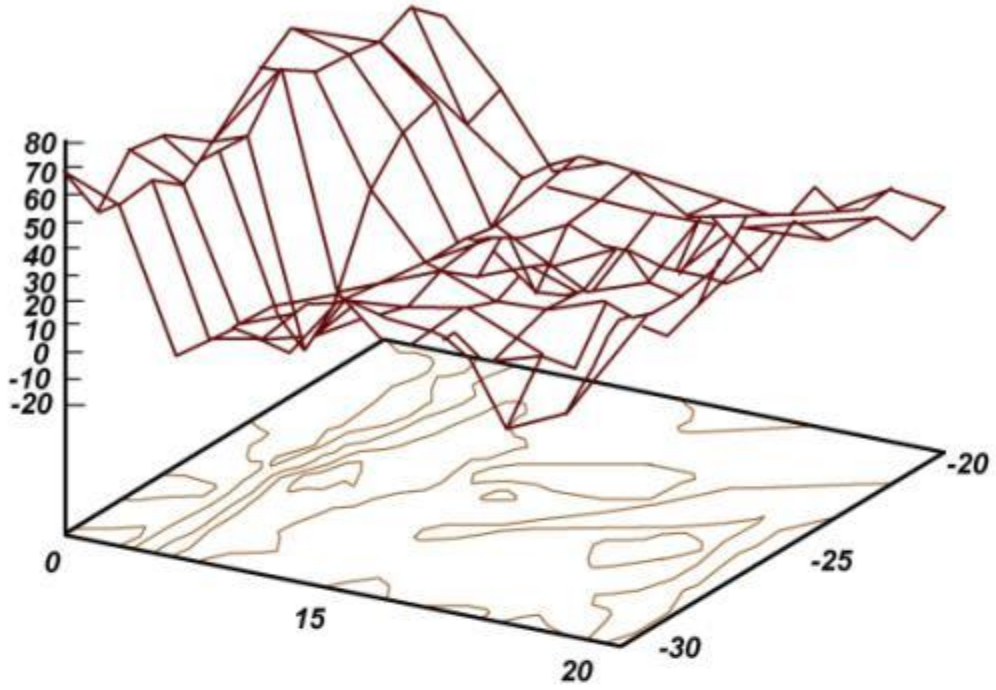
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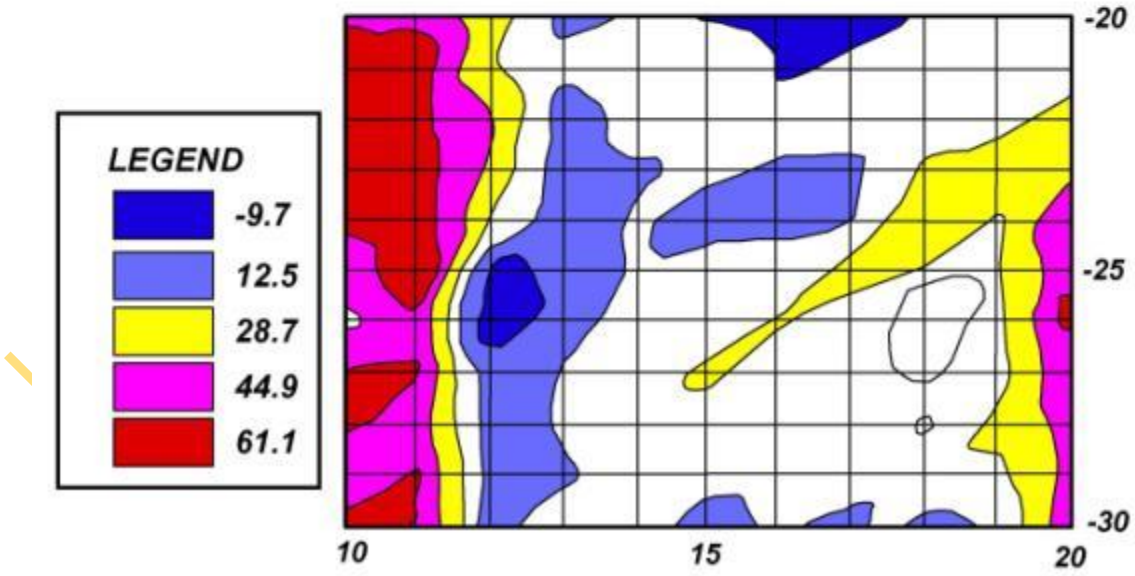
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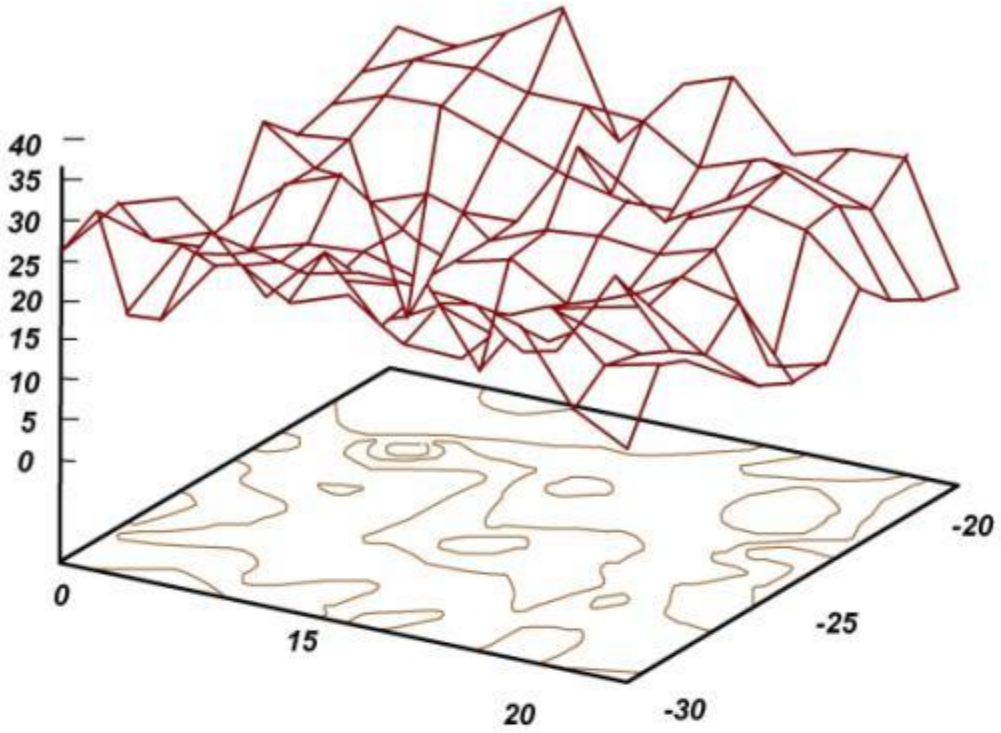
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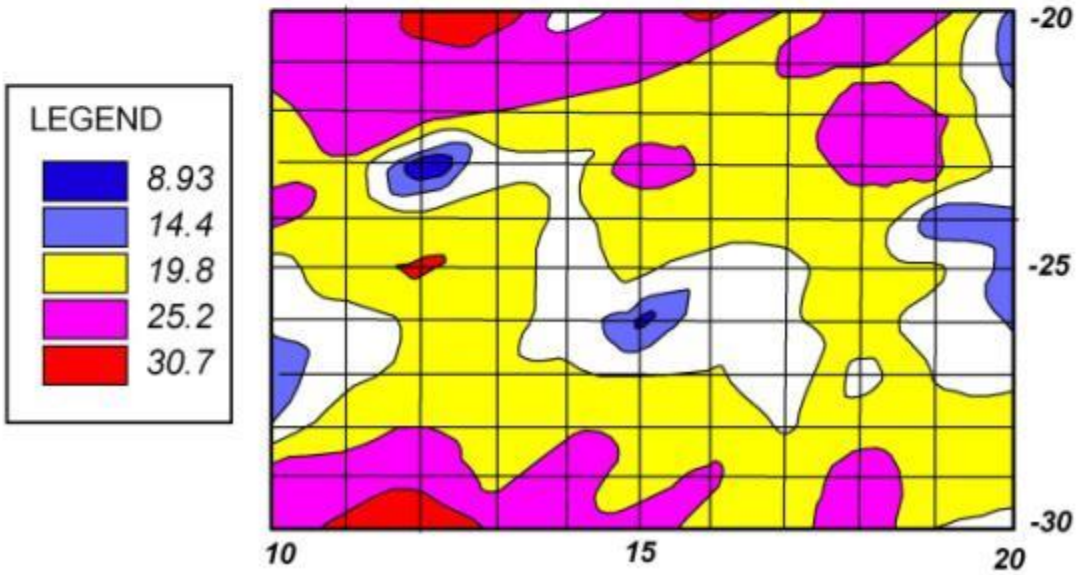
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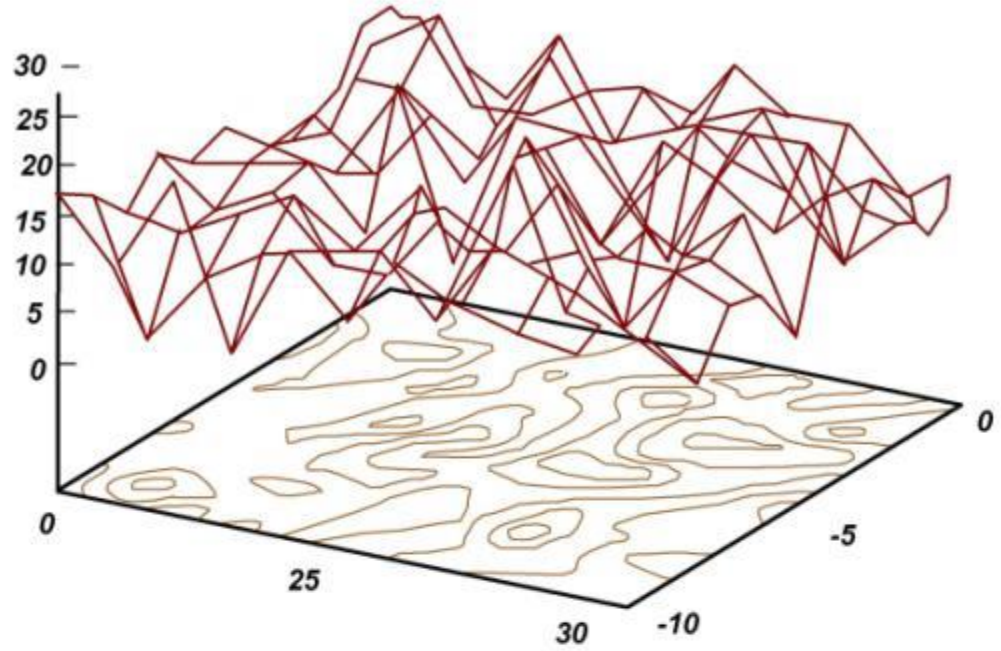
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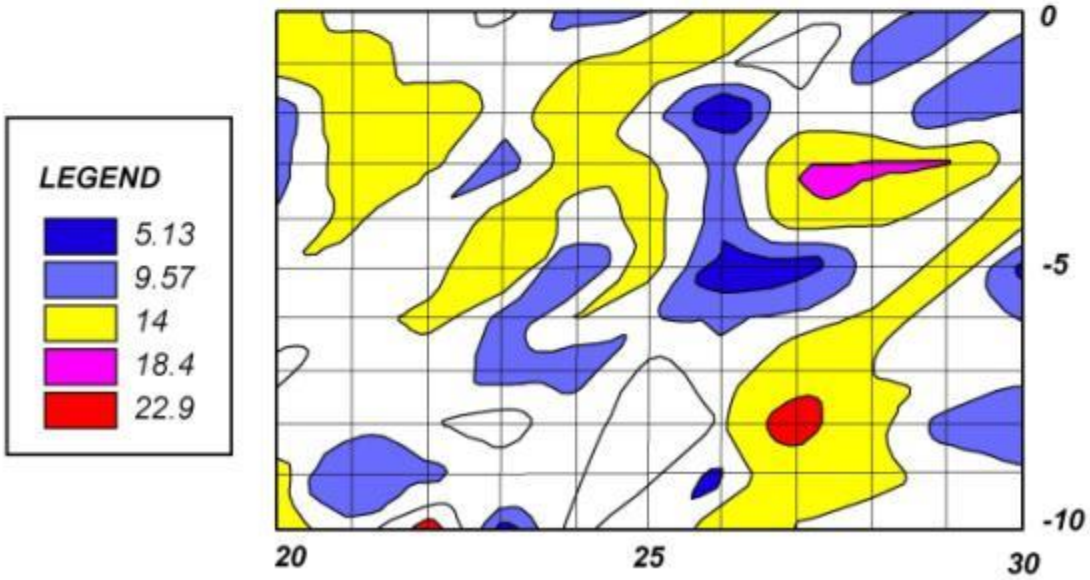
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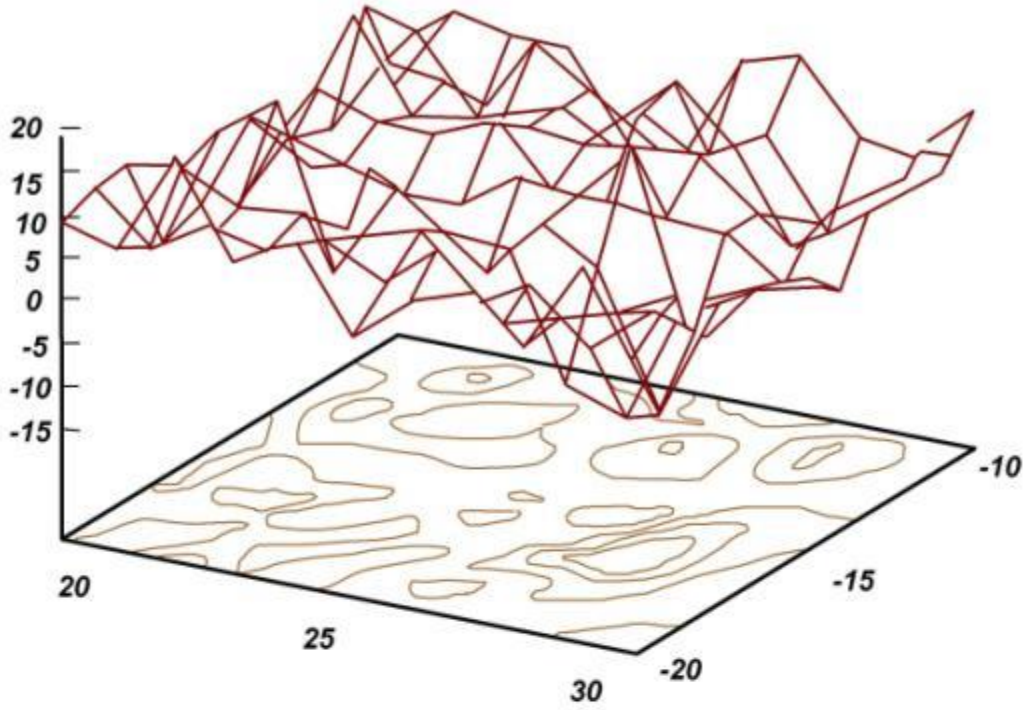
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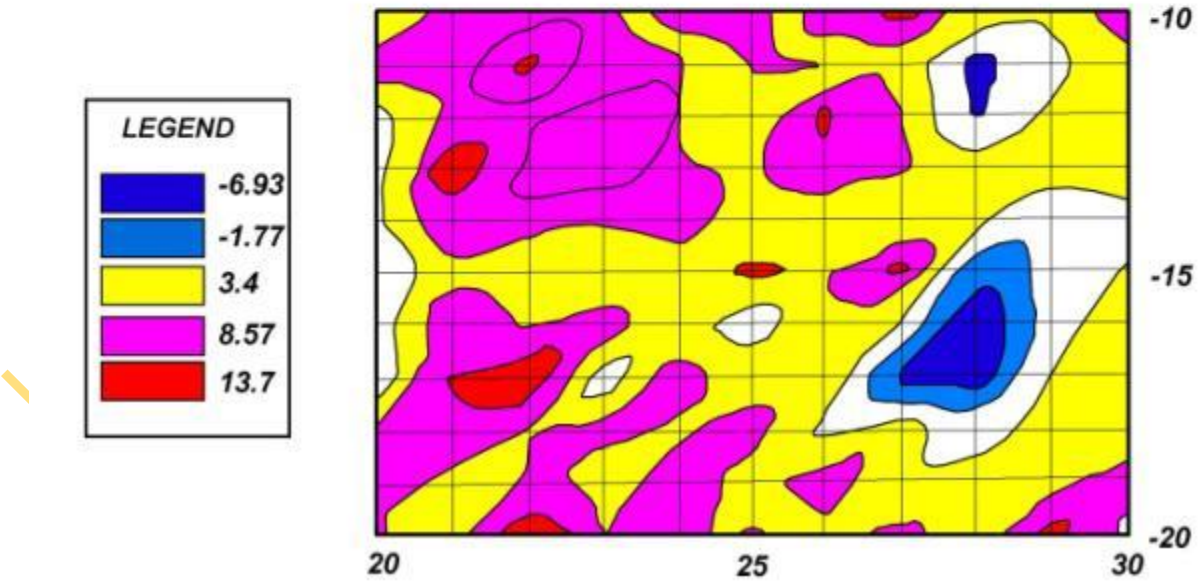
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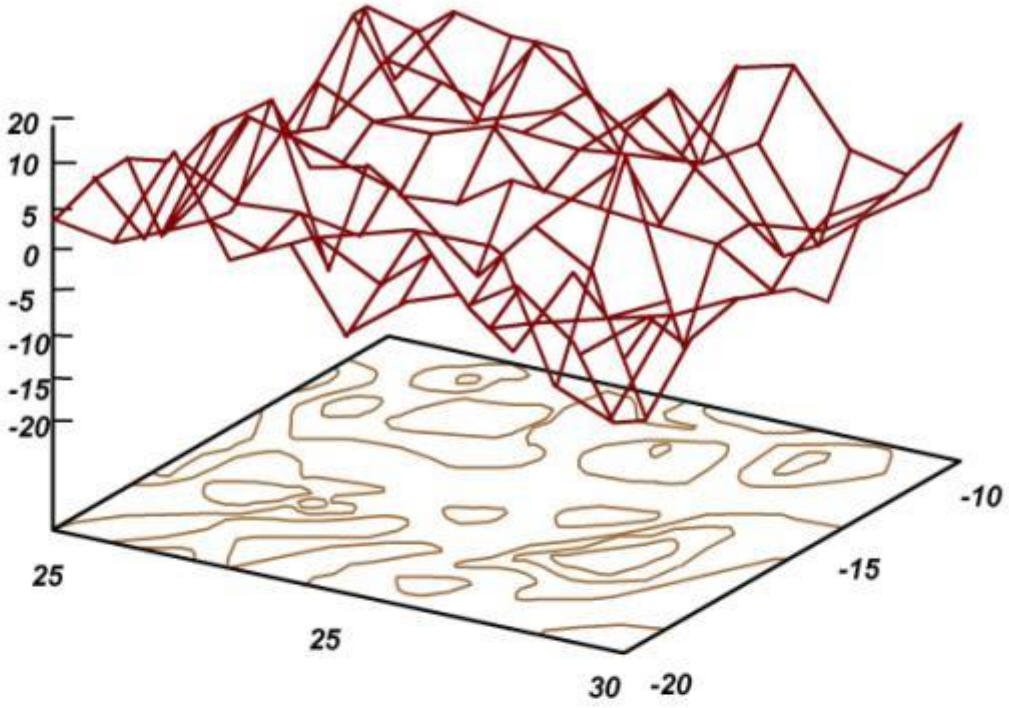
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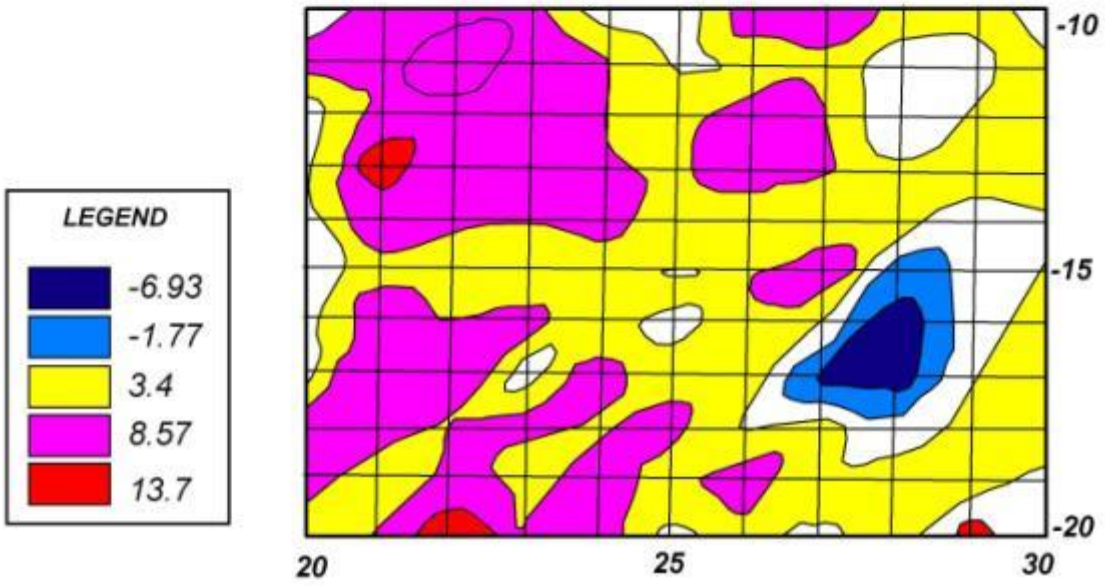
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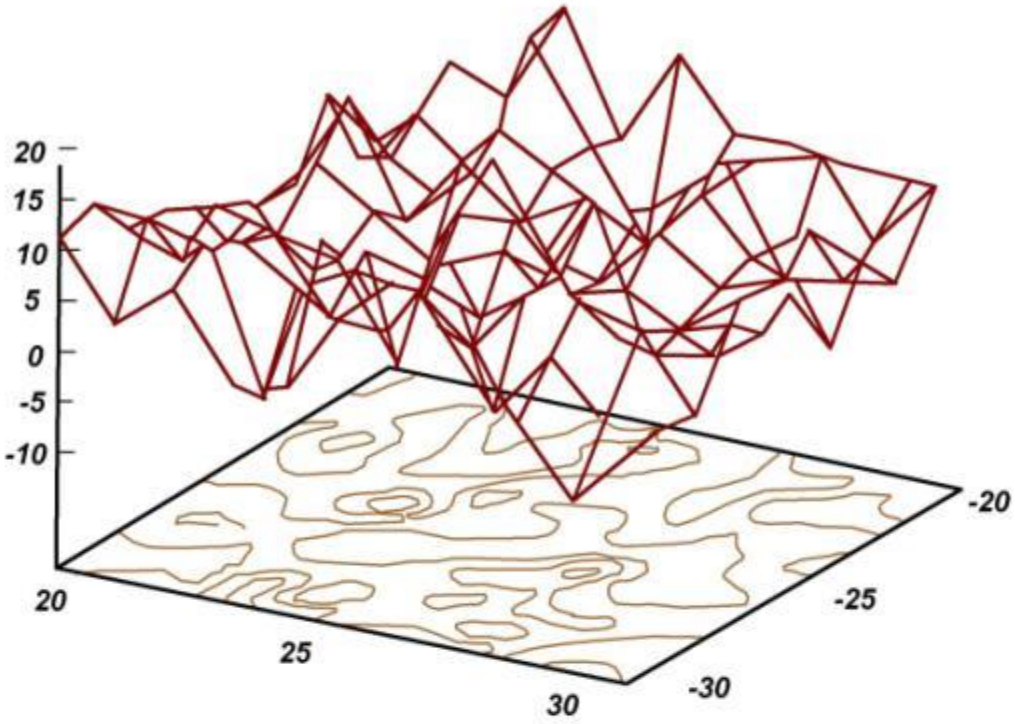
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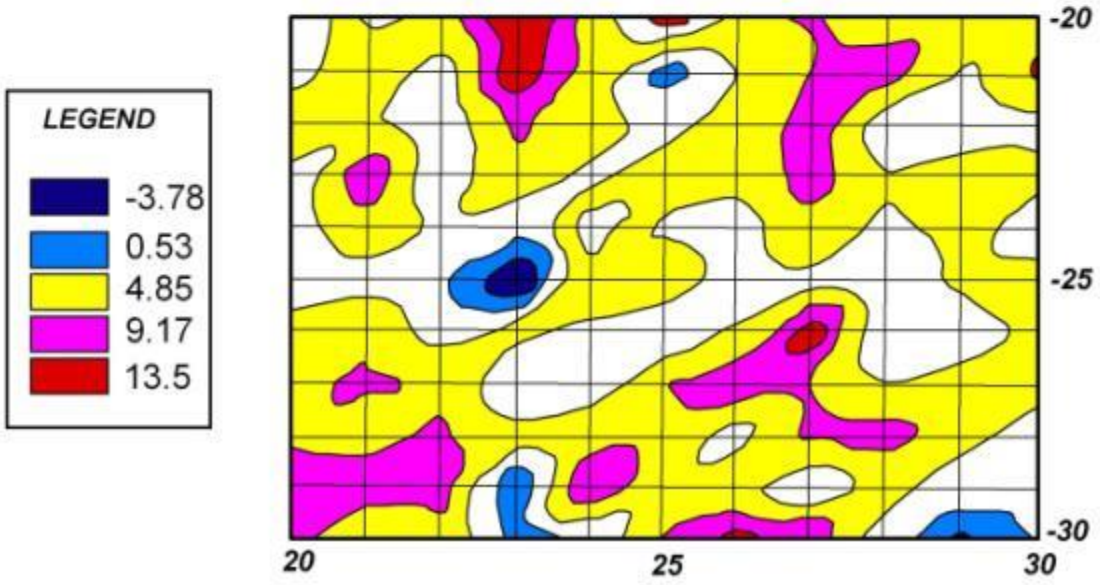
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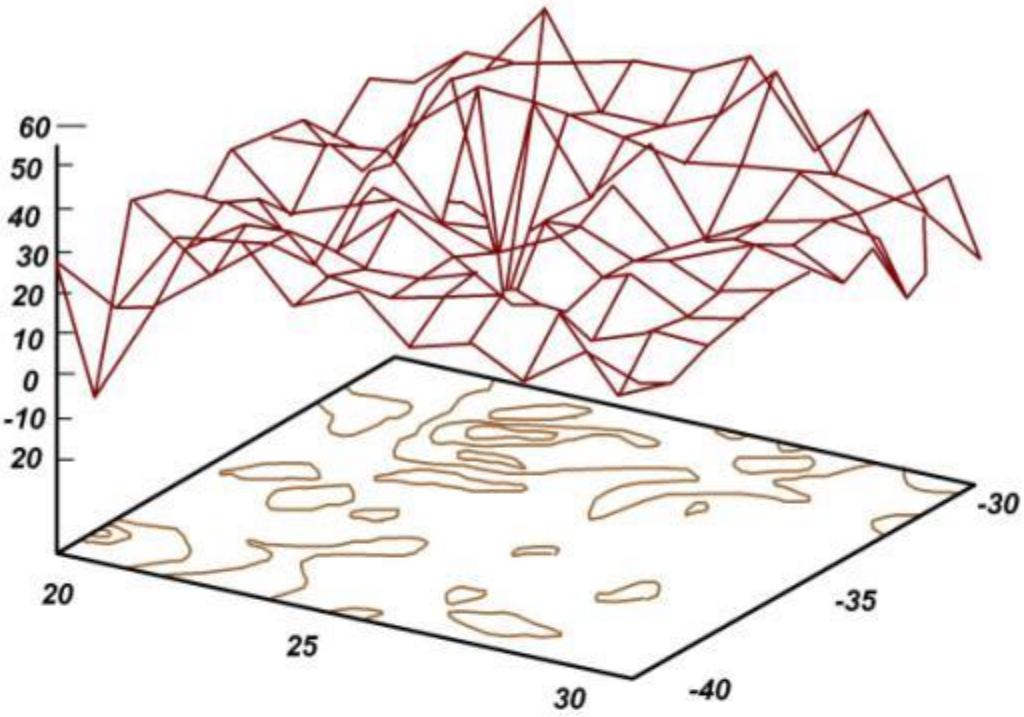
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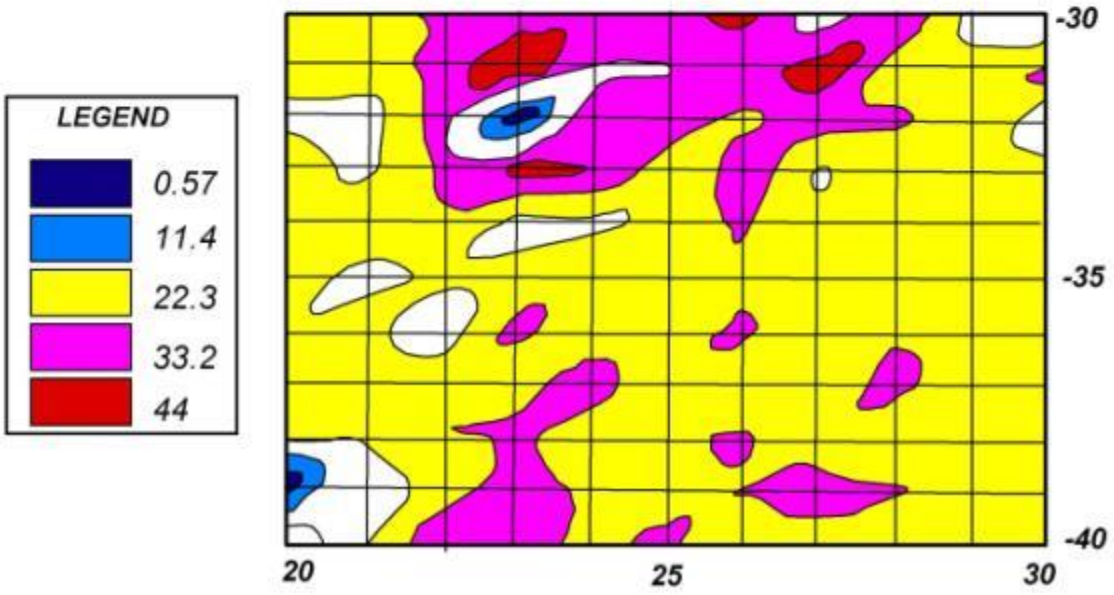
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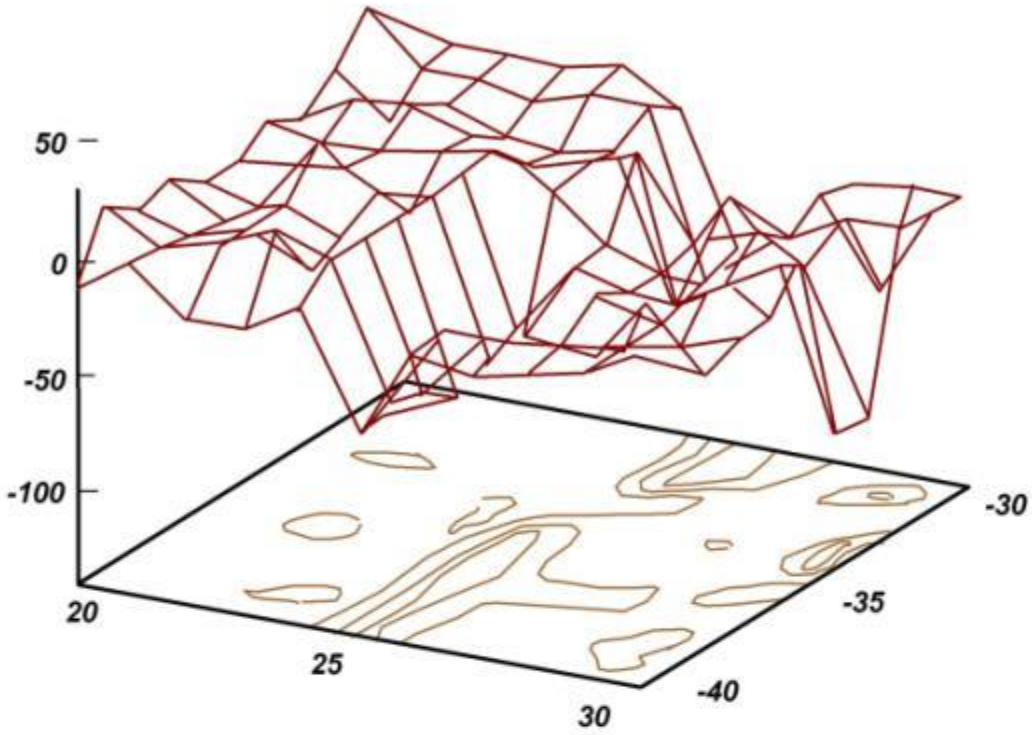
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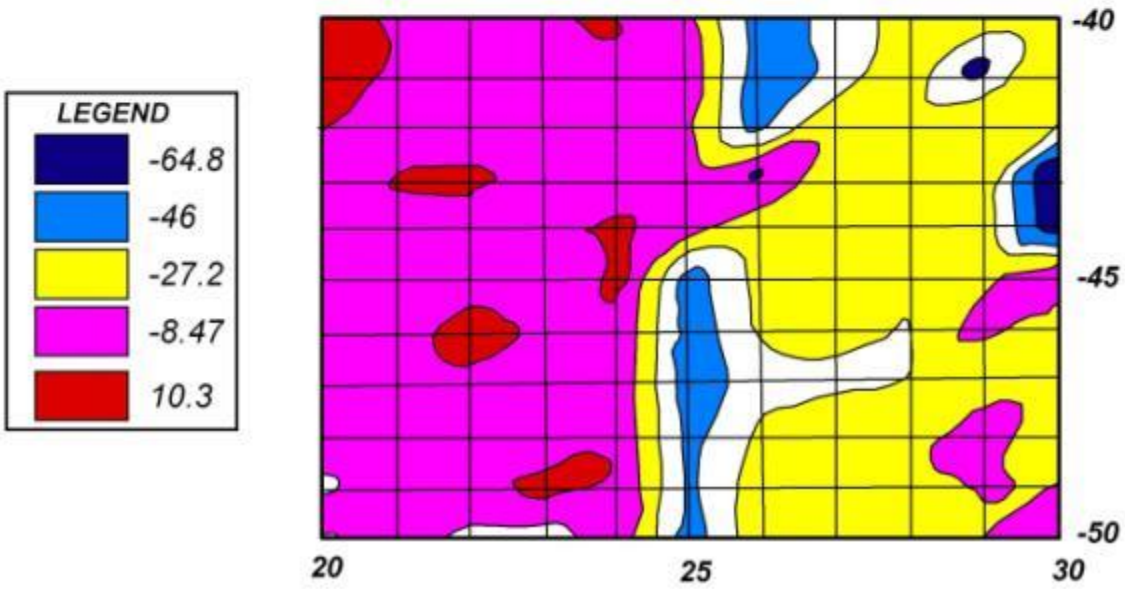
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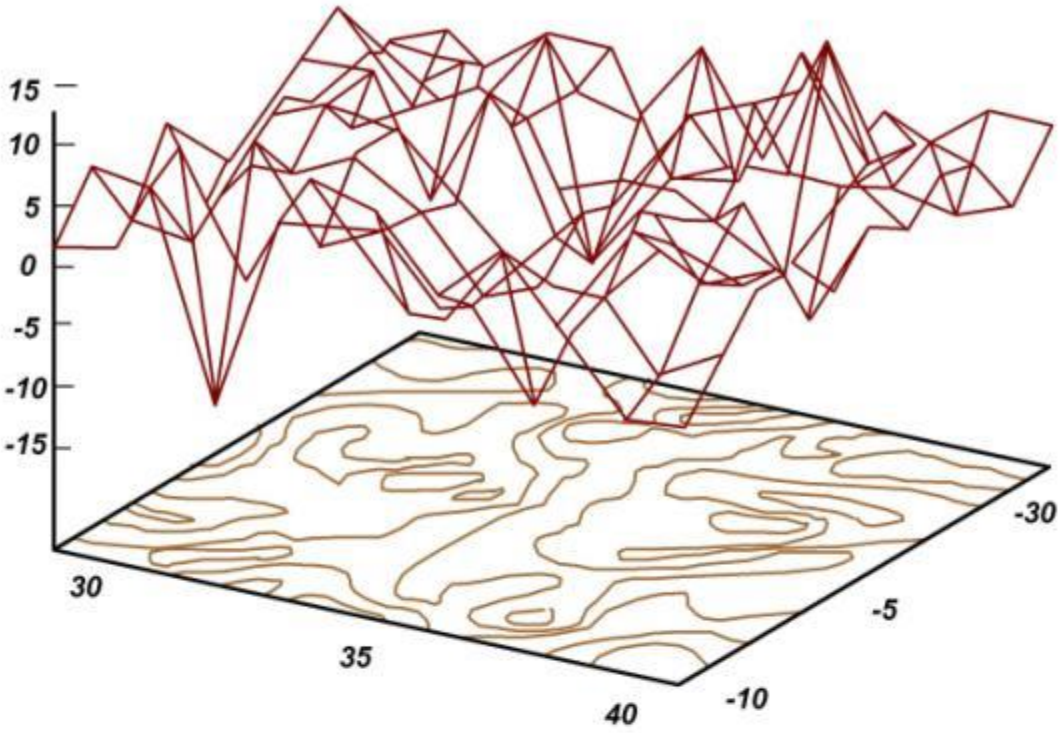
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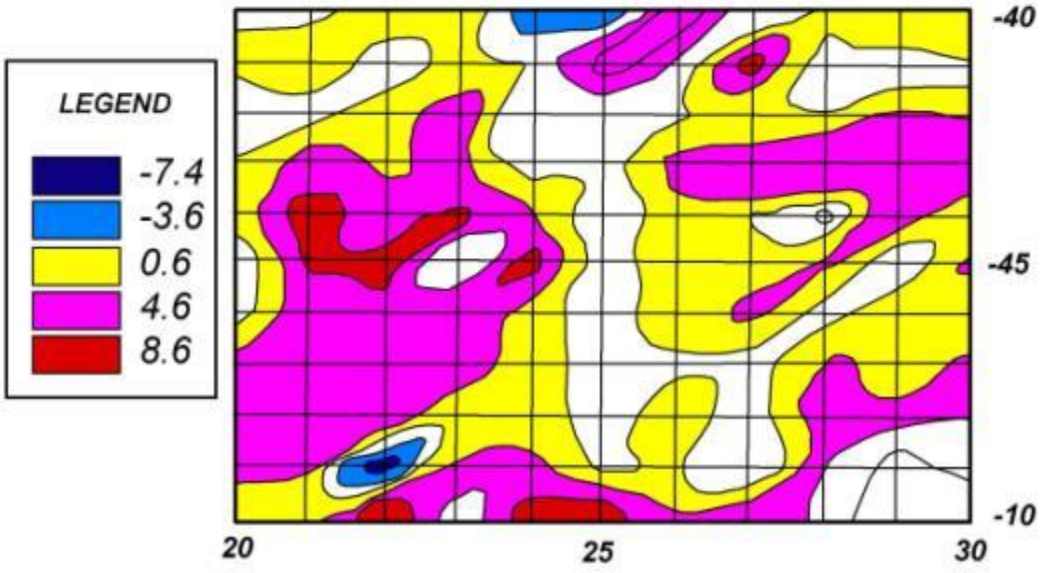
