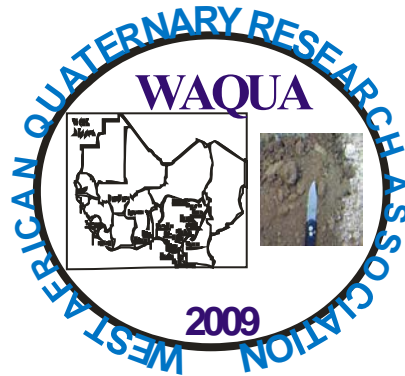


**WEST AFRICAN QUATERNARY RESEARCH  
ASSOCIATION (WAQUA)  
INAUGURAL INTERNATIONAL WORKSHOP**



**THEME: THE WEST AFRICAN QUATERNARY  
PALEOCLIMATIC / SEA LEVEL CHANGES  
AND ANTHROPOGENIC RESPONSES:  
EVIDENCES FROM MARINE AND  
TERRESTRIAL SOURCES**

**Ibadan - Nigeria**

**October 26 – 29, 2009**

**VENUE:**

**Nigerian Institute of Science Laboratory and Technology,  
(NISLT), Samonda  
Ibadan – NIGERIA.**

***PROGRAMME & ABSTRACT VOLUME***

## SCIENTIFIC COMMITTEE

- Dr. Mike AKAEGBOBI** Geology, University of Ibadan, Ibadan – NIGERIA  
[izumike20022002@yahoo.com](mailto:izumike20022002@yahoo.com)
- Dr. B. J. TUBOSUN** Archeology, University of Ibadan – NIGERIA  
[bolatubo@hotmail.com](mailto:bolatubo@hotmail.com)
- Prof. Christophe JOHNSON**, Sciences de la Terre, Universite de Lome – TOGO. [ajohnson@tg.refer.org](mailto:ajohnson@tg.refer.org)
- Dr. Nkiru MELUDU** Agricultural Extension and Rural Development, University of Ibadan, Ibadan – NIGERIA.  
[nkiru\\_m@yahoo.com](mailto:nkiru_m@yahoo.com)
- Dr. Ama ESSEL** Community Health, University of Ghana Medical School, Legon – GHANA . [amakwessel@yahoo.co.uk](mailto:amakwessel@yahoo.co.uk)
- Prof. Michel MBOKO** LACEEDE, Universite Abourney Calavi, Cotonou – BENIN REPUBLIC. [mboko47@yahoo.fr](mailto:mboko47@yahoo.fr)

## WORKSHOP ORGANIZING COMMITTEE

- |   |  |
|---|--|
| <b>Dr. Mike AKAEGBOBI</b><br>Department of Geology,<br>University of Ibadan.<br>Ibadan – Nigeria<br><a href="mailto:izumike20022002@yahoo.com">izumike20022002@yahoo.com</a>                    | <b>Dr. Okugbenga BOBOYE</b><br>Department of Geology<br>University of Ibadan<br>Ibadan - Nigeria<br><a href="mailto:boboyegbenga@yahoo.com">boboyegbenga@yahoo.com</a>       |
| <b>Dr. Bolanle J. TUBOSUN</b><br>Department of Archeology,<br>University of Ibadan.<br>Ibadan – Nigeria<br><a href="mailto:bolatubo@hotmail.com">bolatubo@hotmail.com</a>                       | <b>Dr. Lizzy OKORO</b><br>Department of Geological Sciences<br>Nnamdi Azikiwe University<br>Awka - Nigeria<br><a href="mailto:reallizkay@yahoo.com">reallizkay@yahoo.com</a> |
| <b>Dr. Nkiru MELUDU</b><br>Department of Agricultural Extension and Rural Development,<br>University of Ibadan.<br>Ibadan – Nigeria<br><a href="mailto:nkiru_m@yahoo.com">nkiru_m@yahoo.com</a> |  |

## OFFICAL SPONSORS



**INQUA**

International Union for Quaternary Research



**PAOGES**

PAST GLOBAL CHANGES



**HALAALTECH QUARRY  
&  
CONSTRUCTIONS LIMITED**

<i>Abstract No. 01</i>	<i>Keynote</i>	<i>26/10/2009</i>	<i>10.00 – 10.30</i>
------------------------	----------------	-------------------	----------------------