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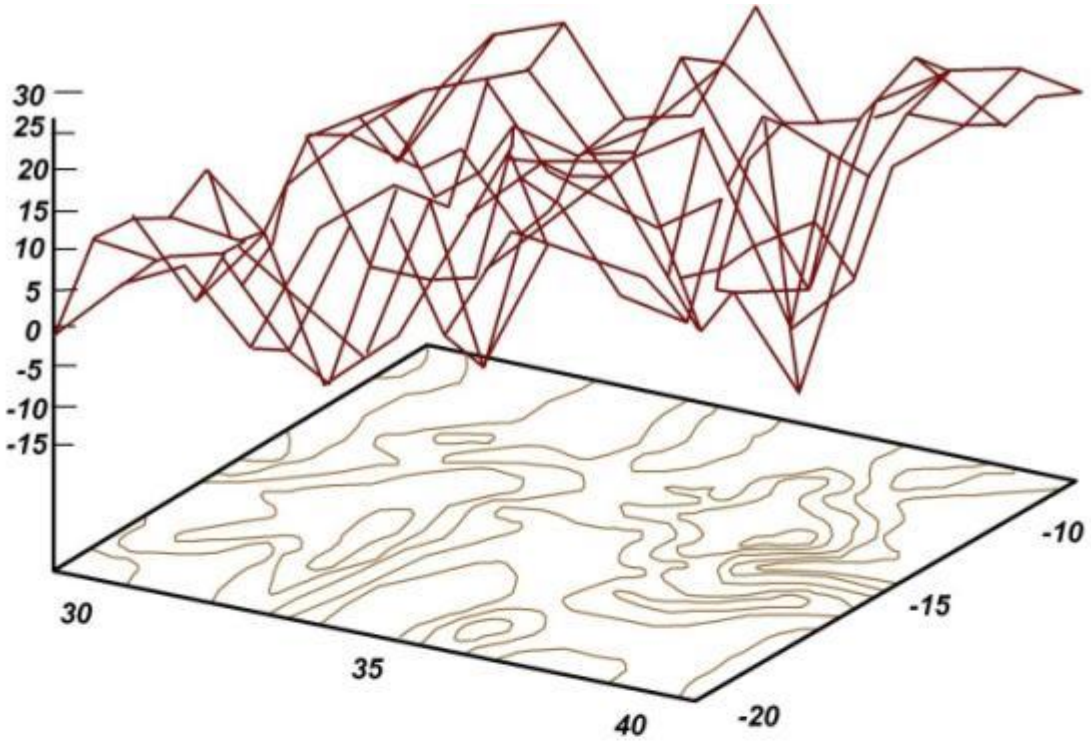
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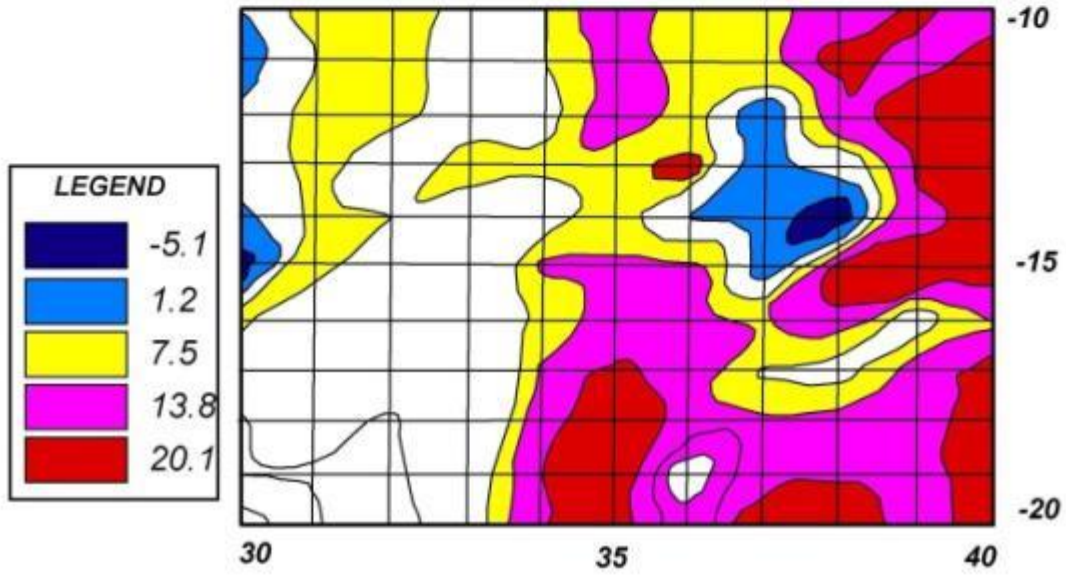
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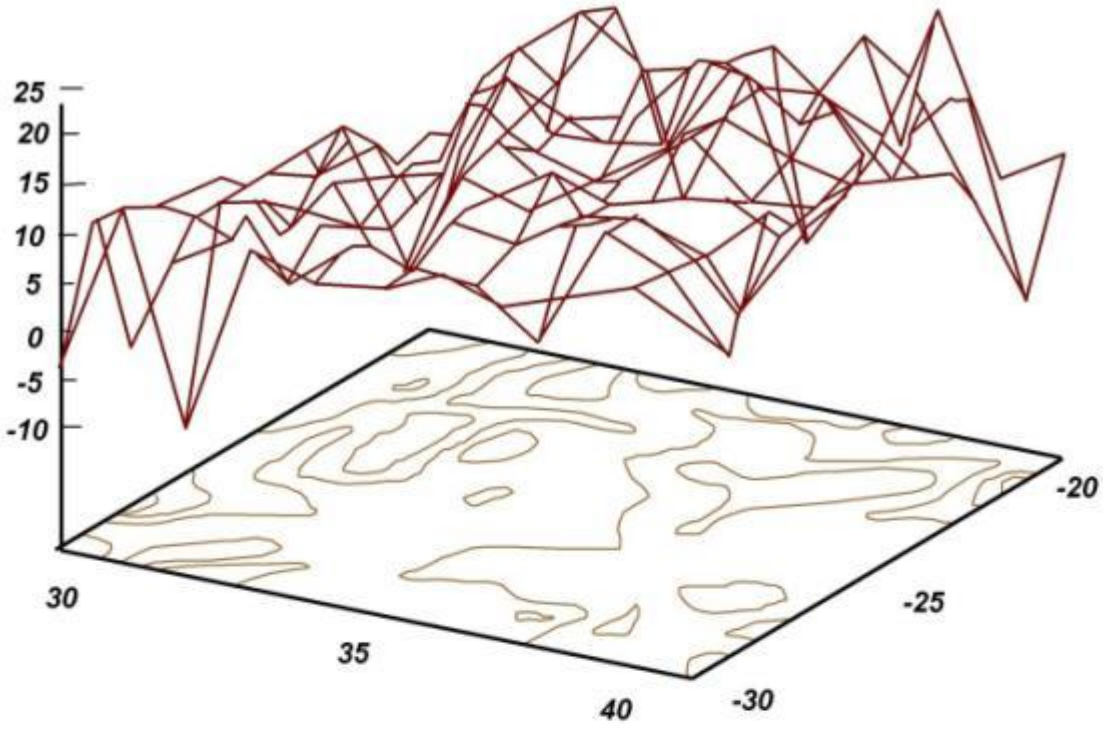
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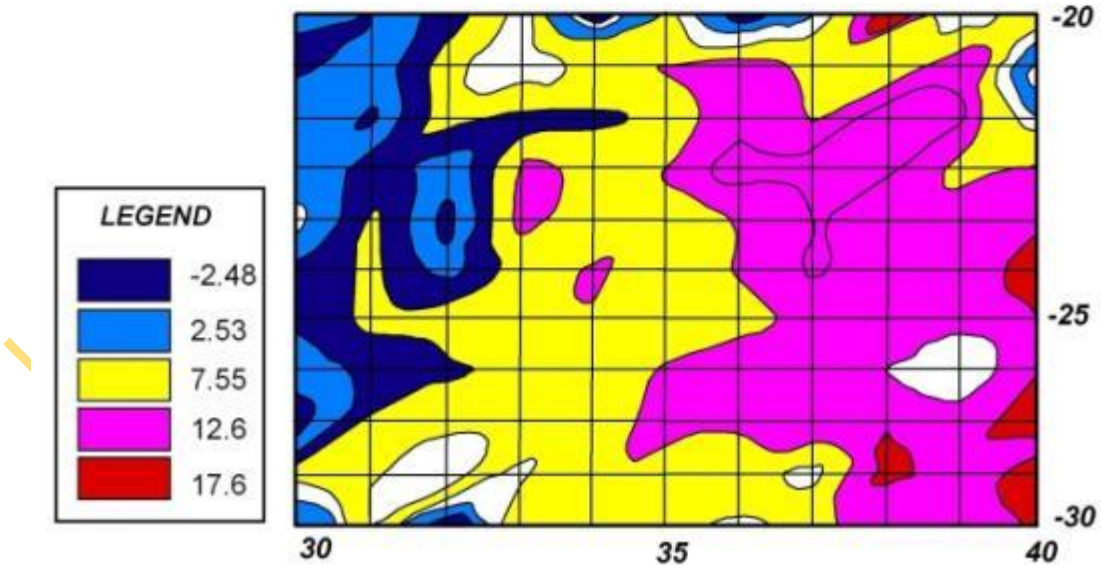
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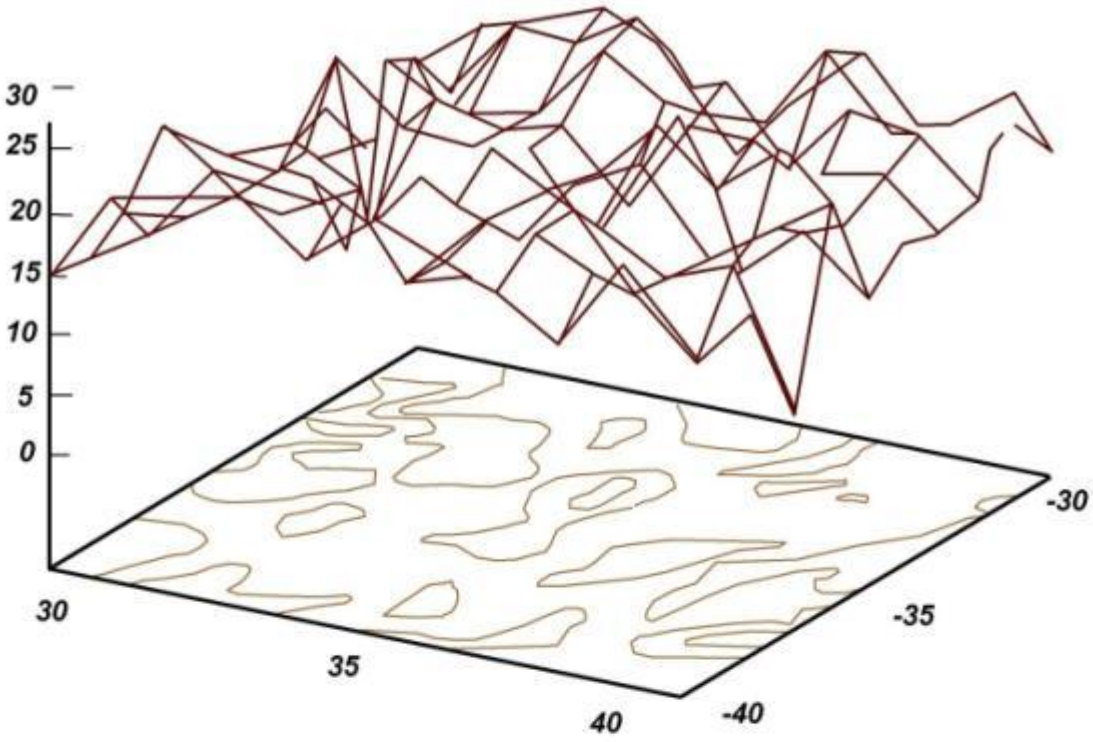
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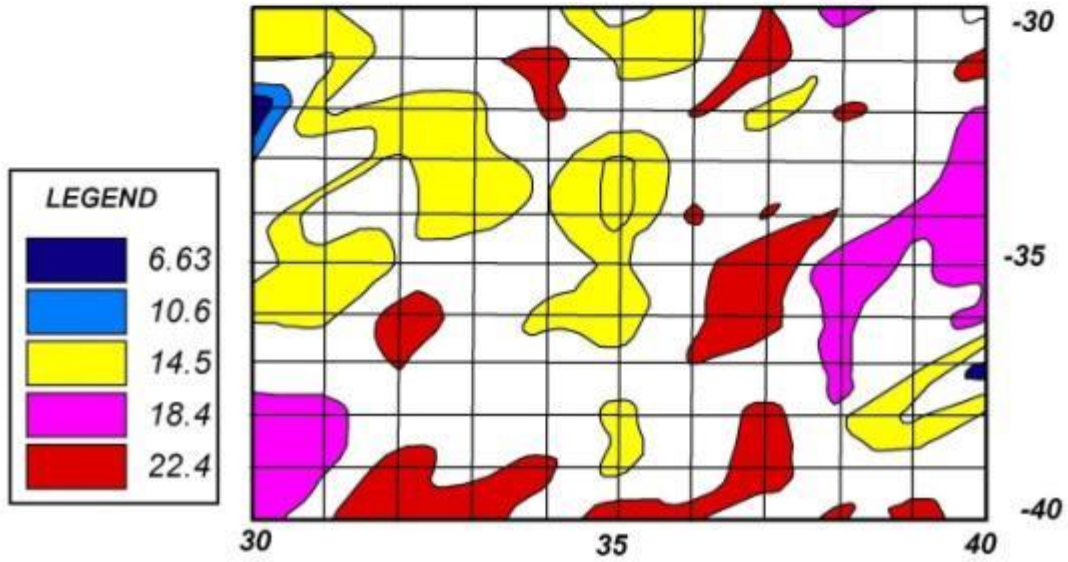
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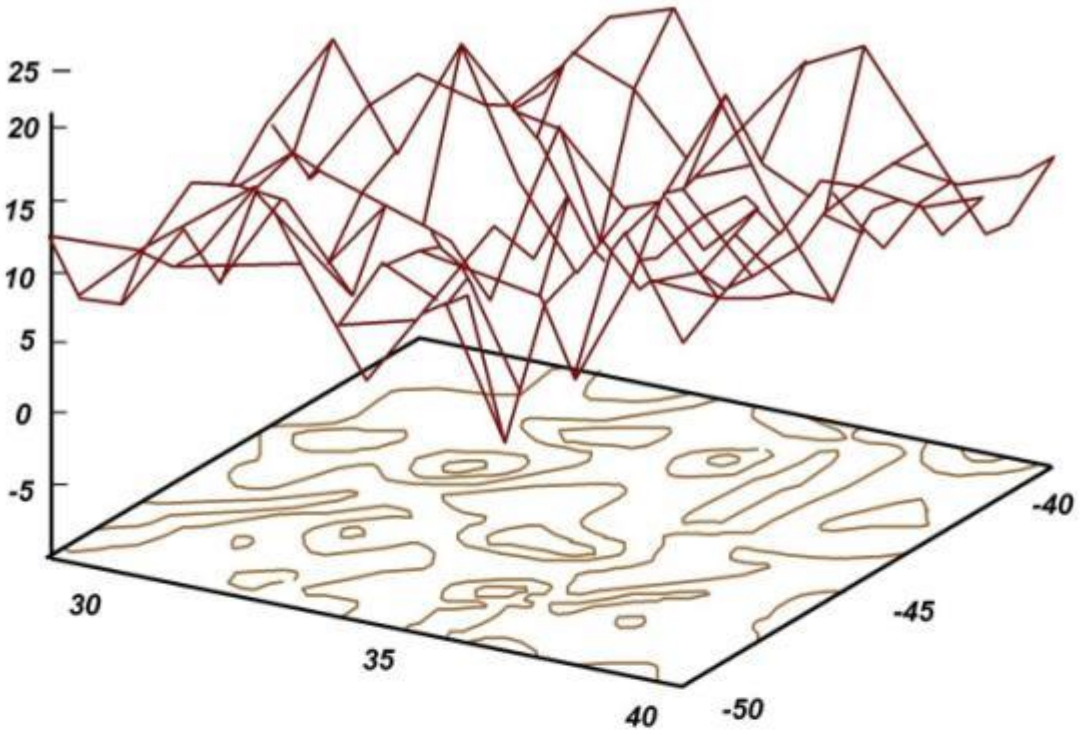
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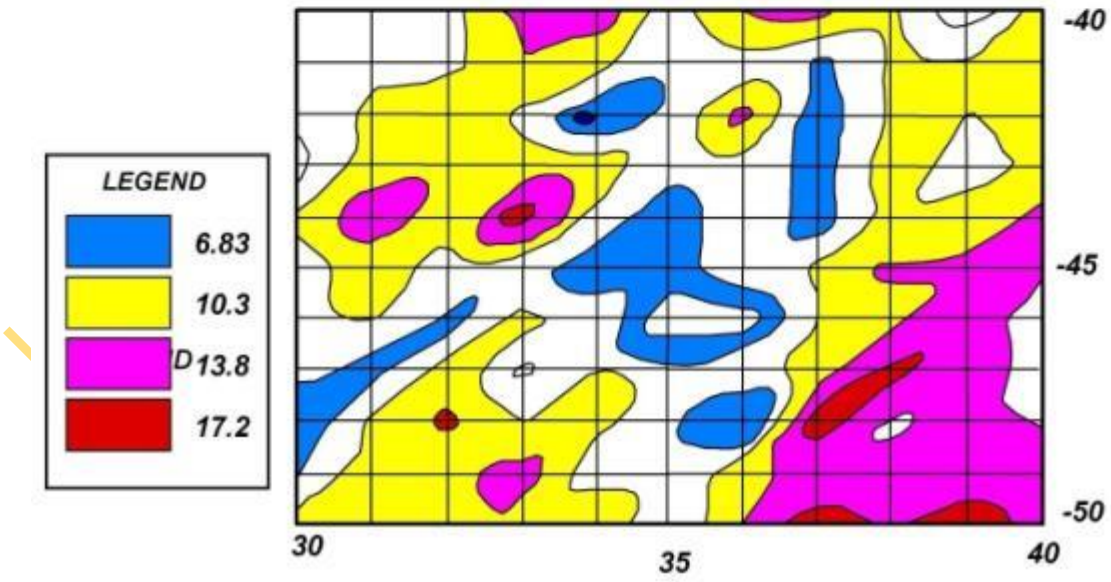
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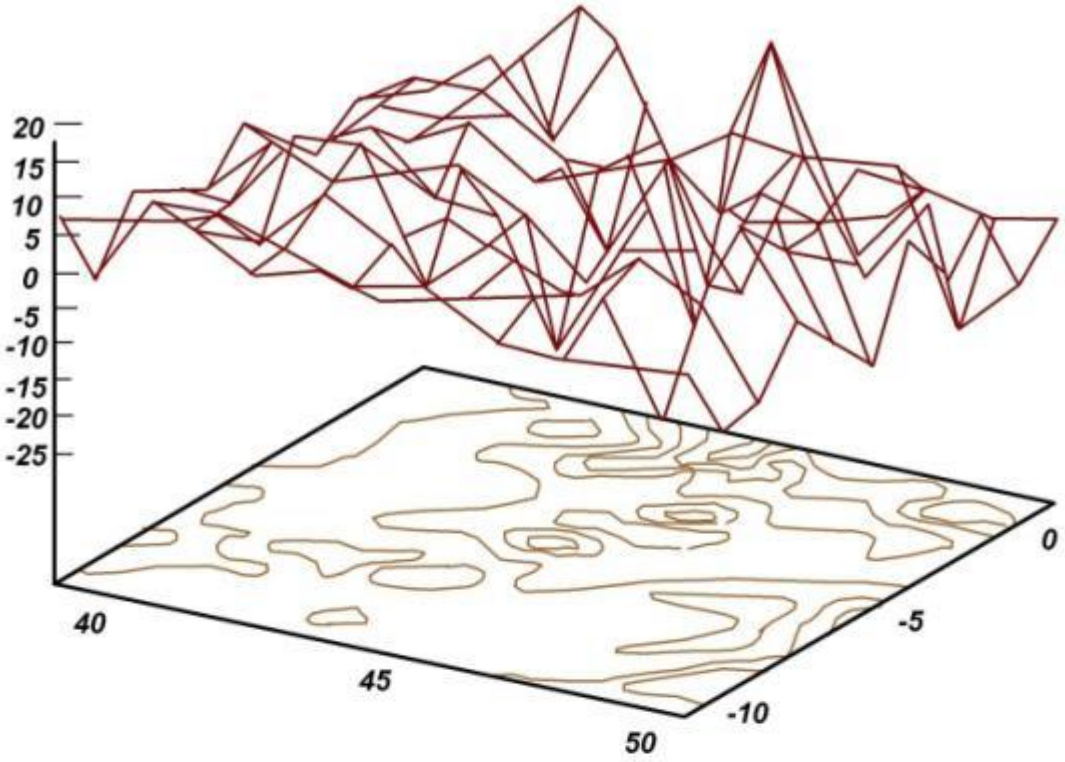
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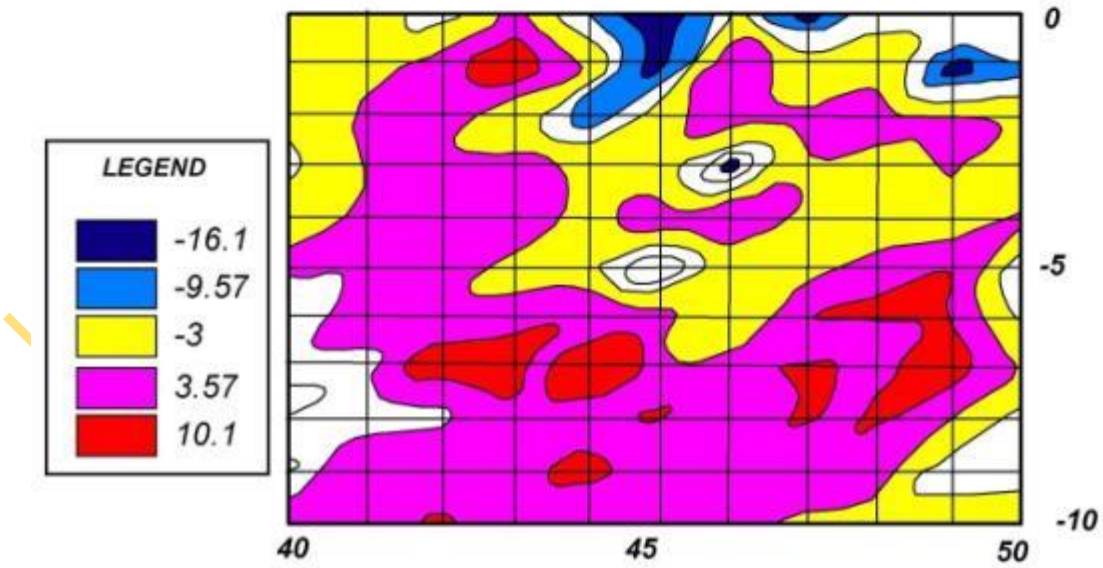
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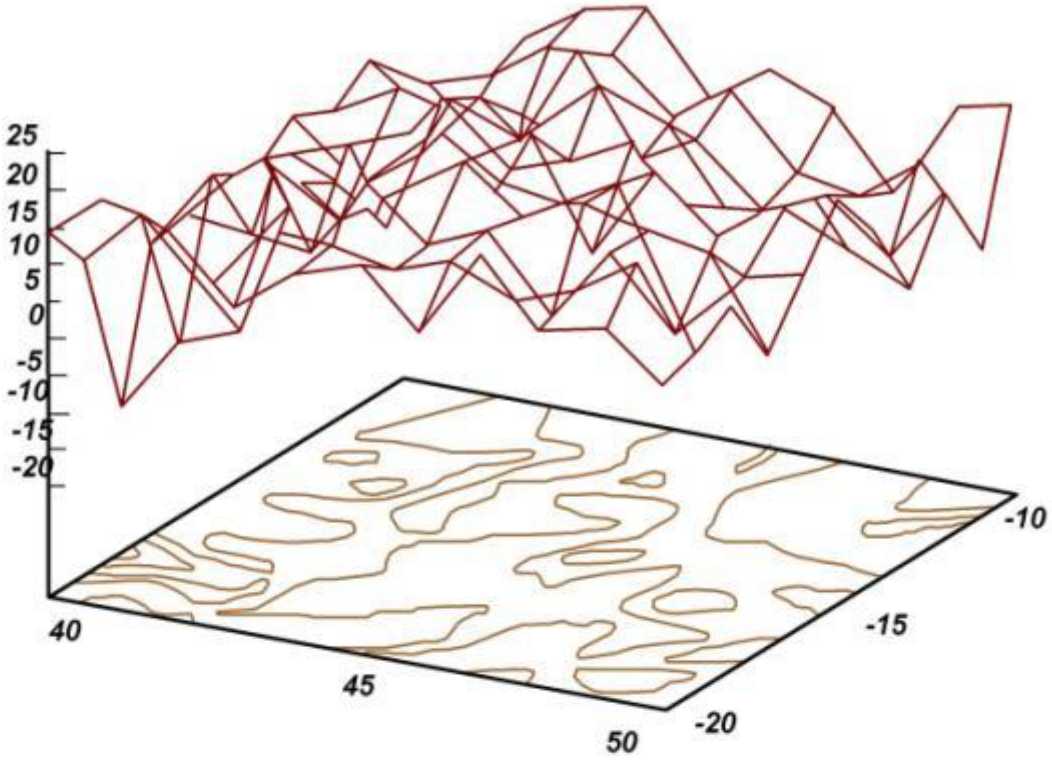
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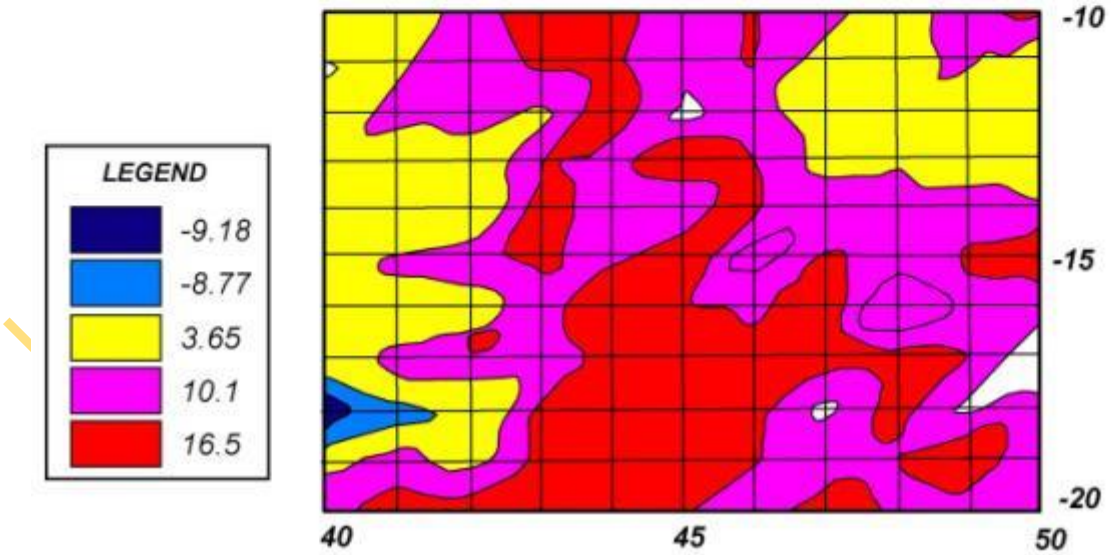
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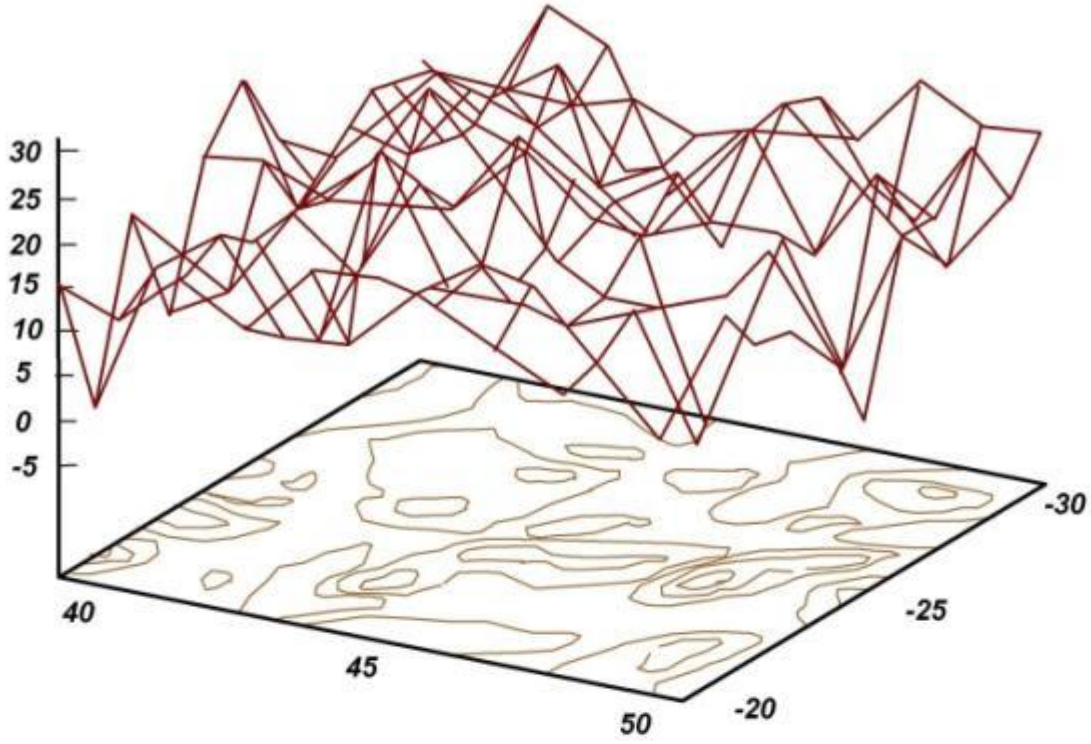
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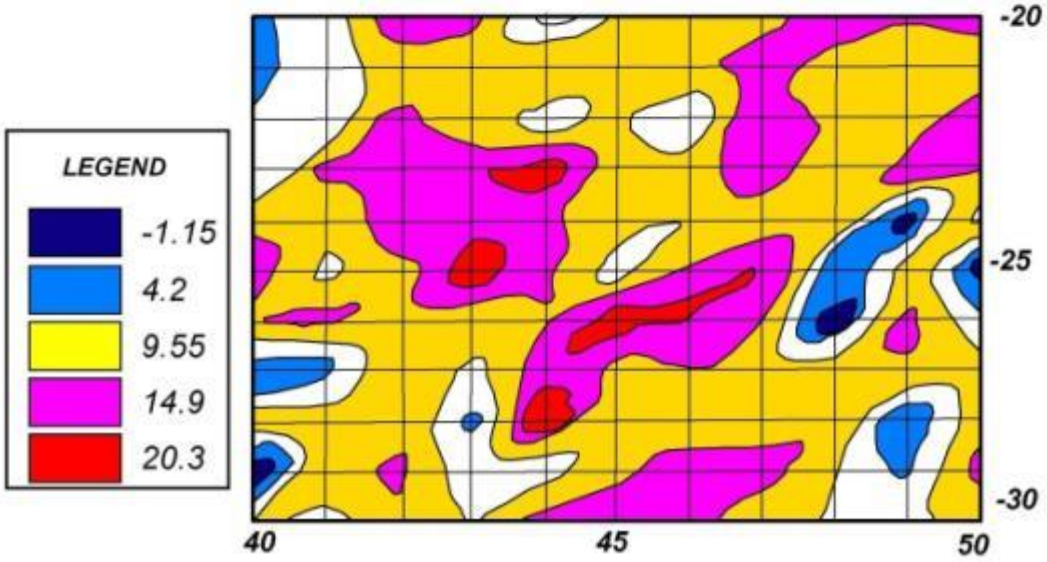
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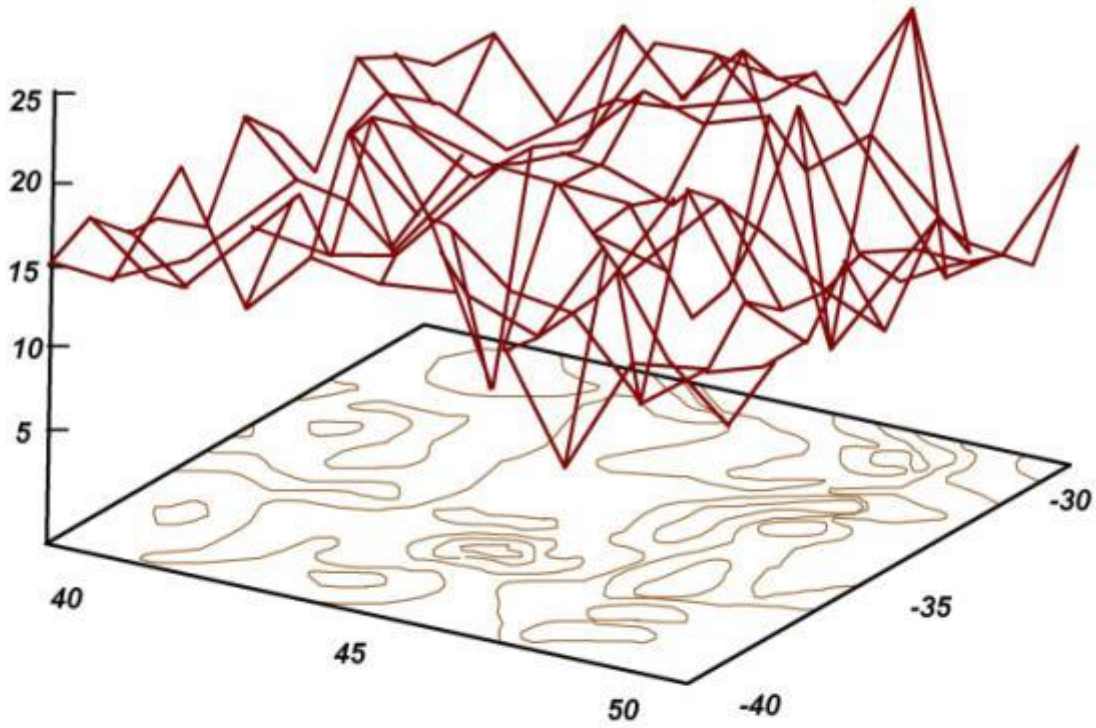
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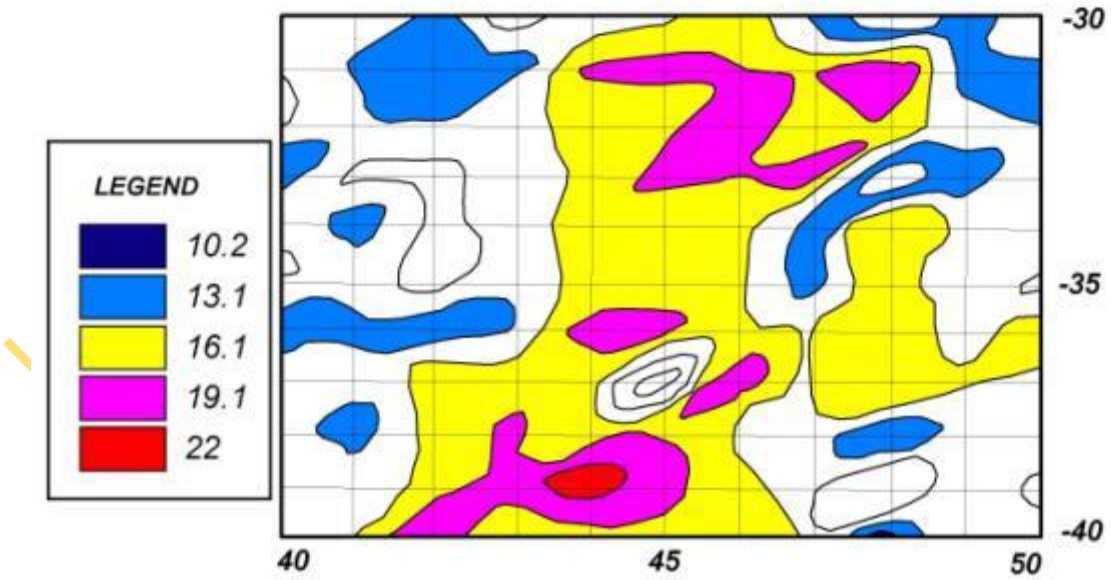
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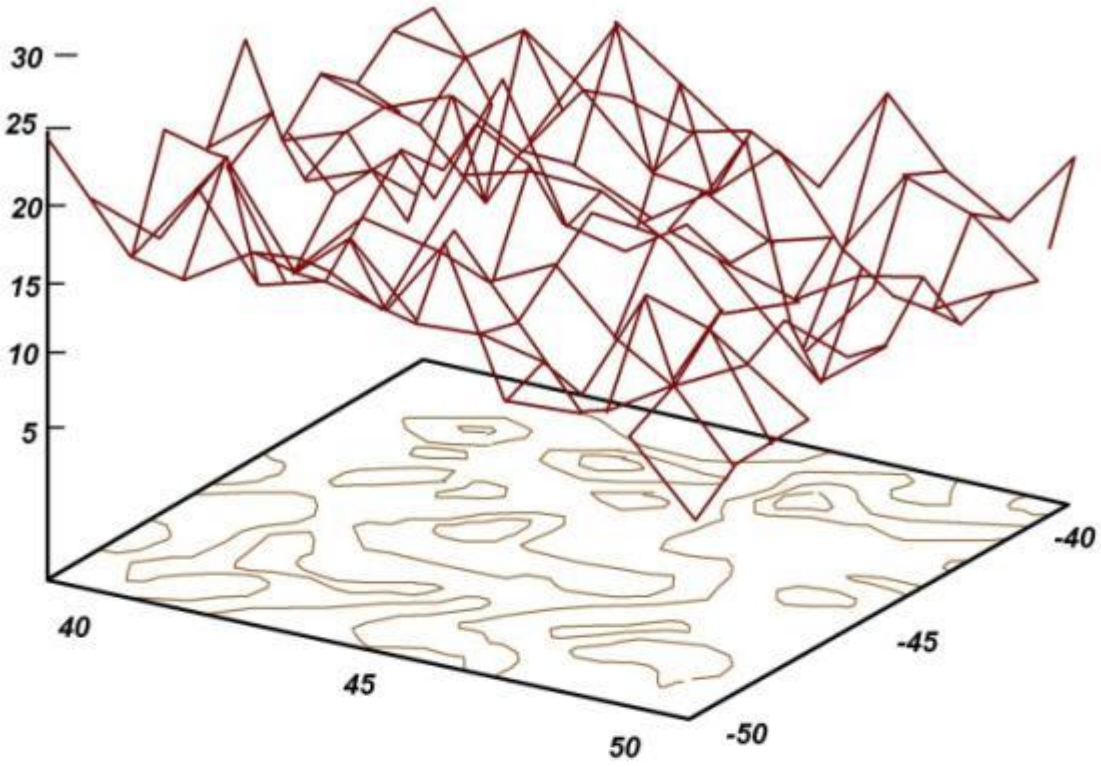
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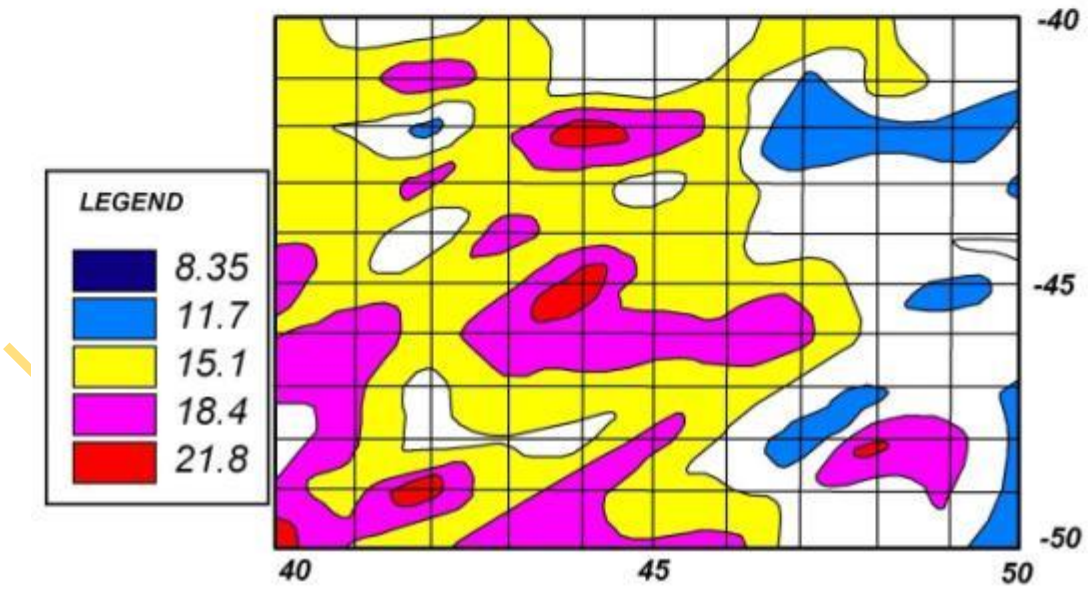
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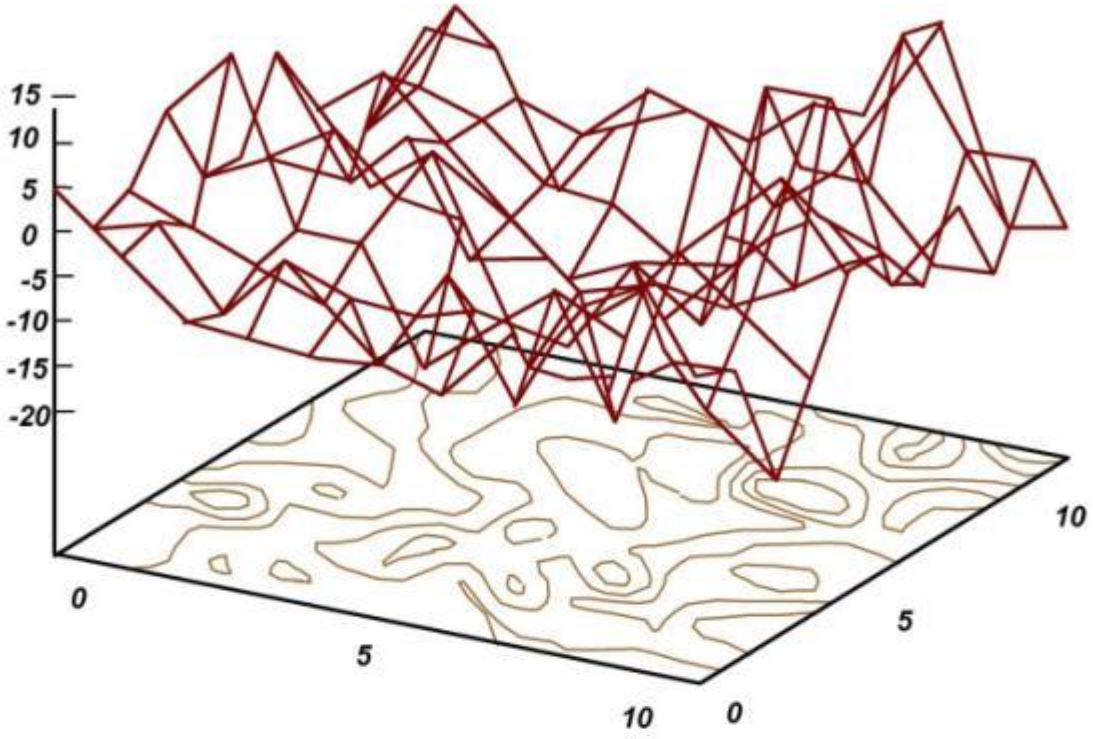
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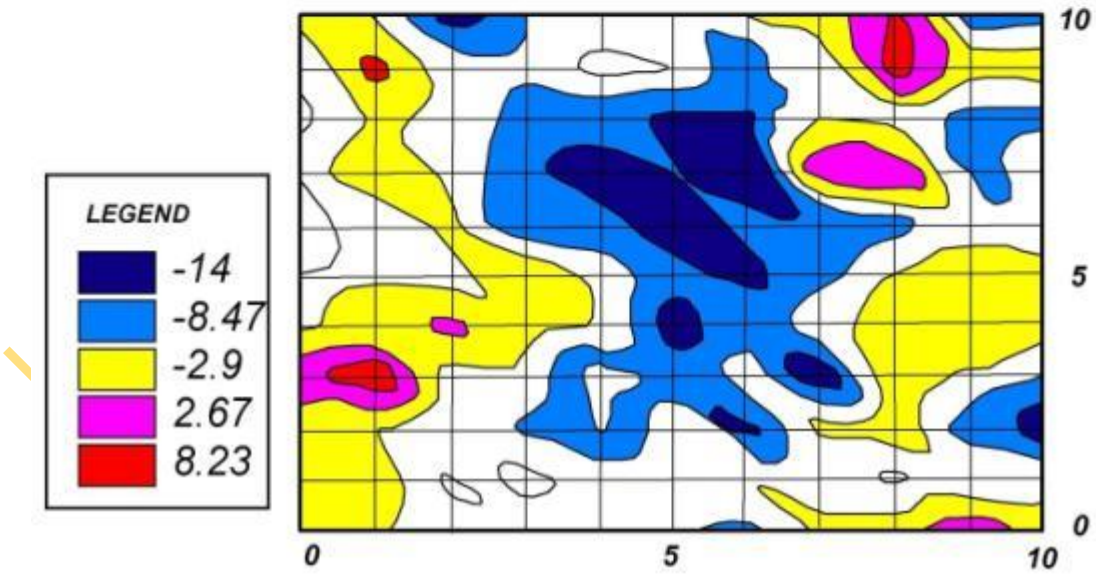
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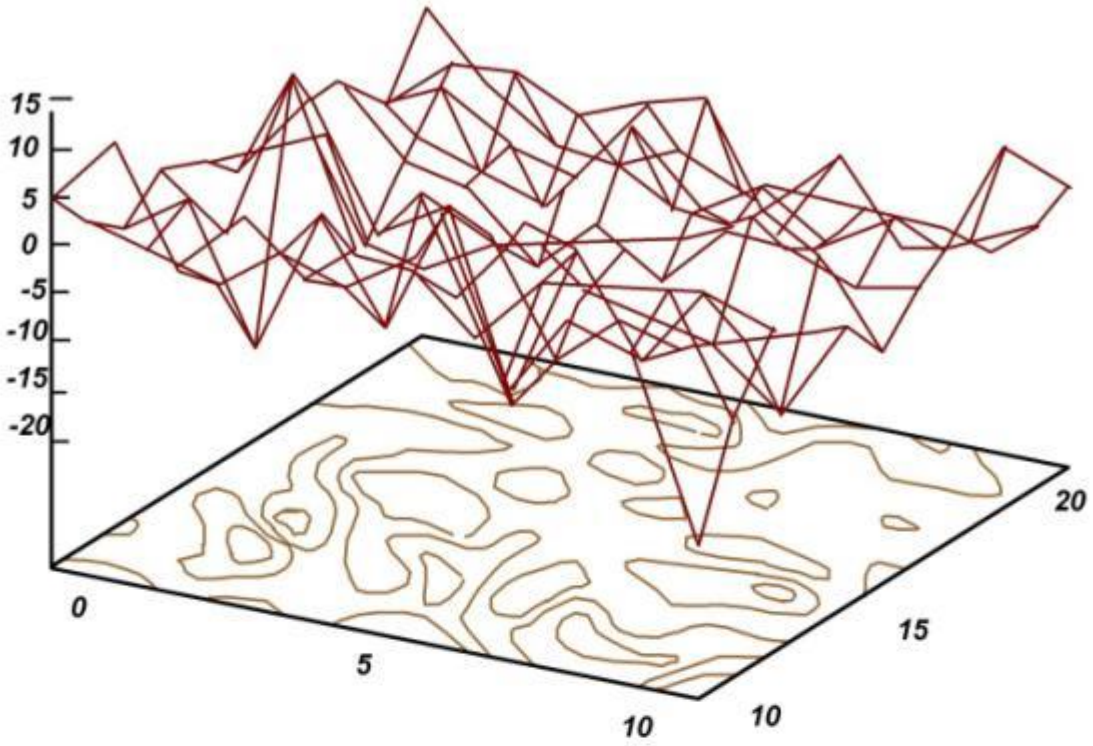
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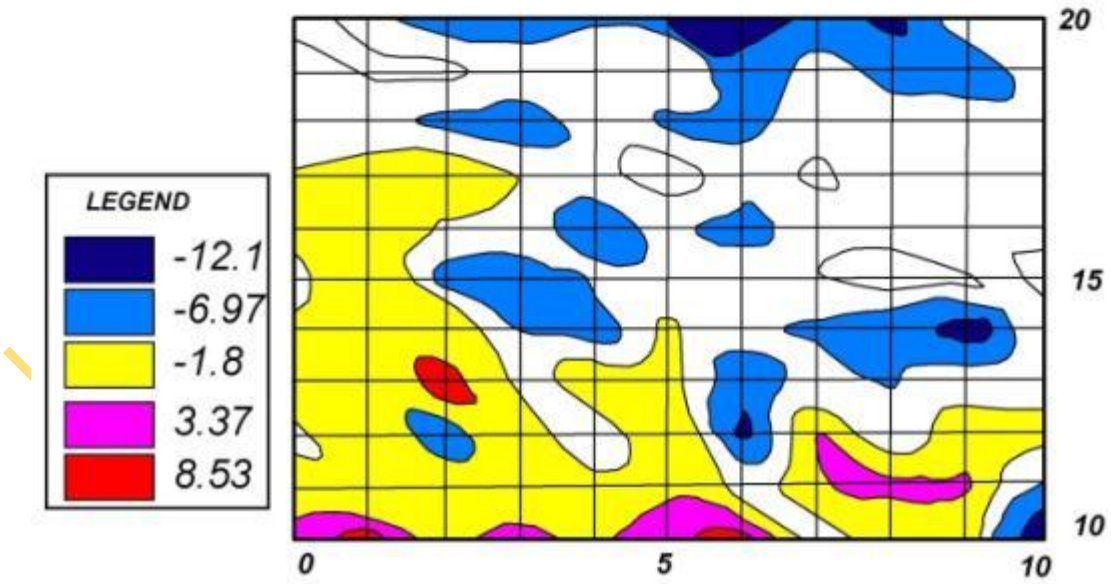
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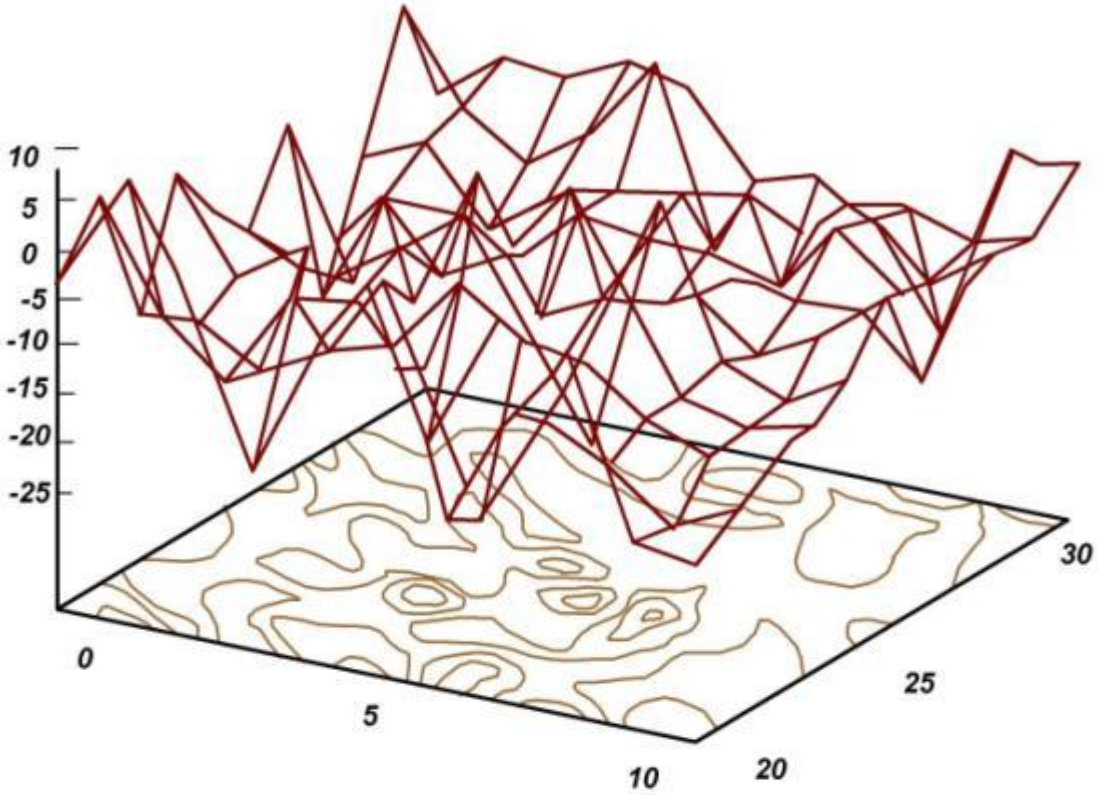
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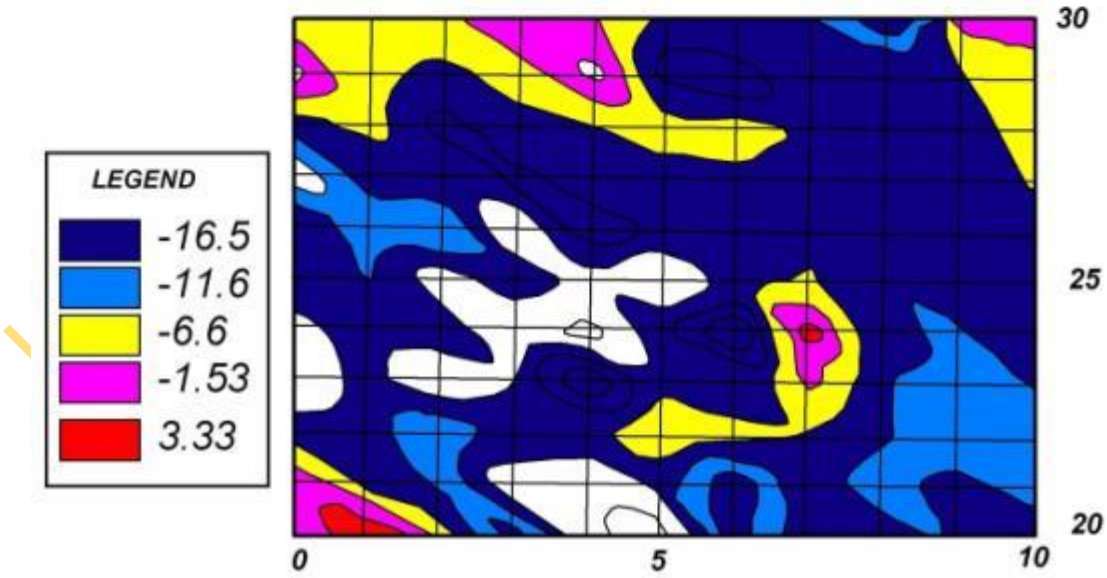
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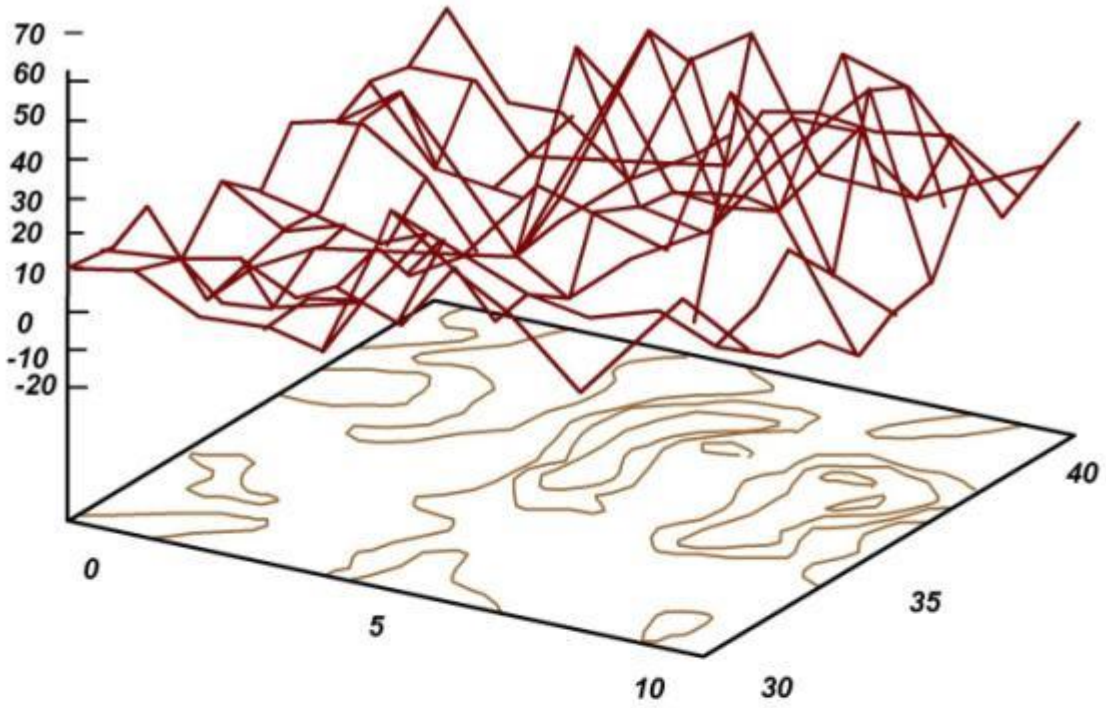
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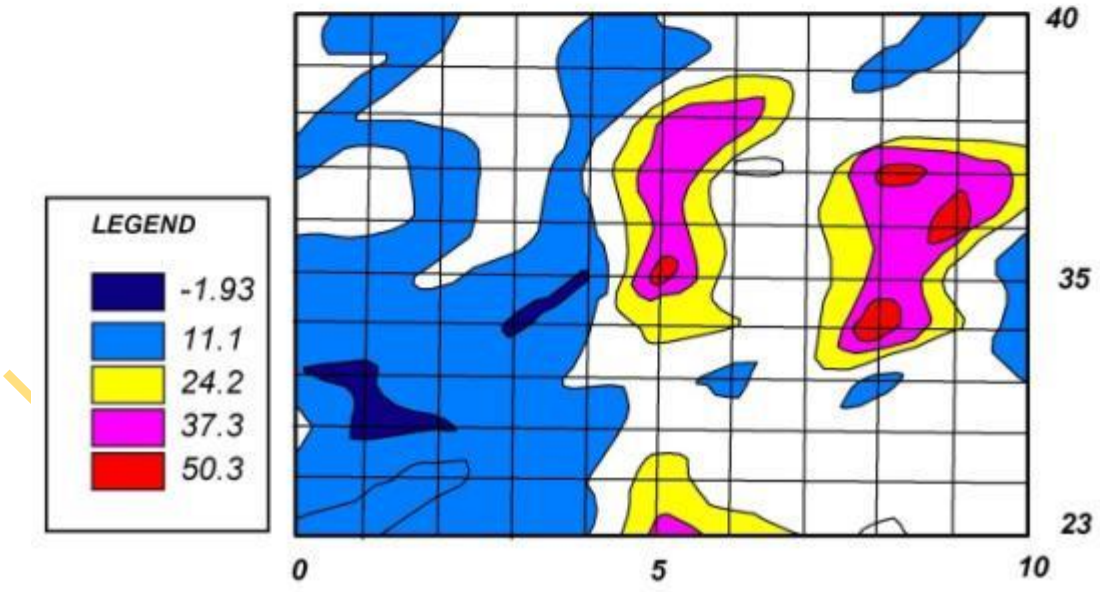
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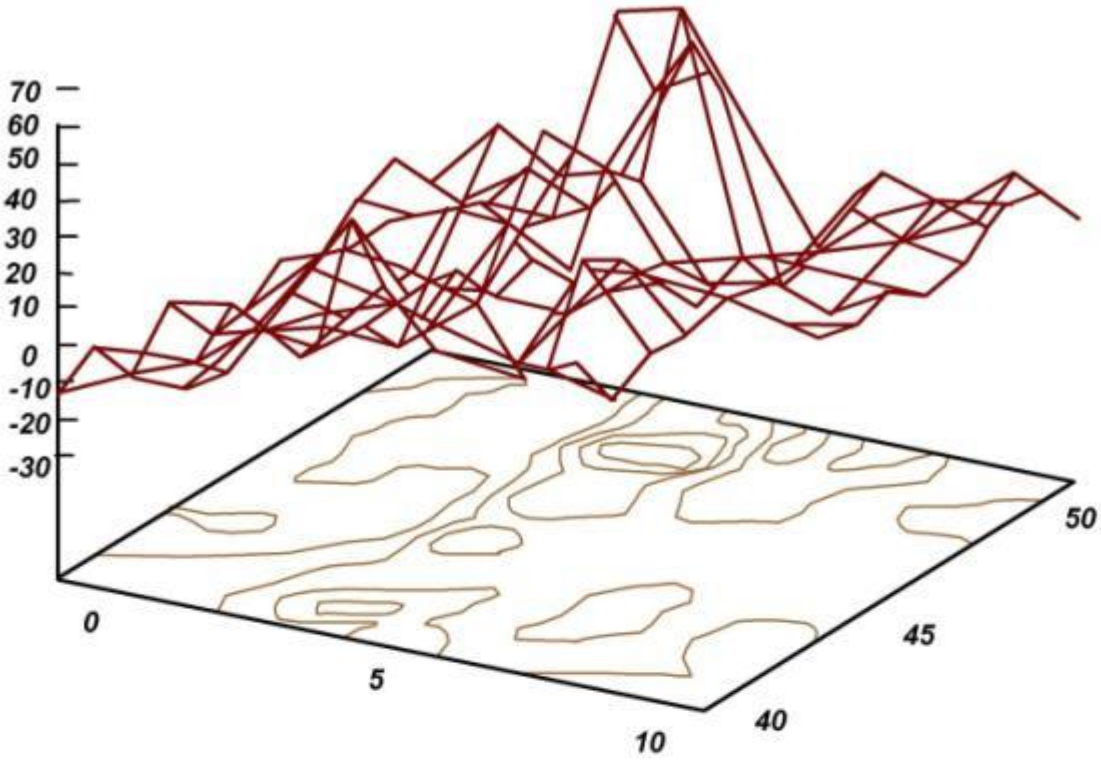
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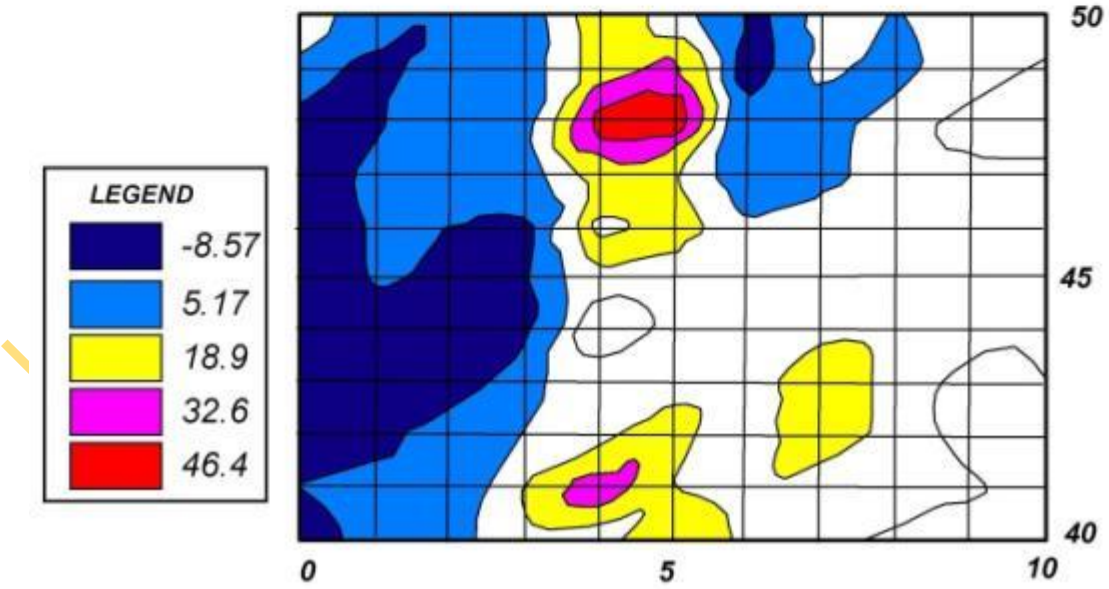
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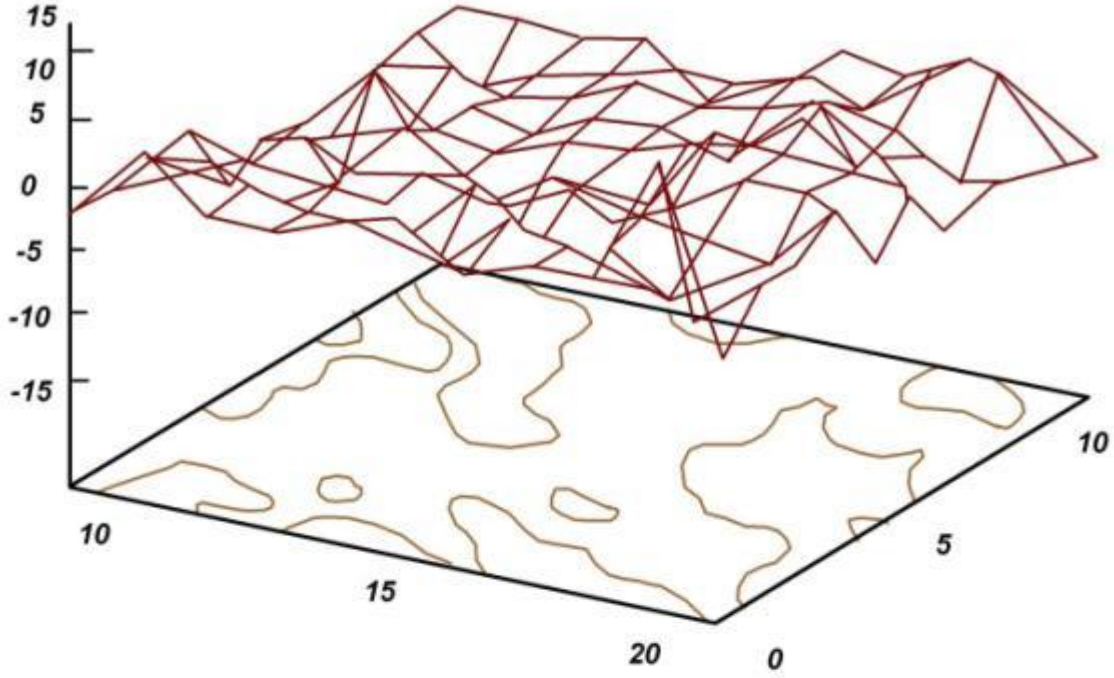
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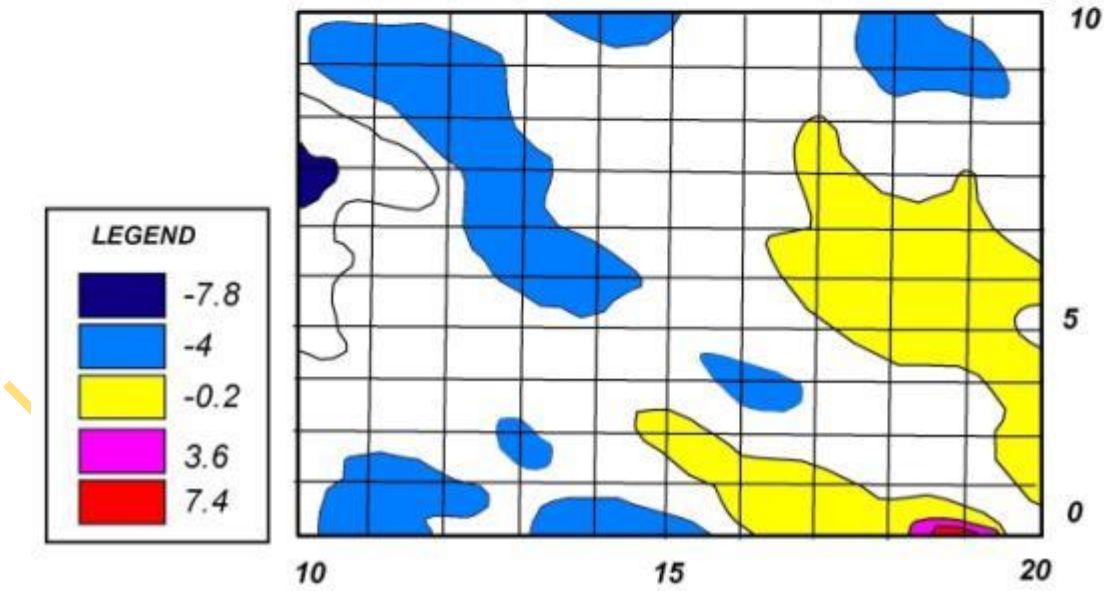
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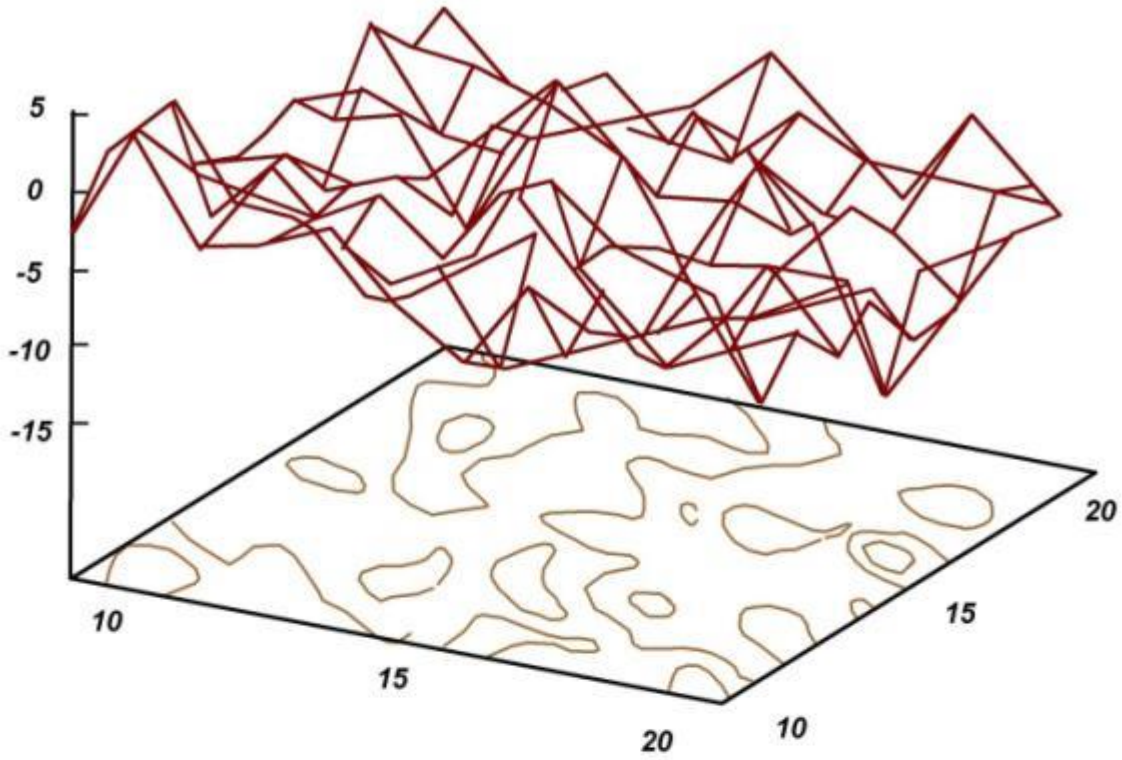
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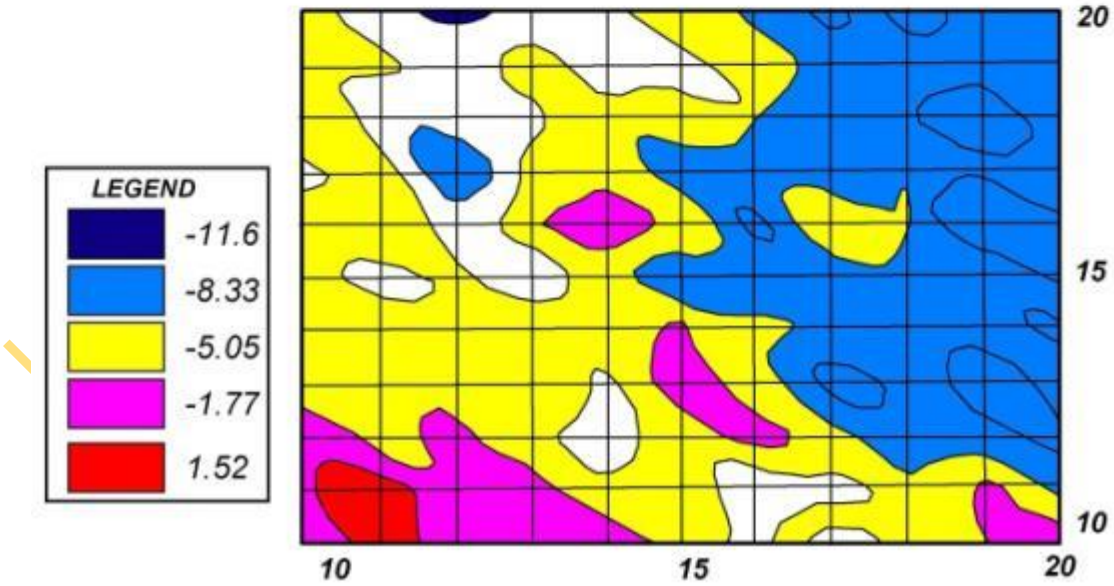
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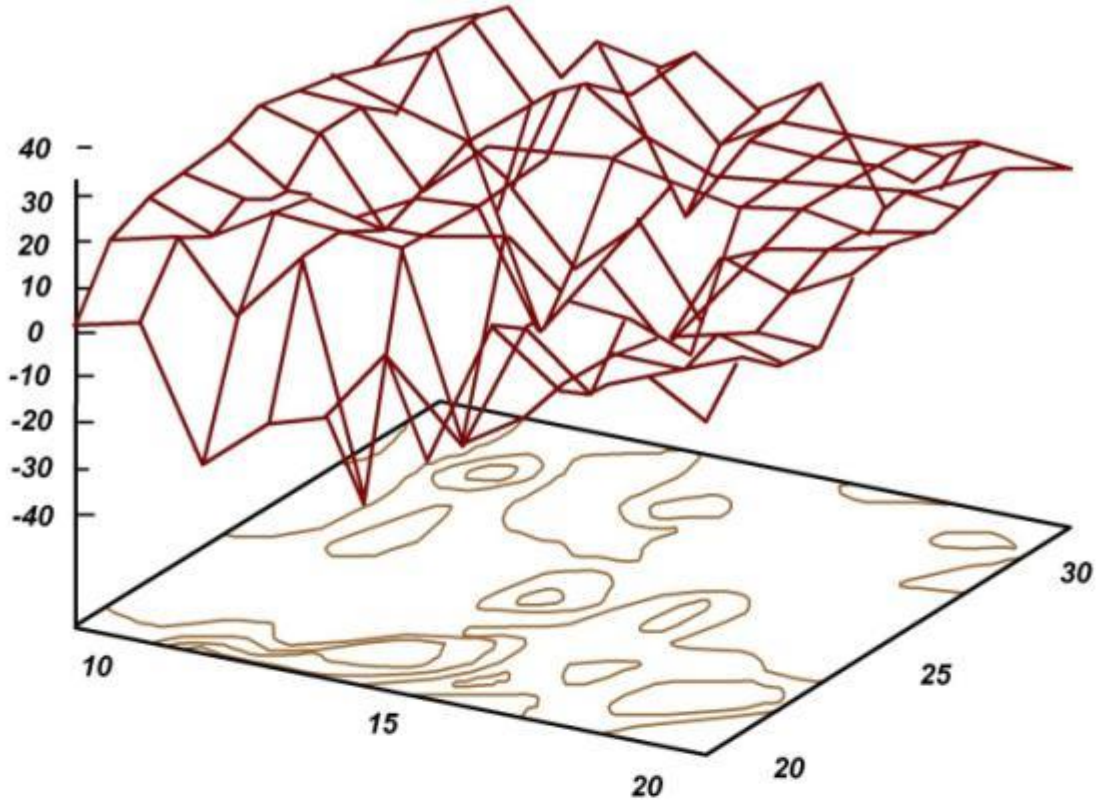
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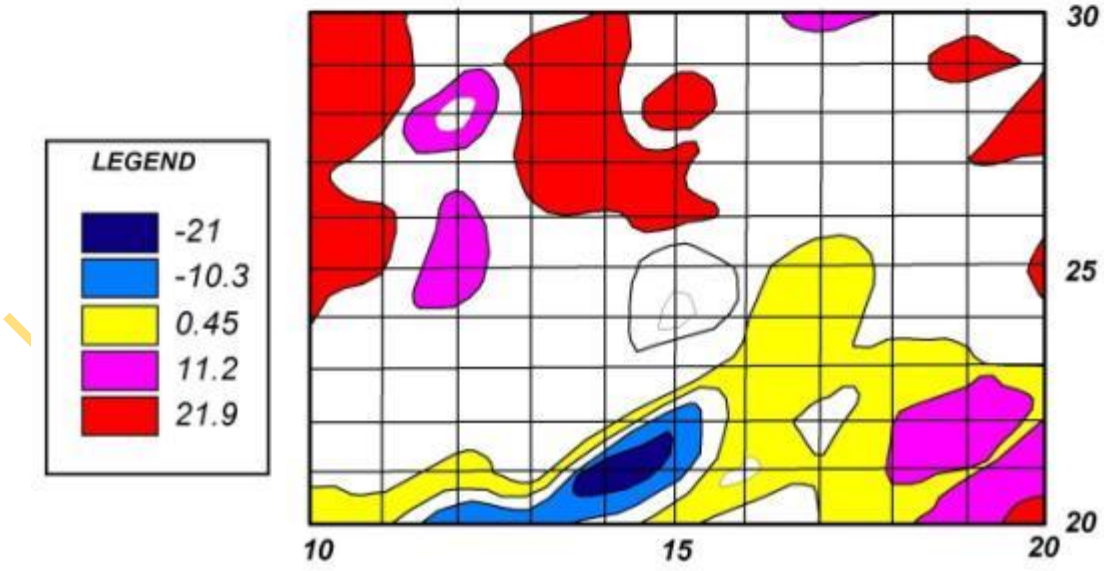
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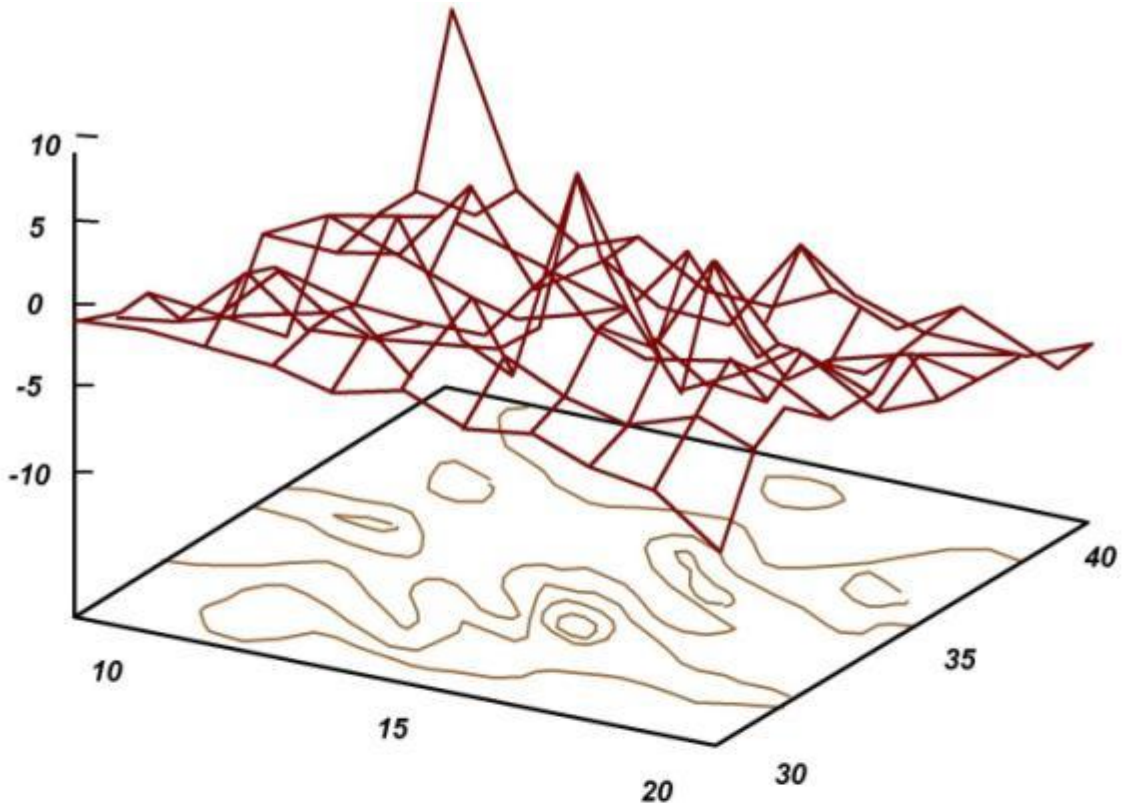
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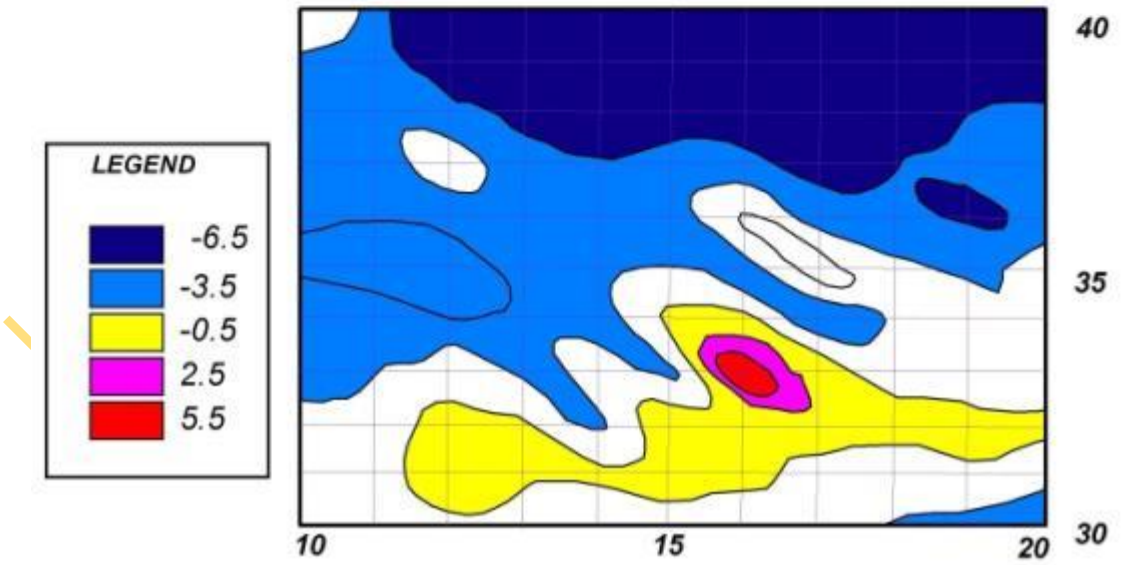
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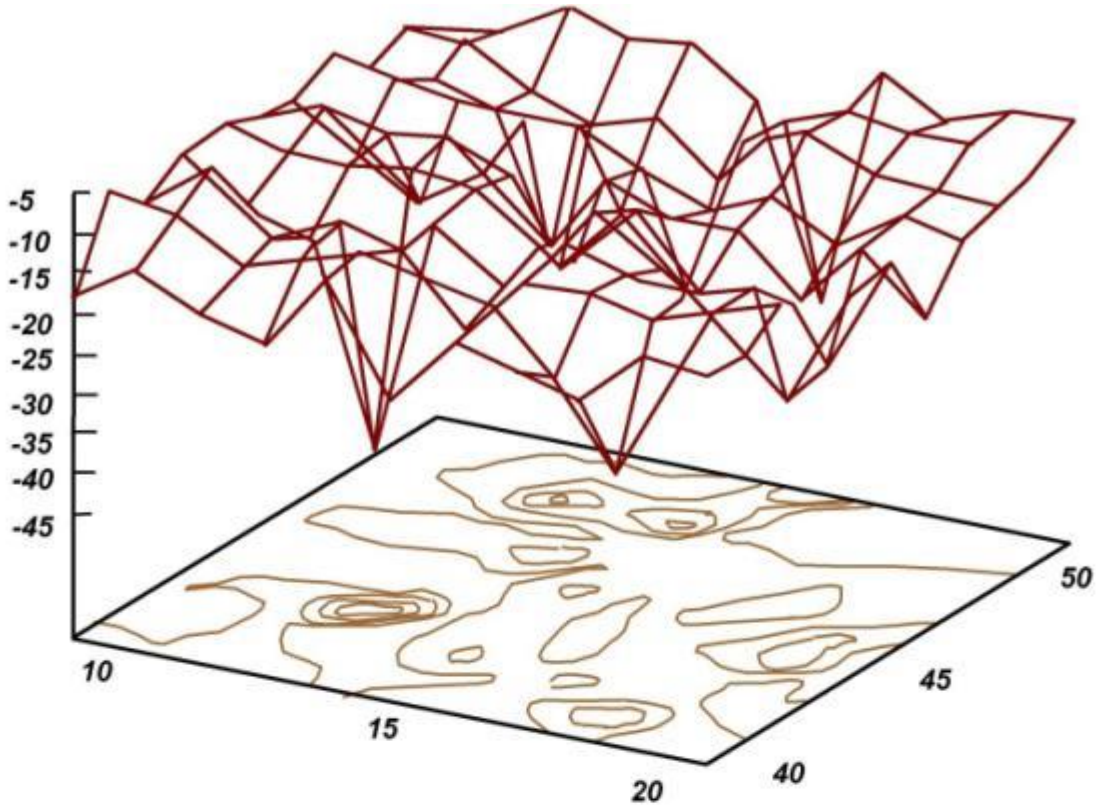
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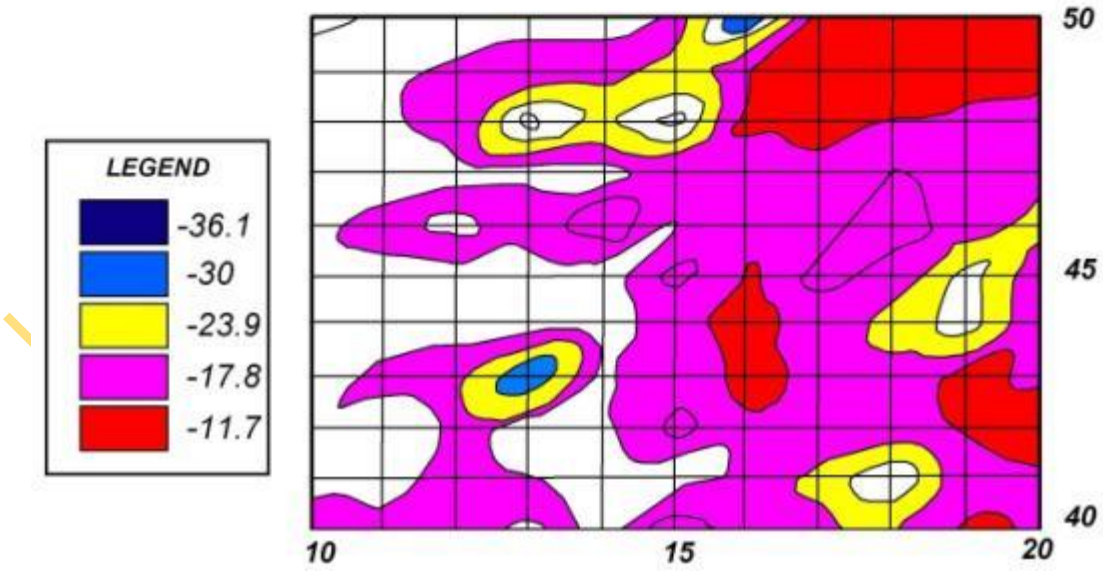
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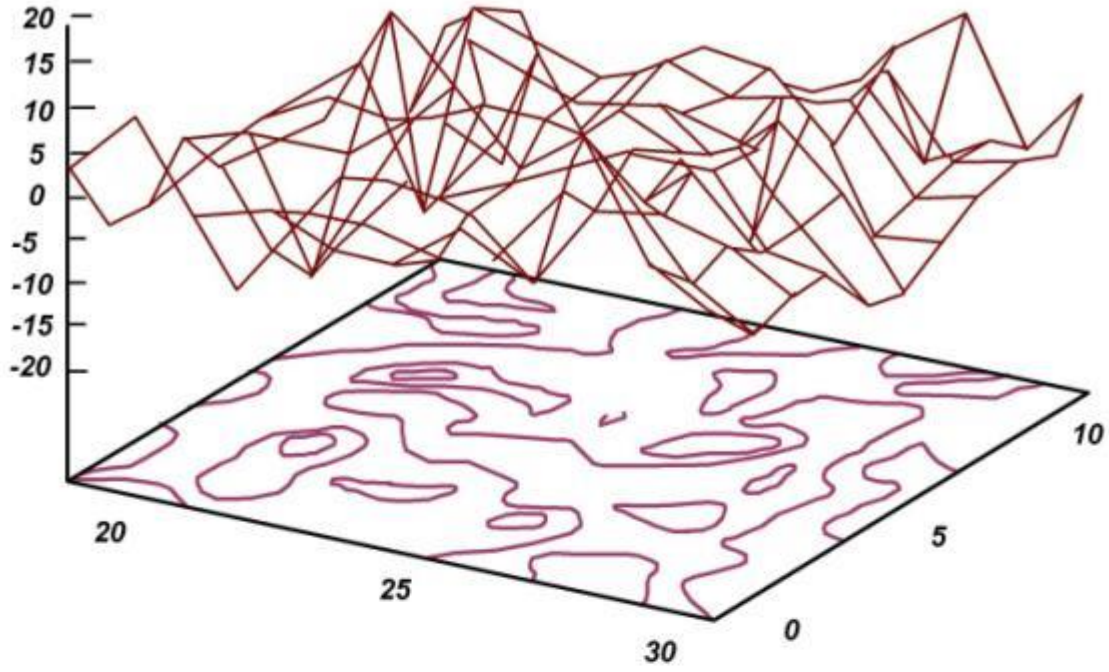
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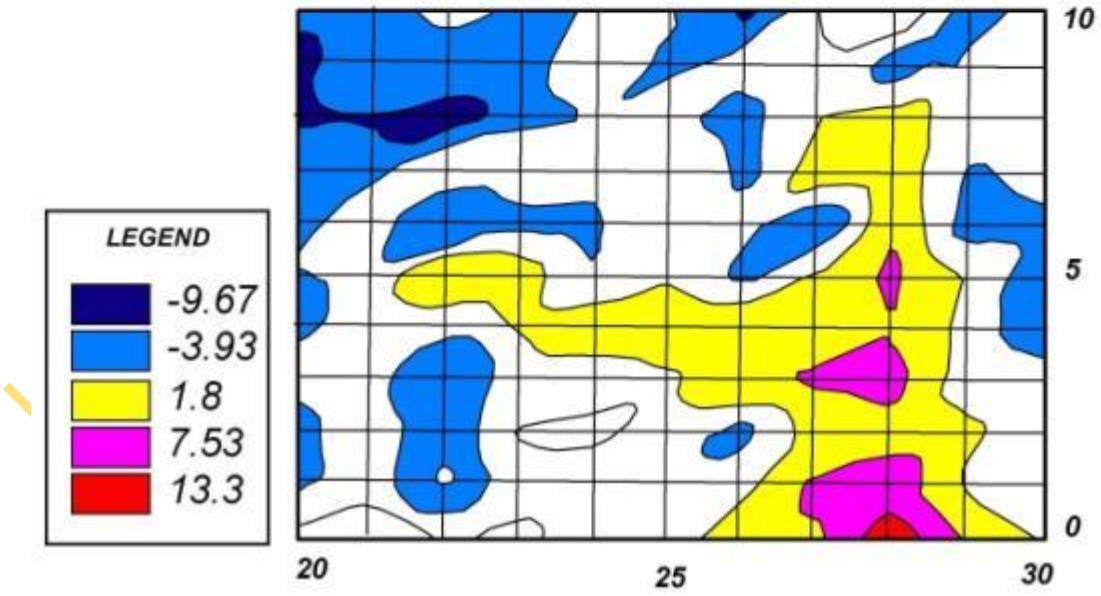
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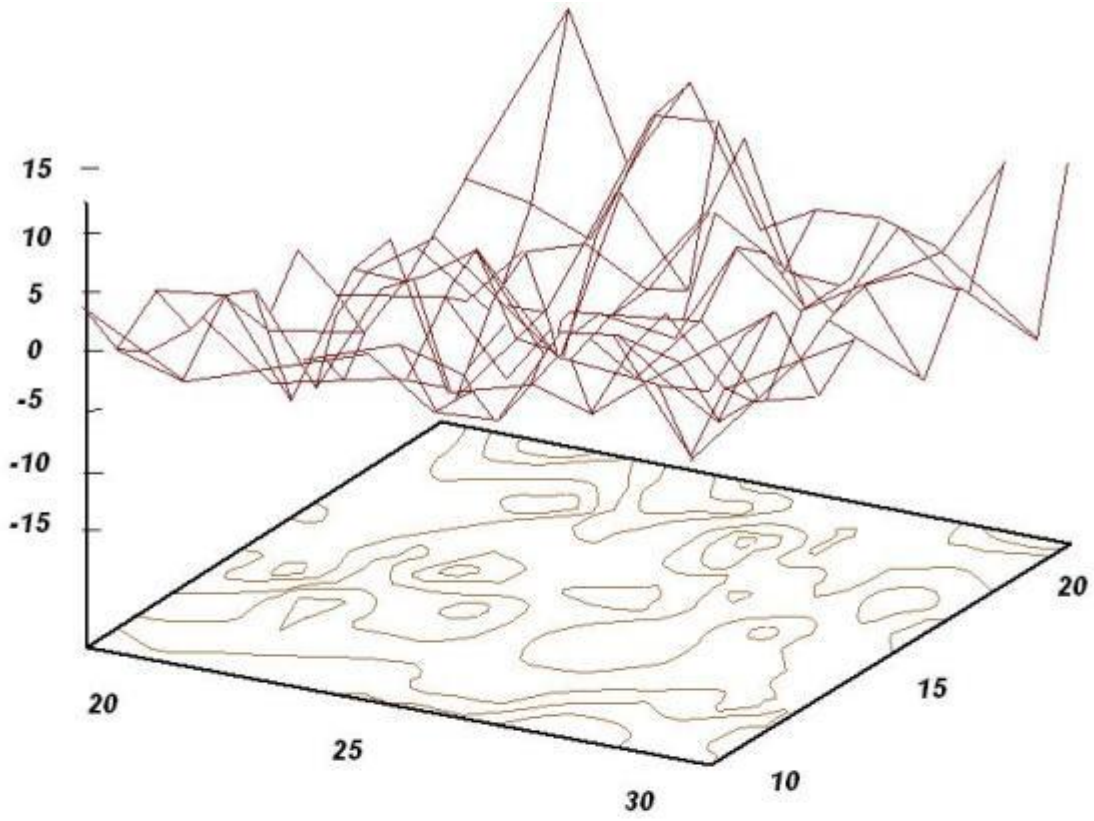
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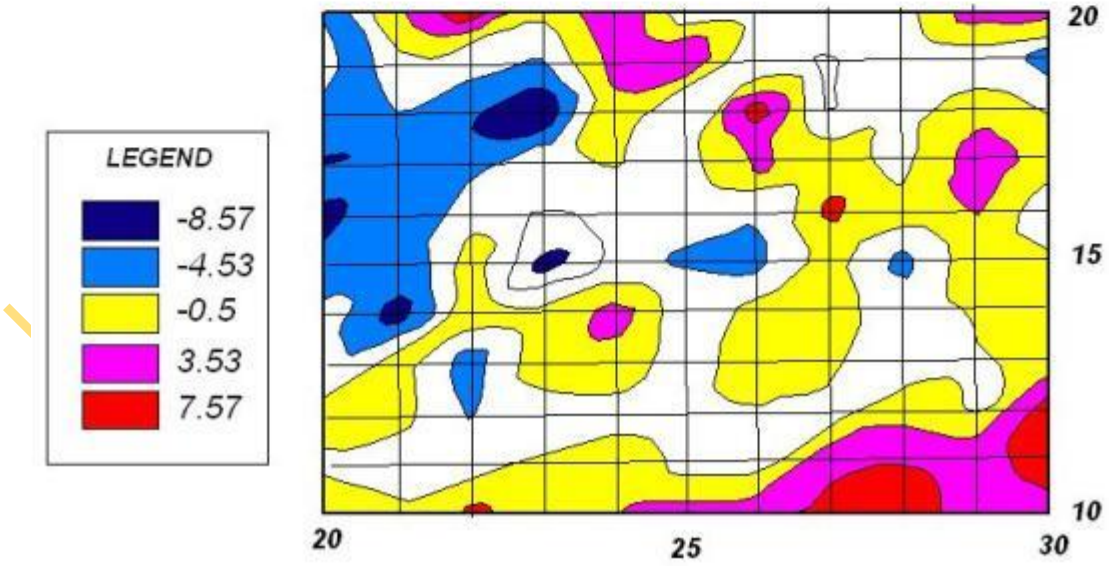
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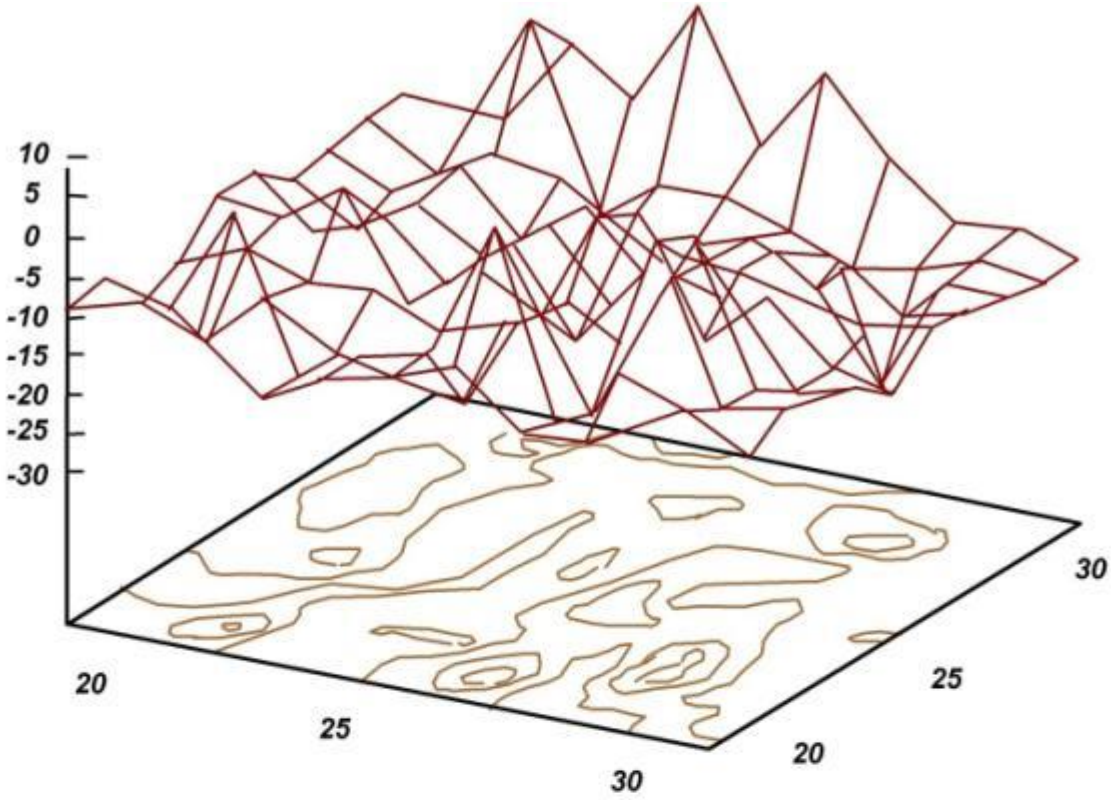
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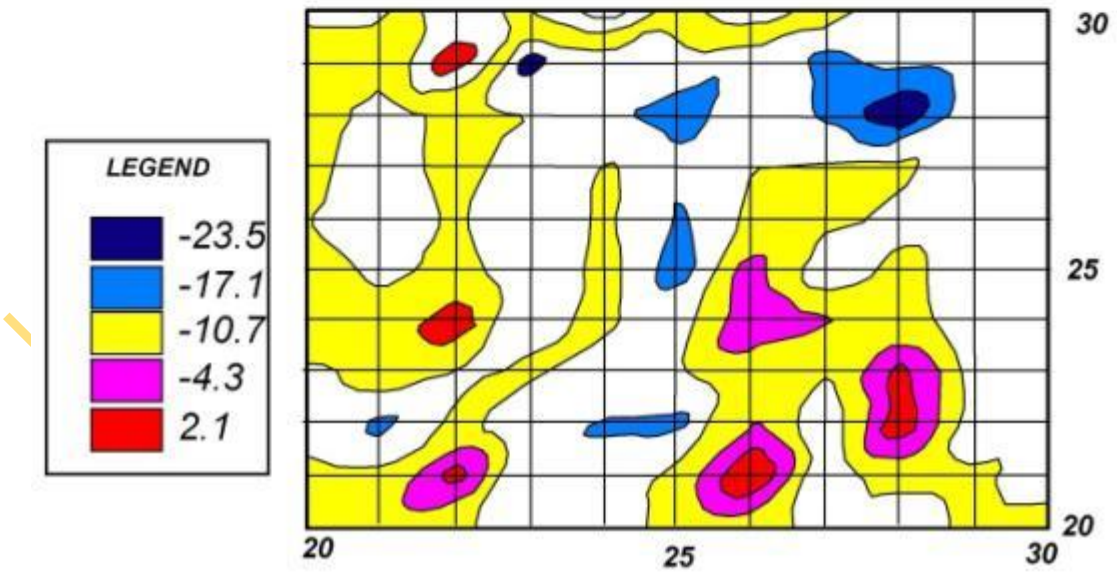
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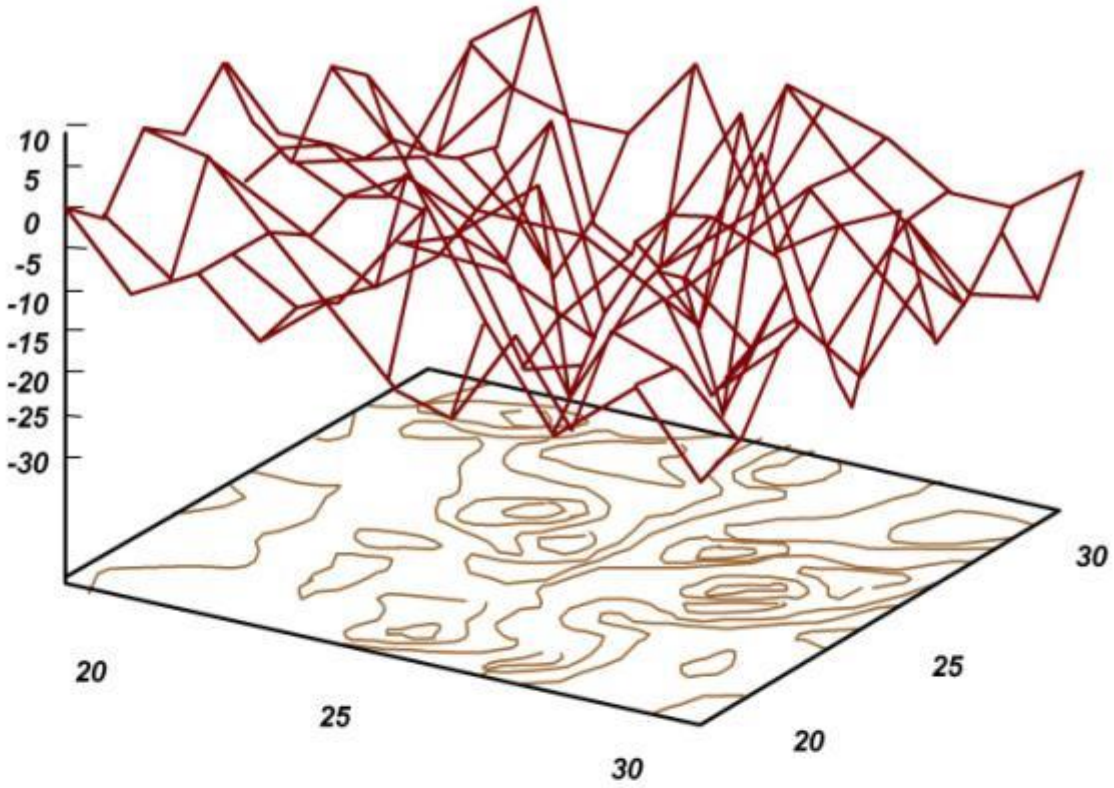
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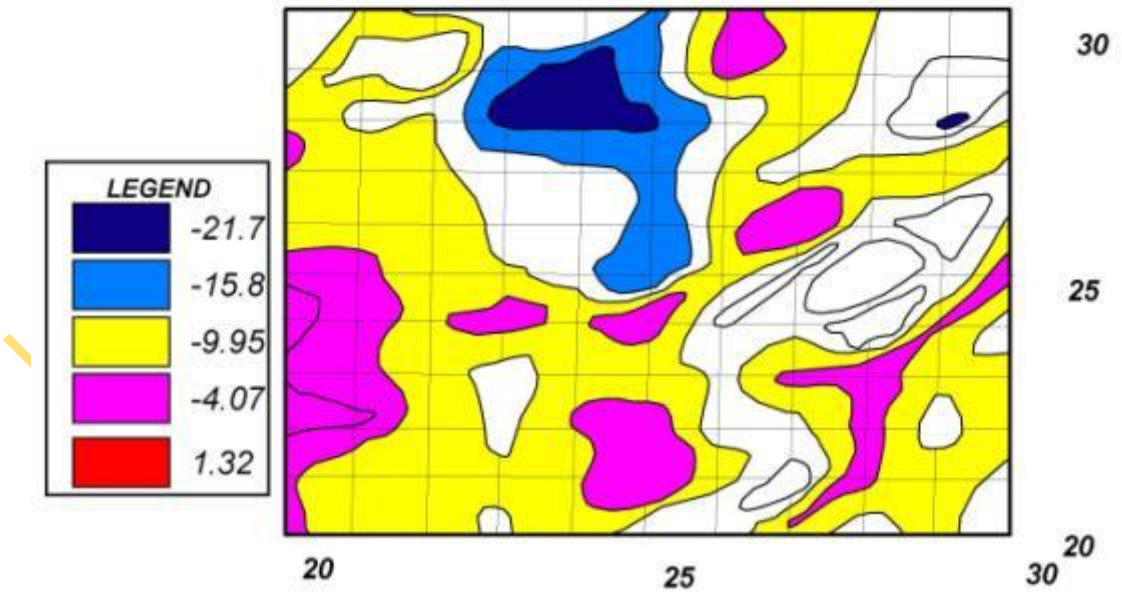
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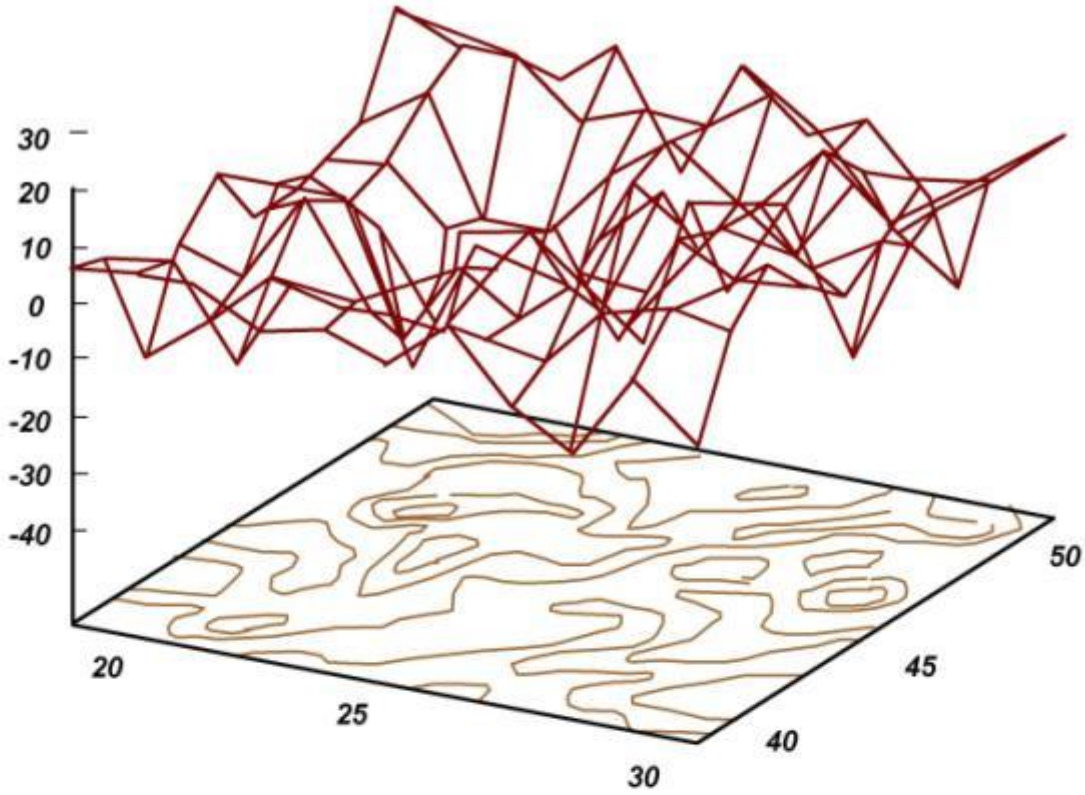
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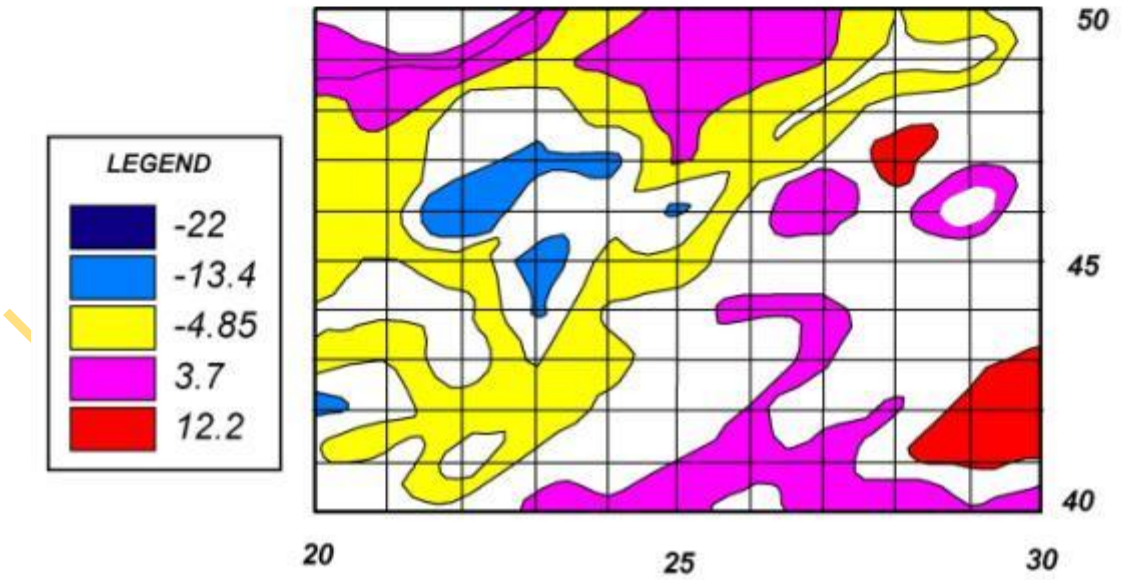
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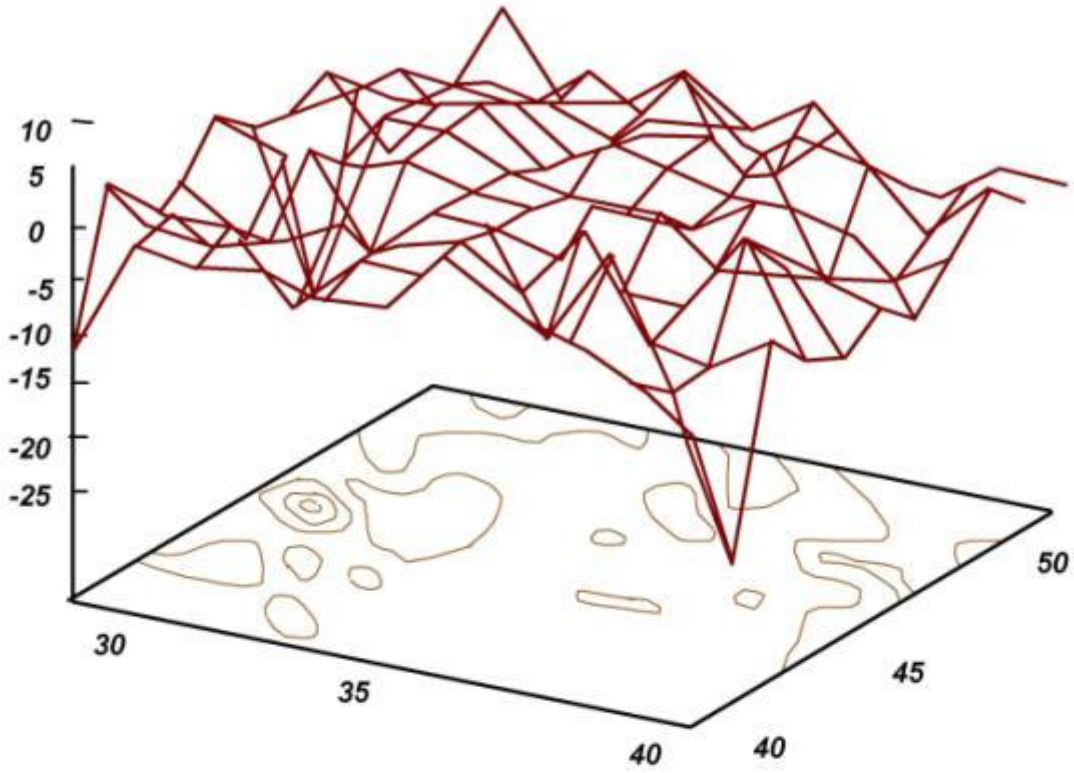
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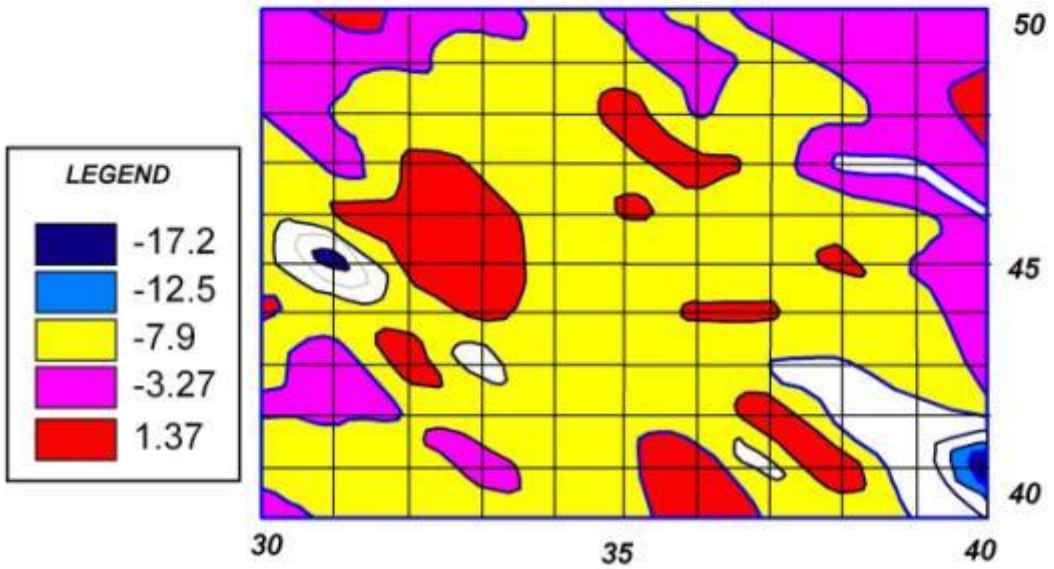
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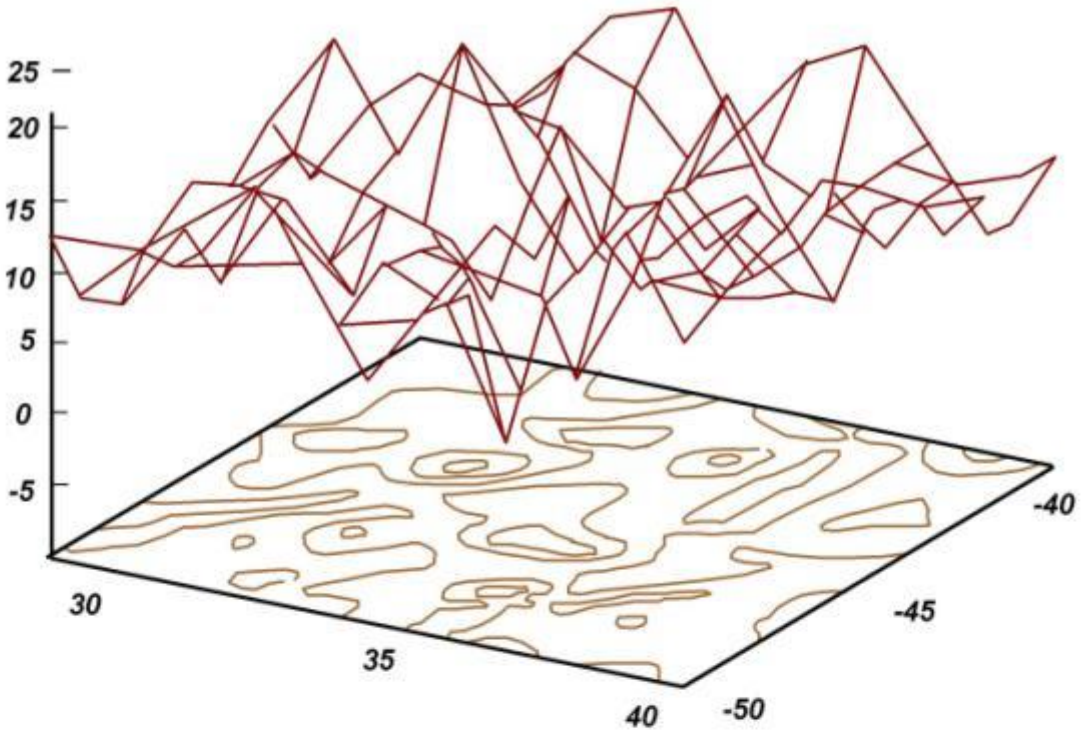
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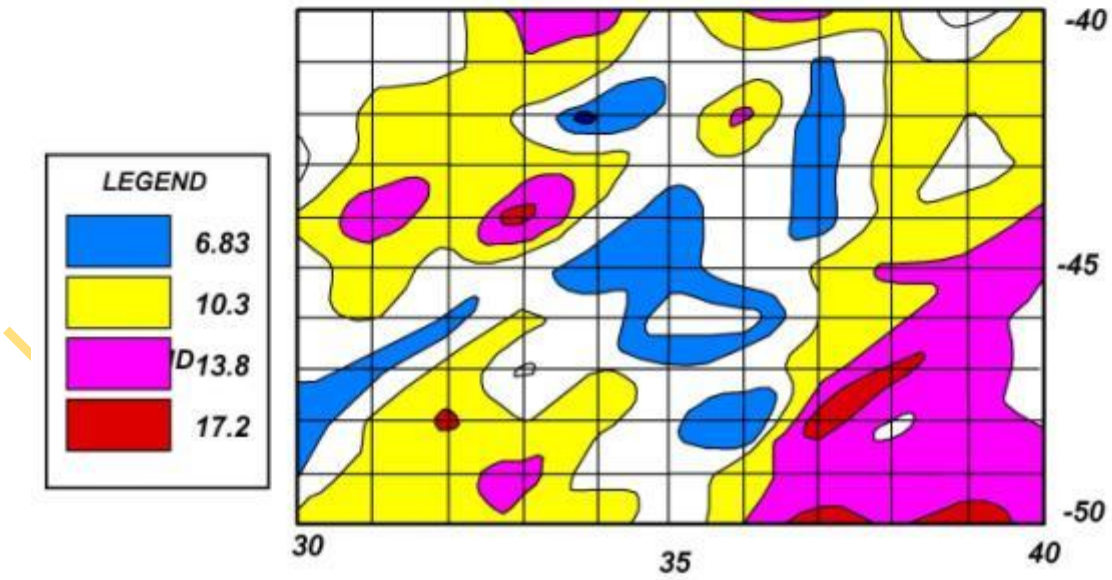
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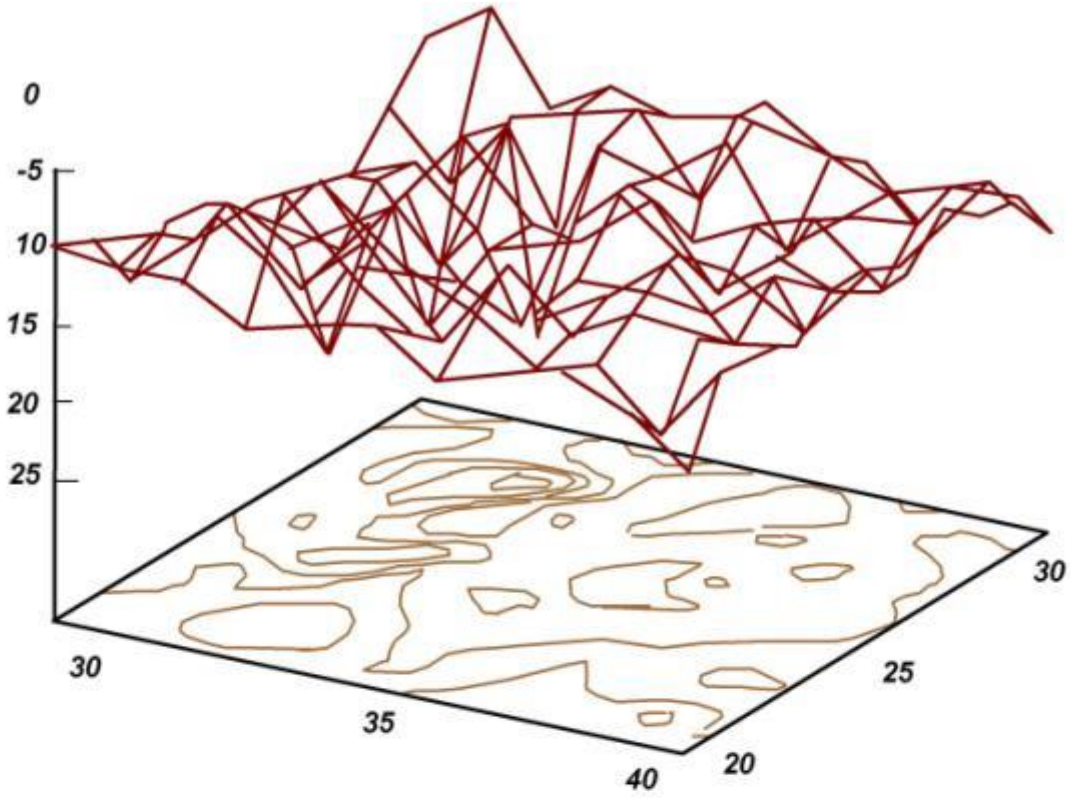
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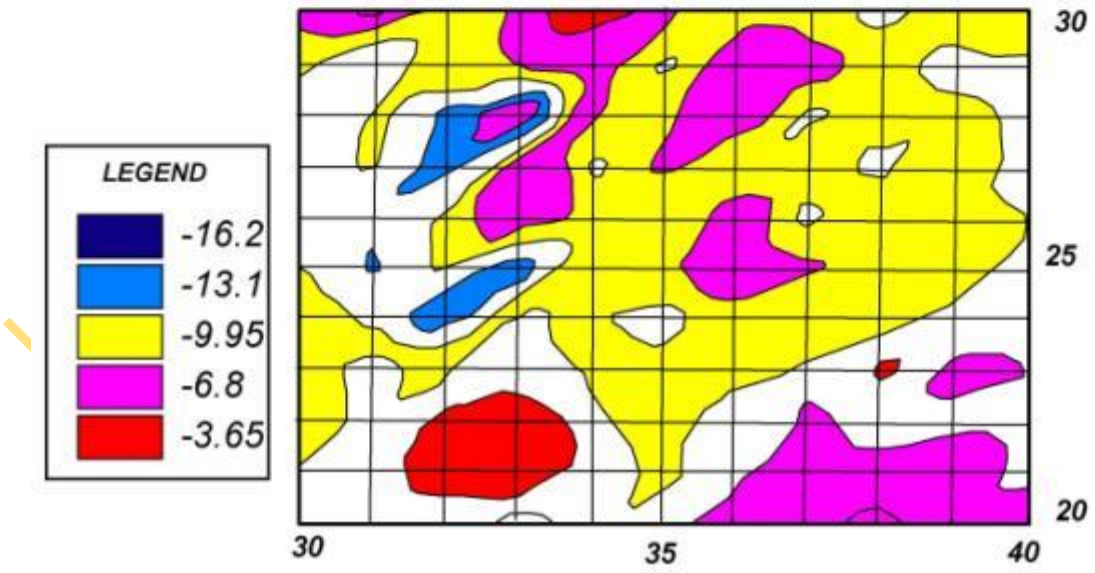
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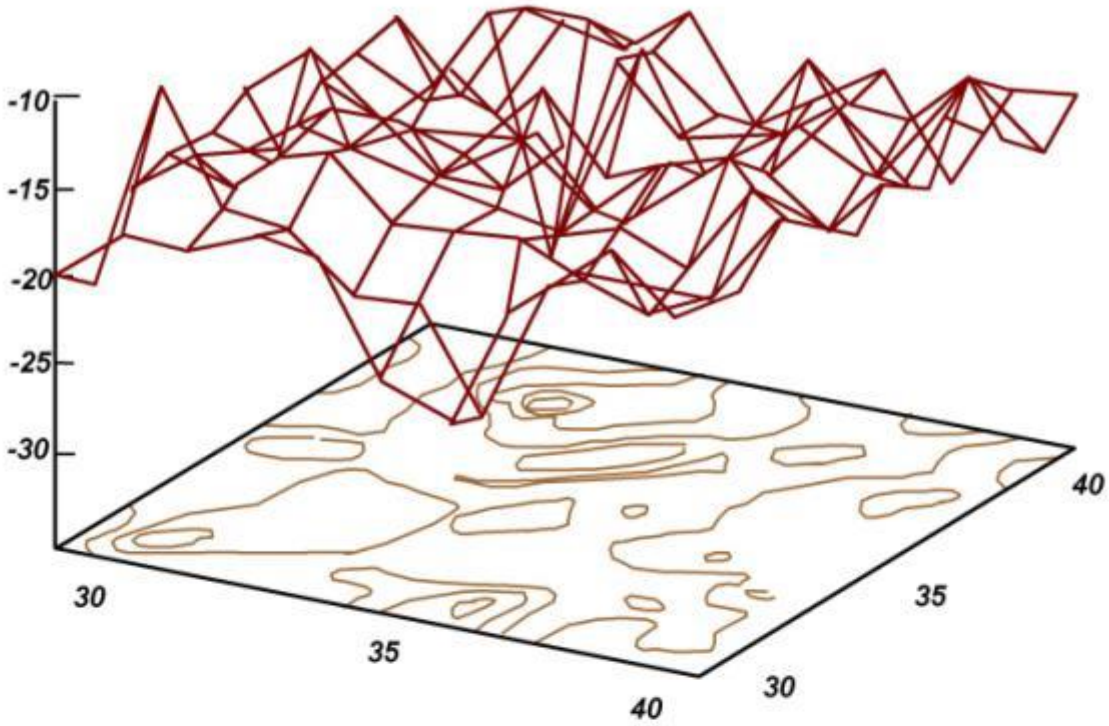
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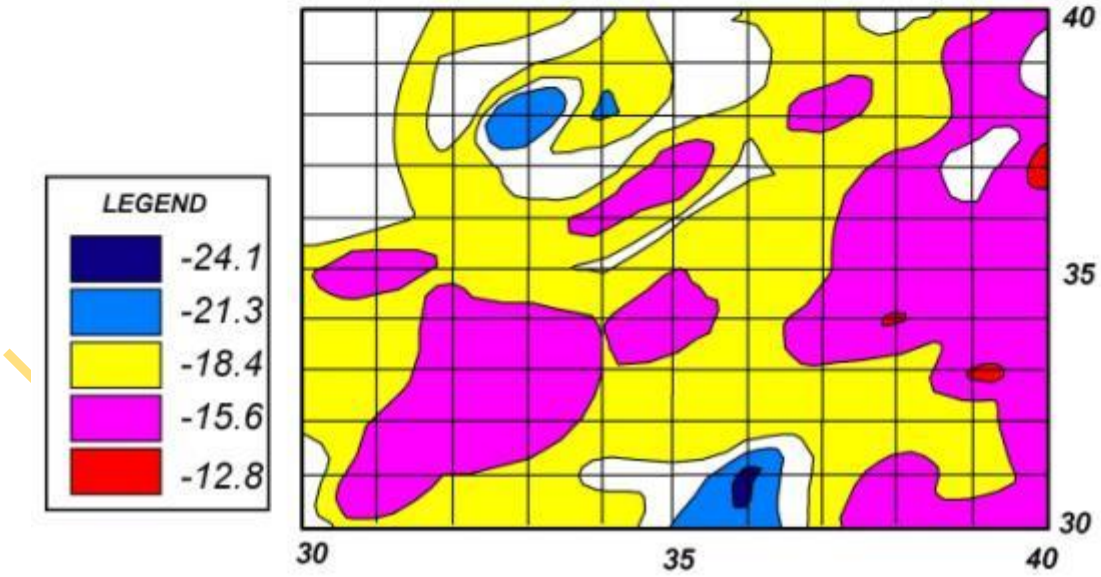
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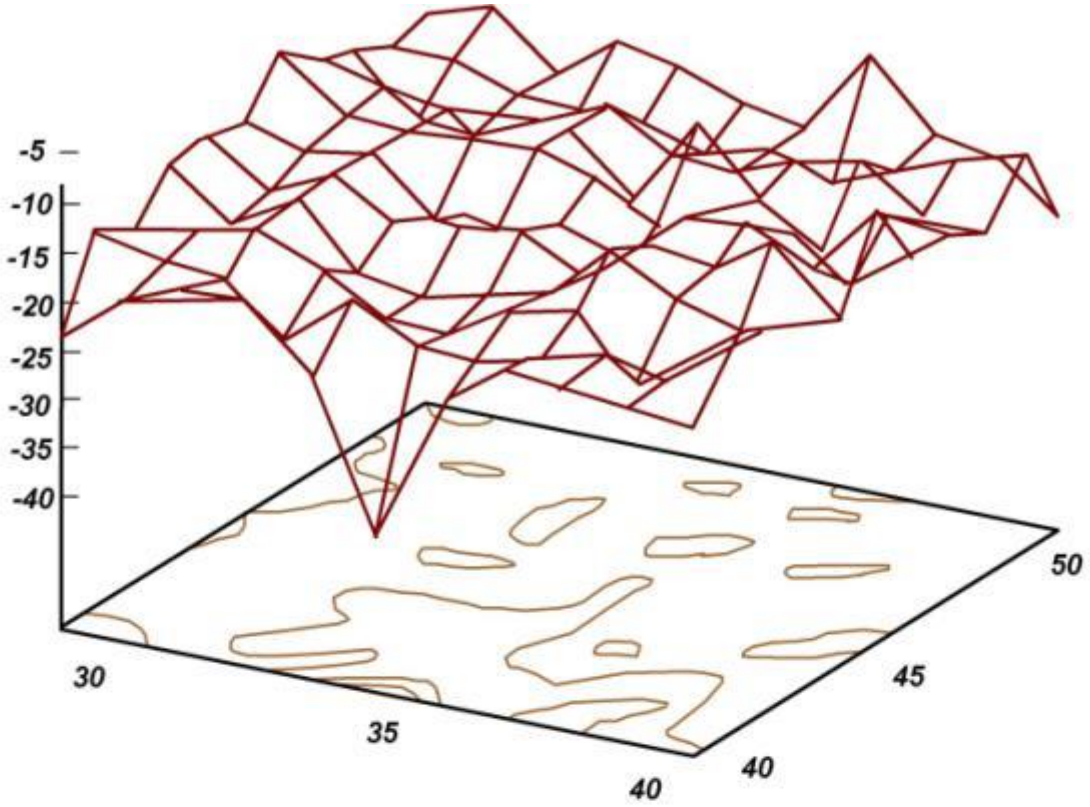
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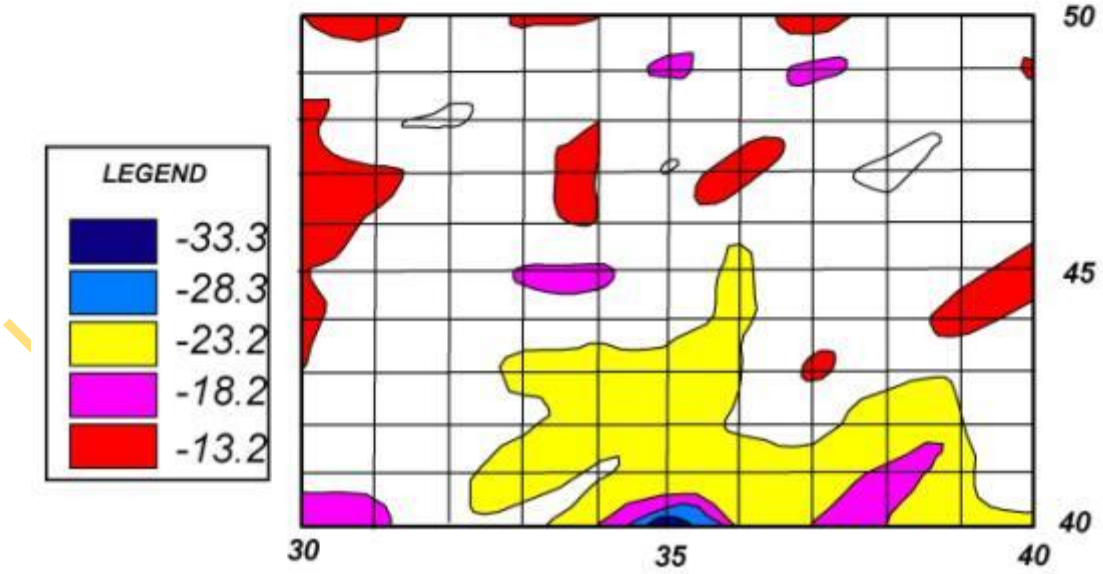
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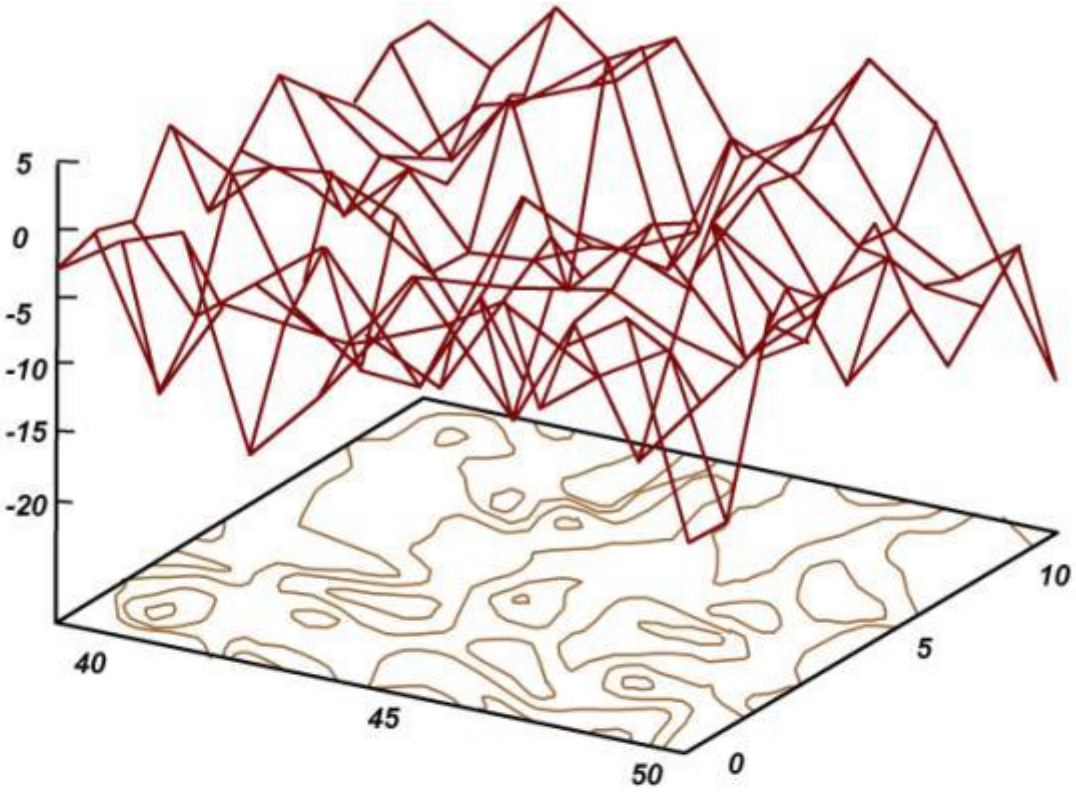
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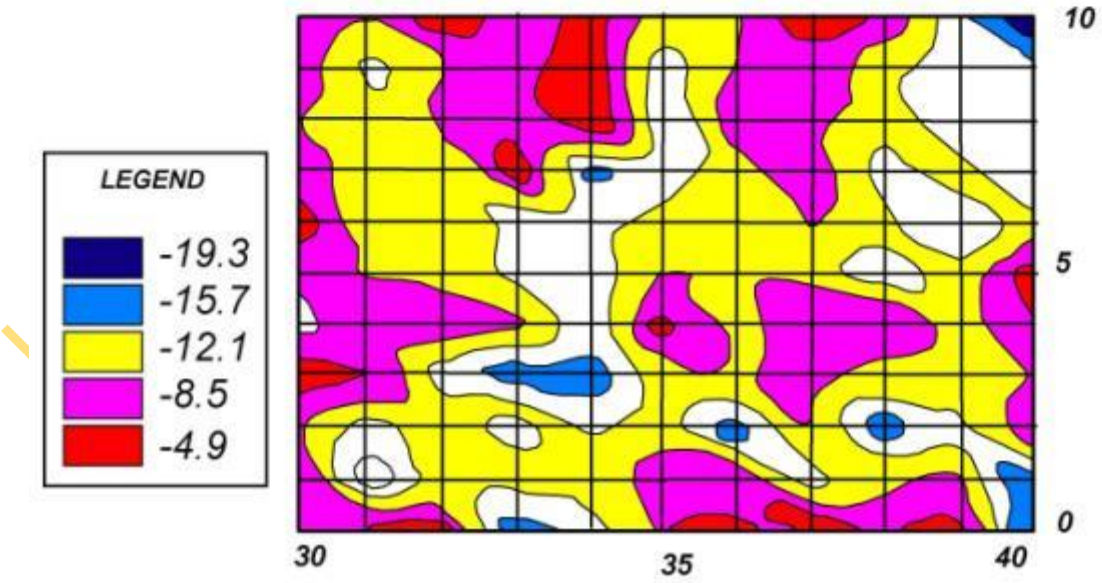
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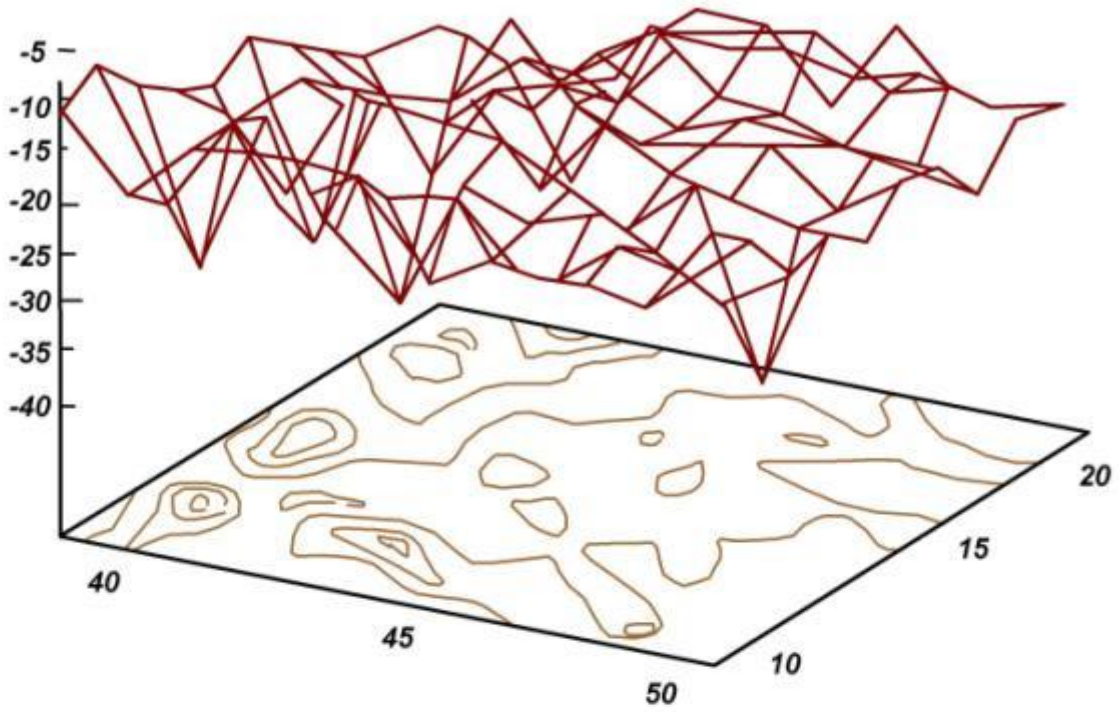
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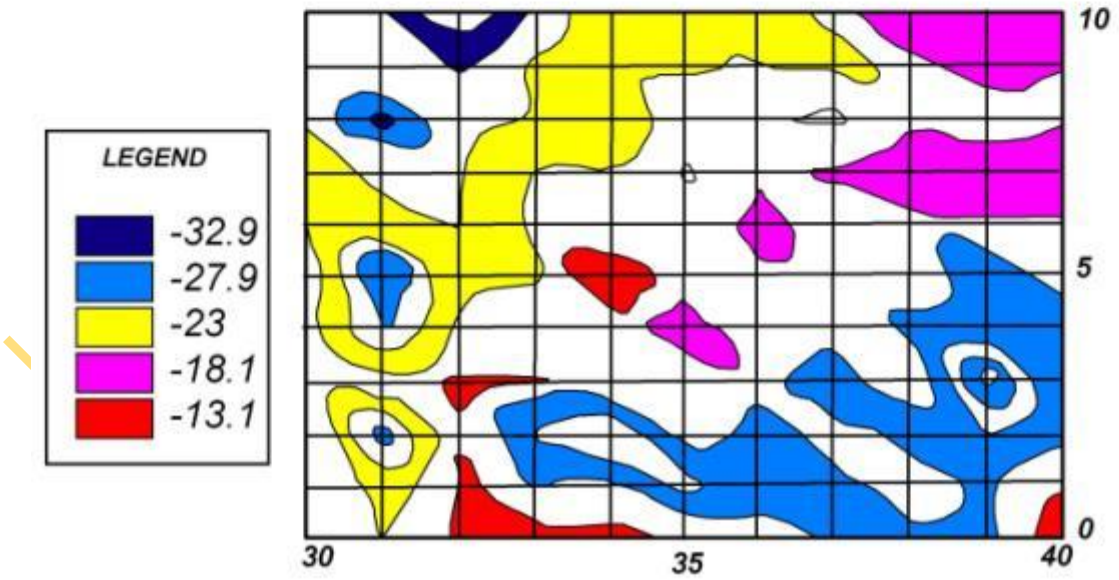
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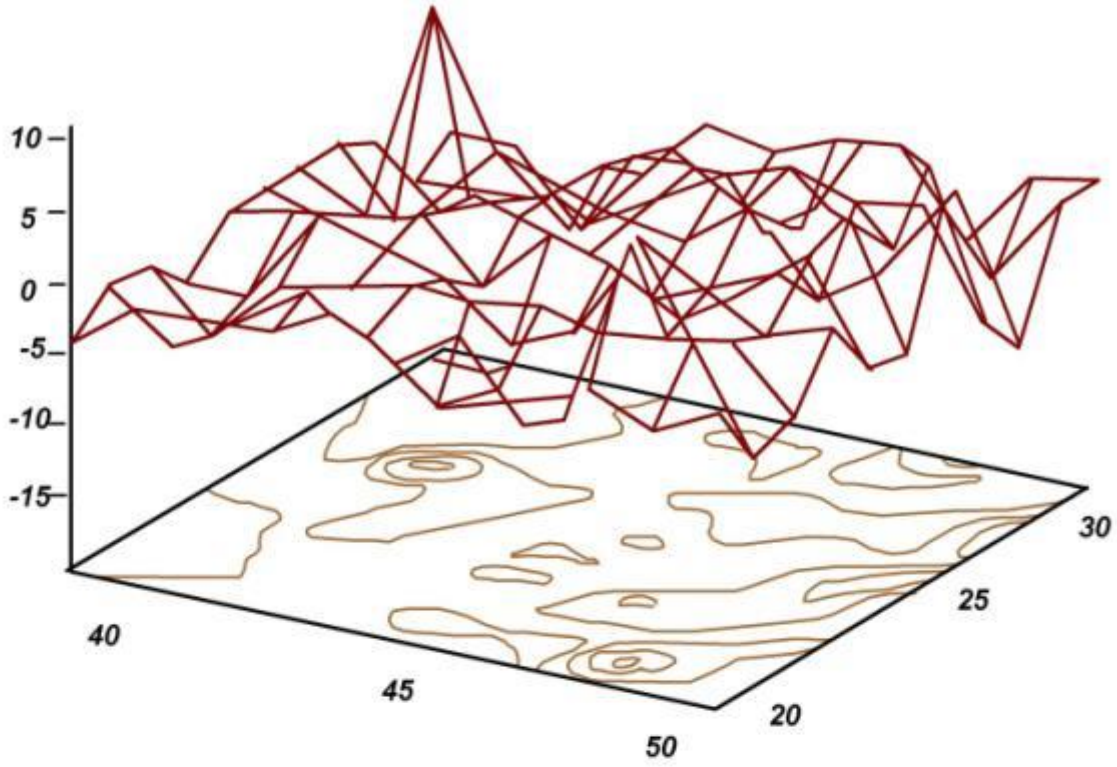
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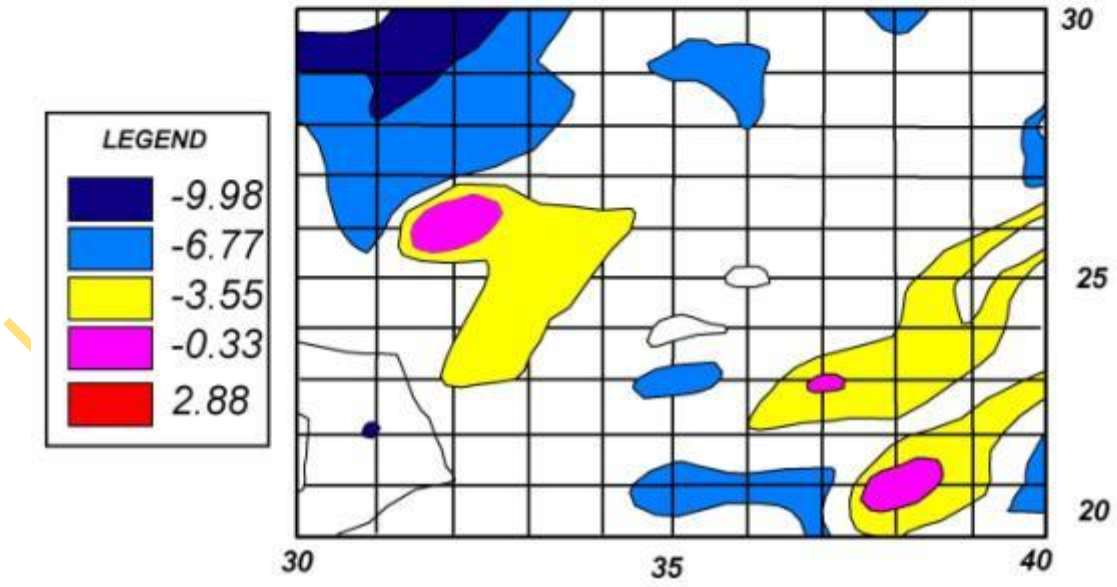
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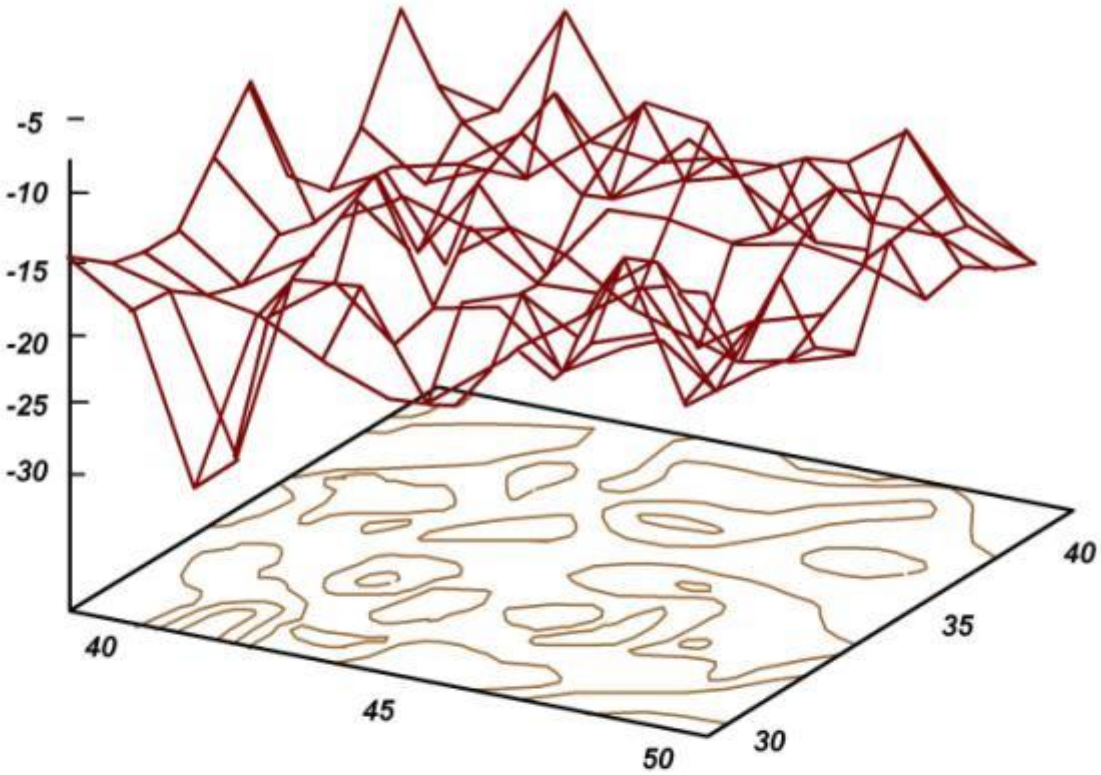
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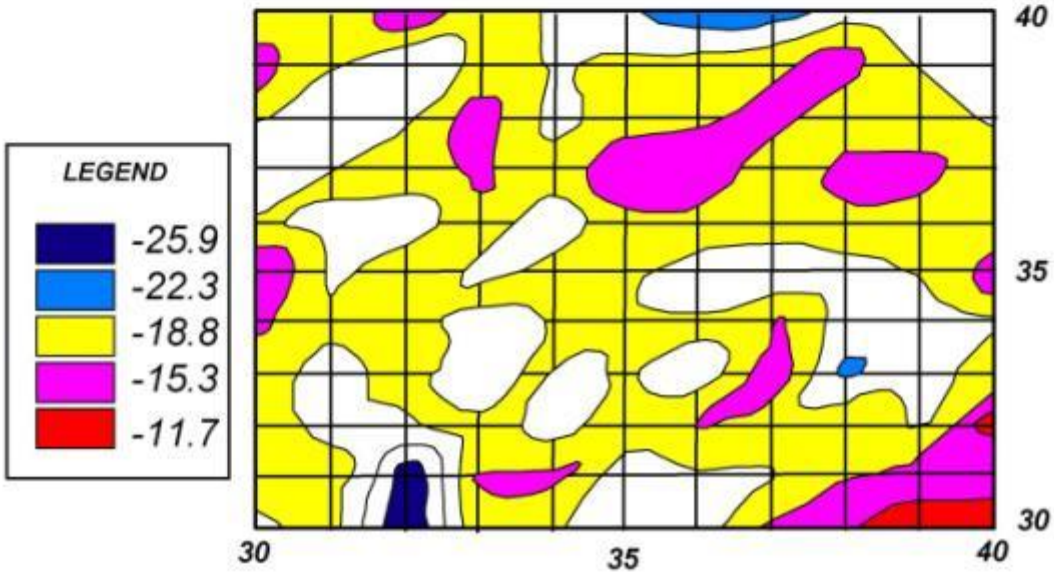
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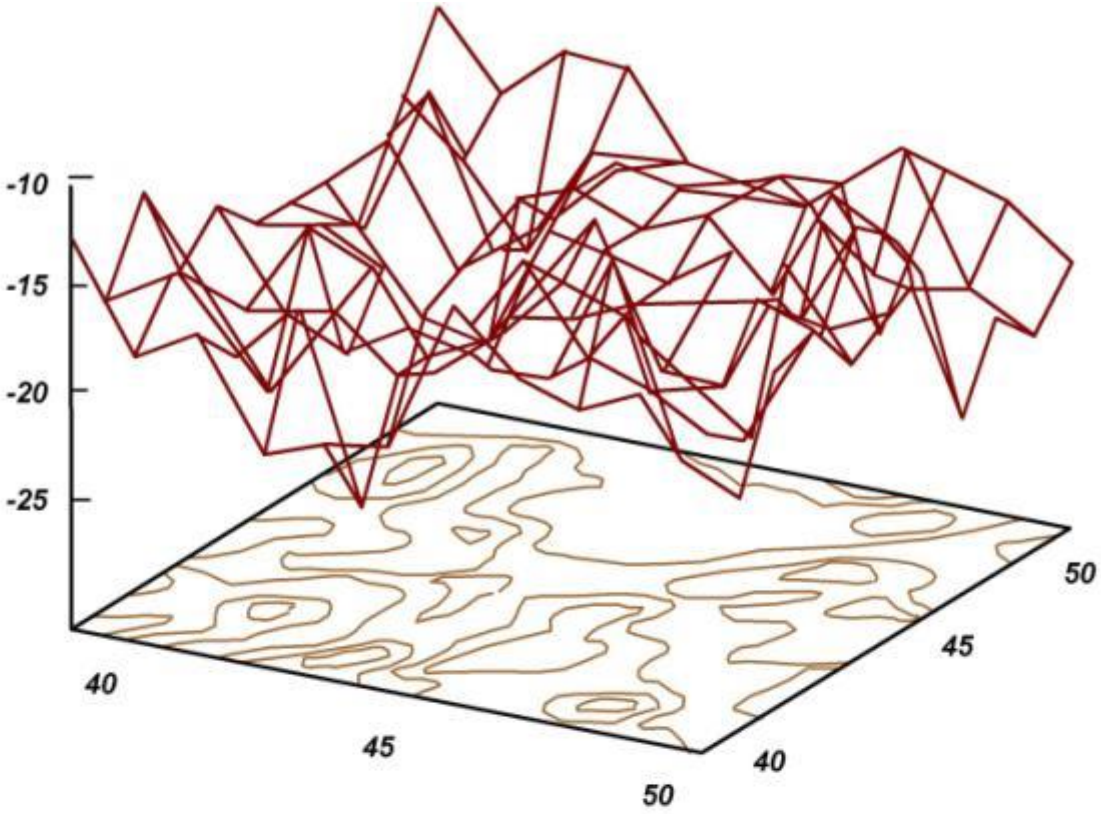
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45
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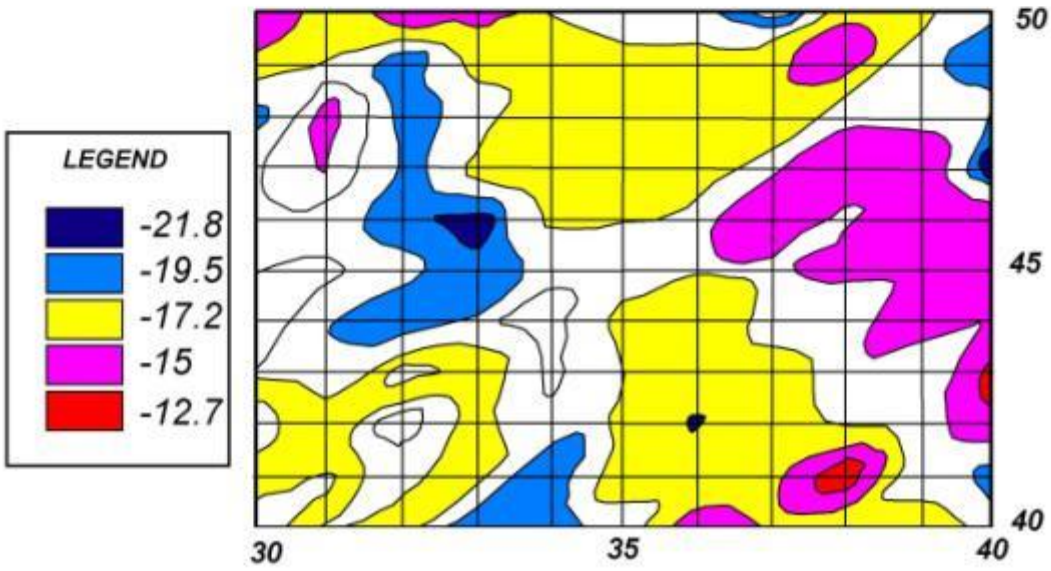
LEGEND
-21.8
-19.5
-17.2
-15
-12.7
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45
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APPENDIX V Interpretation of Geomagnetic readings File 1-50

X	Y	Description	Inspection and Remarks
50	16	File35, interested minimum, less than -7nT, spot - like object	possible artifact
15.1	23	File37, interested minimum, less than -5nT, small object	possible artifact
19	32	File42, interested minimum, less than -5nT, broad object	possible artifact
18	41	File47, interested minimum, less than -5nT, spot - like object	possible artifact
47	49.9	File50, interested minimum, less than -4nT, small object	possible artifact

-18	6	File02, small spot like minimum, less than -8nT spot like structure which	possible artifact
-15	5	File02, small spot - like minimum, less than -8nT	possible artifact
-14	4	File02, interested minimum, less than -8nT, spot like structure	possible artifact
-19.2	4.2	File02, interested minimum, less than -4nT	possible potsherds or slags
-10.5	-10.5	File02, interested minimum, less than -4nT	possible potsherds or slags
-25.8	6.2	File03, interested minimum, less than -15nT	possible artifact,striking NE-SW
-28.5	6	File03, interested minimum, less than -15nT	possible artifact,striking NE-SW
-24	8	File03, interested minimum, less than -15nT	possible artifact striking NE-SW
-22.2	9.7	File03, interested minimum, less than -15nT	possible artifact striking NE-SW

-33.4	9	File04, interested minimum, less than -9nT	possible archaeological structure, striking N-S
-37.5	9.2	File04, interested minimum, less than -9nT, big structure	possible artifact
-44	8	File05, interested minimum, less than -14nT, spot - like structure	possible artifact, srikine NE-SW
-4	12	File06, interested minimum, less than -7nT, small sructure	possible arcahaeological structure, striking E-W
-4.5	11.4	File06, interested minimum, less than -7nT, small structure	arcahaeological structure, striking E-W
-0.1	12.9	File06, interested minimum, less than -7nT, small structure	arcahaeological structure, striking NE-SW
-18	16	File07, interested minimum, less than -22nT, small structure	possible artifact, striking NE-SW
-25.5	10.3	File08, interested minimum, less than -16nT, small structure	possible artifact striking N-S

X	Y	Description	Inspection and Remarks
-0.5	1.5	File01, interested minimum, less than -11nT	very big structure which may possibly be broken debris of a wall
-2	4	File01, interested minimum, less than -11nT	very big structure which may possibly be broken debris of a wall
-6	6	File01, small spot - like interested minimum, less than -11nT	possible artifact
-9	8.5	File01, interested minimum, less than -5nT	narrow structure, striking approximately N-S
-2	3.9	File01, small spot - like interested minimum, less than -11nT	very big structure which may possibly be broken debris of a wall
-8	8.5	File01, interested minimum, less than -5nT	wide archaeological structure

-46	15	File10, interested minimum, less than -5nT, spot - like object	small archaeological material
-43	12	File10, interested minimum, less than -5nT, small structure	archaeological material
-9	19	File11, interested minimum, less than -4nT	small archaeological object
-5	24	File11, interested minimum, less than -4nT, spot - like object	archaeological material
-5	26.5	File11, interested minimum, less than -4nT, small object	archaeological material
-2	26	File11, interested minimum, less than -4nT, small object	archaeological material
-2	29.2	File11, interested minimum, less than -4nT, spot - like object	archaeological material
-16.5	27.8	File12, interested minimum, less than -5nT, big structure	possible archaeological material striking NE-SW
-25	23	File13, interested minimum, less than	possible archeological material

-32	24	File14, interested minimum, less than -11nT	possible artifact
-39	20.2	File14, interested minimum, less than -11nT	possible artifact
-46.5	29.7	File15, interested minimum, less than -18nT, small object	possible artifact
-8	34	File16, interested minimum, less than -4nT, small object	possible archaeological material
-9	32	File16, interested minimum, less than -4nT, small object	possible arcahaeological material
-18	33	File17, interested minimum, less than -10nT, narrow structure	possible artifact , striking N-S
-14	37.5	File17, interested minimum, less than -16nT, small structure	possible artifact, striking NE-SW
-12	37	File17, interested minimum, less than -16nT, small structure	possible artifact striking
-14	33	File17, interested mini-	possible archeological

-20	34	File18, interested minimum, less than -5nT, small object	possible archaeological material
-24	32	File18, interested minimum, less than -5nT, small object	possible archaeological material
-18	31	File18, interested minimum, less than -5nT, small object	possible archaeological material
-28	30.2	File18, interested minimum, less than -5nT, small object	possible archaeological material
-19.5	30.5	File18, interested minimum, less than -5nT, small object	possible arcahaeological material
-32	30.3	File19, interested minimum, less than -4nT, spot - like object	possible arcahaeological material
-3	46	File21, interested minimum, less than -7nT, spot - like object	possible artifact

0	47	File21, interested minimum, less than -7nT, spot - like object	possible artifact
-0.5	45	File21, interested minimum, less than -7nT, small object	possible archaeological material
-18	40	File22, interested minimum, less than -6nT, small object	possible archaeological material
-24	49	File23, interested minimum, less than -5nT, small object	possible archaeological material
-26	48	File23, interested minimum, less than -5nT, spot - like object	possible arcahaeological material
-29	40	File23, interested minimum, less than -5nT, small object	possible arcahaeological material
-37	45	File24, interested minimum, less than -3nT, small object	possible artifact
-33	48	File24, interested minimum, less than -3nT,	possible artifact, striking NE-SW

6	5	File26, interested minimum, less than -6nT, big structure	possible artifact, striking NE-SW
7	5.5	File26, interested minimum, less than -6nT, big structure	possible archaeological material
2.8	4	File26, interested minimum, less than -6nT, small object	possible archaeological material
4	5	File26, interested minimum, less than -6nT, small object	possible archaeological material
2	6	File26, interested minimum, less than -6nT, small object	possible arcahaeological material
3	7	File26, interested minimum, less than -6nT, small object	possible arcahaeological material
12	2	File27, interested minimum, less than -6nT, spot - like object	possible artifact
12.2	5	File27, interested minimum, less than -6nT,	possible artifact

19.8	5.8	File27, interested minimum, less than -6nT, small structure	possible artifact, striking NW-SE
19.9	8	File27, interested minimum, less than -6nT, small structure	possible archaeological material
24.5	6	File28, interested minimum, less than -6nT, narrow - like object	possible archaeological material, striking N-S
27	4	File28, interested minimum, less than -6nT, spot - like object	possible archaeological material
26.3	6	File28, interested minimum, less than -6nT, spot - like object	possible arcahaeological material
37.5	3	File29, interested minimum, less than -12nT, big structure	possible artifact
32.5	1	File29, interested minimum, less than -12nT, small structure	possible artifact, striking NW - Se
34.5	3.5	File29, interested minimum, less than -12nT,	possible artifact, strikine NE -SW

49.4	6.2	File30, interested minimum, less than -13nT, narrow structure	possible artifact, striking N - S
47	1	File30, interested minimum. less than -13nT, flat - like structure	possible artifact, striking E -W
7	10.2	File31, interested minimum, less than -4nT, small object	possible archaeological material
18.8	4	File28, interested minimum, less than -6nT, spot - like object	possible archaeological material
26.3	6	File28, interested minimum, less than -6nT, spot - like object	possible arcahaeological material
37.5	3	File29, interested minimum, less than -12nT, big structure	possible artifact
32.5	1	File29, interested minimum, less than -12nT, small structure	possible artifact, striking NW - Se
34.5	3.5	File29, interested minimum. less than -12nT,	possible artifact, strikine NE -SW

7	10.2	File31, interested minimum, less than -4nT, small objecte	possible artifact
36.4	18.8	File32, interested minimum, less than -4nT, small object	possible artifact
39	16.2	File32, interested minimum, less than -4nT, small object	possible archaeological material, striking E- W
38.3	16	File32, interested minimum, less than -4nT, very big structure	possible archaeological material, striking E - W
21	14.2	File33, interested minimum, less than -11nT, small object	possible arcahaeological material, striking NE - SW
16	19.2	File34, interested minimum, less than -4nT, small object	possible artifact, striking NW - SE
18	19	File34, interested minimum, less than -4nT, spot - like object	possible artifact
43	13	File35, interested minimum, less than -7nT,	possible artifact, strikine NE -SW

1.1	22	File36, interested minimum, less than -6nT, spot - like object	possible artifact
3	22	File36, interested minimum, less than -6nT, small object	possible artifact
6	27	File36, interested minimum, less than -6nT, spot - like object	possible archaeological material
9.9	26	File36, interested minimum, less than -6nT, spot - like object	possible archaeological material
6	22	File36, interested minimum, less than -6nT, small object	possible arcahaeological material, striking NE - SW
9.8	22	File36, interested minimum, less than -6nT, small object	possible artifact
7.8	21.5	File36, interested minimum, less than -6nT, large structuret	possible artifact, striking E - W
14.2	20.9	File37, interested minimum, less than -5nT,	possible artifact, strikine NE -SW

19	20.2	File37, interested minimum, less than -5nT, small object	possible artifact
18	22.5	File37, interested minimum, less than -5nT, small object	possible artifact, striking NE - SW
28	28	File38, interested minimum, less than -6nT, small object	possible archaeological material, striking NE - SW
34	28	File39, interested minimum, less than -6nT, spot - like object	possible archaeological material
38	39	File39, interested minimum, less than -6nT, spot - like object	possible arcahaeological material
35.2	25	File39, interested minimum, less than -6nT, small object	possible artifact
38.5	23.5	File39, interested minimum, less than -6nT, large structuret	possible artifact, striking E - W
1	38	File41, interested minimum, less than -5nT,	possible artifact, strikine NE -SW

18	32	File42, interested minimum, less than -5nT, small object	possible artifact, striking NW - SE
15	31	File42, interested minimum, less than -5nT, spot - like object	possible artifact
27.9	32.8	File43, interested minimum, less than -4nT, small object	possible archaeological material, striking NE - SW
33	38	File44, interested minimum, less than -3nT, small object	possible archaeological material
30.8	35.9	File44, interested minimum, less than -3nT, small object	possible arcahaeological material
40.2	35	File45, interested minimum, less than -5nT, small object	possible artifact
9.8	49.8	File46, interested minimum, less than -5nT, small object	possible artifact
15	41	File47, interested minimum, less than -5nT,	possible artifact

19.8	42	File47, interested minimum, less than -5nT, small object	possible artifact
13	49	File47, interested minimum, less than -5nT, spot - like object	possible artifact
28	49.9	File48, interested minimum, less than -3nT, small object	possible archaeological material
22	41	File48, interested minimum, less than -3nT, spot - like object	possible archaeological material
29.2	41.2	File48, interested minimum, less than -6nT, large structure	possible arcahaeological material
30.5	42	File49, interested minimum, less than -3nT, narrow - like object	possible artifact, striking N - S
40.8	43.8	File50, interested minimum, less than -4nT, small object	possible artifact, striking N - S
45.9	42.9	File50, interested minimum, less than -4nT,	possible artifact

X	Y	Description	Inspection and Remarks
47	49.9	File50, interested minimum, less than -4nT, small object	possible artifact
-42	36	file20,interested minimum, less than -13nT, spot - like object	possible artifact
-39.8	17	File09, interested minimum, less than -7nT, broad structure	possible archeological material
-5	45	File21, interested minimum, less than -7nT, spot - like object	possible artifact
-1	49	File21, interested minimum, less than -7nT, spot - like object	possible artifact
-42	47.3	File25, interested minimum, less than -3nT, small object	possible artifact, striking NE-SW
14	9	File27, interested minimum, less than -6nT, small object	possible artifact, striking E- W
44.5	1.5	File30, interested mini-	possible artifact, strik-

APPENDIX VI: RADIO-CARBON DATE RESULT

UNIVERSITY OF WASHINGTON
QUATERNARY ISOTOPE LAB
RADIOCARBON CALIBRATION PROGRAM REV 4.1.2

Stuiver, M. and Reimer, P.J., 1993, Radiocarbon, 35, p. 215-230.

Calibration file(s): intcal98.14c
Listing file: c14fil.lst
Export file: c14res.csv

GX-32369

(KJ)(AJ)(Rm 1) 40-50 cm
charcoal
Radiocarbon Age BP 360 +/- 60 Reference

Calibrated age(s) cal AD 1491, 1603, 1609 (Stuiver et al., 1998a)

cal AD/BC age ranges obtained from intercepts (Method A):
one Sigma** cal AD 1448 - 1637
two Sigma** cal AD 1432 - 1656

Summary of above:

maximum of cal age ranges (cal ages) minimum of cal age ranges:
1 sigma cal AD 1448 (1491, 1603, 1609) 1637
2 sigma cal AD 1432 (1491, 1603, 1609) 1656

cal AD/BC age ranges (cal ages as above)
from probability distribution (Method B):
% area enclosed cal AD age ranges relative area under probability distribution

68.3 (1 sigma)	cal AD 1472 - 1525		.461
	1560 - 1628		.539
95.4 (2 sigma)	cal AD 1443 - 1642		1.000

GX-32370

(KJ)(AJ)(Rm 1) 103 cm
charcoal
Radiocarbon Age BP 780 +/- 80 Reference (Stuiver et al., 1998a)

Calibrated age(s) cal AD 1263
cal AD/BC age ranges obtained from intercepts (Method A):
one Sigma** cal AD 1191 - 1200 1208 - 1290
two Sigma** cal AD 1040 - 1102 1115 - 1142
1151 - 1316 1353 - 1388

Summary of above:

maximum of cal age ranges (cal ages) minimum of cal age ranges:

1 sigma cal AD 1191 (1263) 1290
2 sigma cal AD 1040 (1263) 1388

cal AD/BC age ranges (cal ages as above)
from probability distribution (Method B):

% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal AD 1176 - 1295	1.000
95.4 (2 sigma)	cal AD 1040 - 1103	.096
	1107 - 1142	.048
	1146 - 1315	.799
	1353 - 1388	.058

References for datasets used:
Stuiver, M., Reimer, P.J., Bard, E., Beck, J.W.,
Burr, G.S., Hughen, K.A., Kromer, B., McCormac, F.G.,
v.d. Plicht, J., and Spurk, M. (1998a).
Radiocarbon 40:1041-1083.

Comments:
* This standard deviation (error) includes a lab error multiplier.
** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2)
where ^2 = quantity squared.
[ ] = calibrated with an uncertain region or a linear extension to the calibration curve
0* represents a "negative" age BP
1955* denotes influence of nuclear testing C-14

NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50yr.