## **Paleoclimate of Africa**

**Mohammed Umer**

*Addis Ababa University, Addis Ababa, Ethiopia*

In Tropical Africa Lake levels were falling and rising dramatically under natural climate change and variability at a millennial time scales. Large lakes dried out between 20000-15000 years ago and then gradually filled to create extensive fresh water bodies in today's arid and semi-arid regions, as indicated by remnants of their deposits. Fossil ground waters of the Sahara-Sahel resulted from this humid event of the Early Holocene. These changes have affected the rise and collapse of ancient civilization.

More detailed investigations based on tree rings, stalagmites, lake sediments as well as hyrax middens are now providing century to decadal to annual scale resolutions. They will help to deal with processes such as El Niño.

More over long term climate changes are now being sought through lake drilling programs as well as possibly on land. The drill programs attempt to respond to issues related to human evolution and adaptations.

Organizations such as NSF, START, NERC and PAGES are supporting the programs for research, networking and capacity building.

<i>Abstract No. 02</i>	<i>Presentation 02</i>	<i>26/10/2009</i>	<i>10.30 – 10.45</i>
------------------------	------------------------	-------------------	----------------------

**Clim  
ate**

## **Change and Groundwater Regime of Benin Formation, Nigeria.**

**<sup>1</sup>Sidney Ezenwa, and <sup>2</sup>Okoro Elizabeth**

*<sup>1</sup>Anambra State Water Corporation, Awka. <sup>2</sup>Department of Geological Sciences Nnamdi Azikiwe University, Awka, Nigeria.*

Benin Formation is an arenaceous deposit laid in Quaternary era in the southern Nigeria. It stretches from Anambra embayment into Dahomey Basin. In this work, the ground water behaviour of its aquifer was established using qualitative analysis of the impact of the Niger River on the regime of the underground water. This is because the hydrology of aquifer and health of ecosystem are closely connected. Understanding the water resources of a system will enable its management in an integrated manner to ensure the sustainability of the ecosystem and the water it provides. It was established that by use of hydrographic factors in parts where the impact of River Niger is small, local climatic factors do not exercise great influence. It can thus be adduced that the

aquifer receives more recharge from the River and the movement of the groundwater towards the discharge area is very slow. This was further confirmed by the analysis of River Niger profile at various times of the year. However, the flow regime reverses in the dry season. Even though the groundwater level correlates positively with rainfall and River Niger level, it does not respond to the August dry spell. It has a singular peak while the rainfall has double peaks. Thus, it was concluded that the groundwater regime of Benin Aquifer is affected more by regional rainfall index than the local rainfall regime. The seasonal flow directions were thus established.

<i>Abstract No. 03</i>	<i>Presentation 03</i>	<i>26/10/2009</i>	<i>10.45 – 11.00</i>
------------------------	------------------------	-------------------	----------------------

## **Histoire Du Climat Au Quaternaire En Afrique De L'ouest**

**Euloge Ogouwale , and Michel Boko**

*Laboratoire Pierre Pagny, Climats, Eau, Ecosystèmes et Développement  
Université d'Abomey-Calavi 01 BP 526, Cotonou 01 ; ogkelson@yahoo.fr*

Le climat de la Terre a été marqué par des variations dans le temps et dans l'espace. Les informations et les détails sur les derniers milliers d'années sont particulièrement importants dans le cadre de d'une bonne connaissance de l'impact possible des activités humaines sur le climat contemporain et des prochaines décennies.

L'analyse bibliographique et les travaux de terrain révèlent que les régions septentrionales et ouest africaines ont été le centre de plusieurs changements climatiques dans le temps. La multitude de petits lacs ayant occupé les creux interdunaires au nord du Sahara, au Sahara, au Sahel et au sud du Sahara, la présence d'immense nappe phréatique, exploitée actuellement, sous le Sahara, les types de sols, la présence des dalles cuirassées, de sables jaunes dans les régions littorales, etc. et certaines spécificités géomorphologiques, sont les traces et les signes évidents des changements climatiques anciens en Afrique du Nord et de l'Ouest.

En somme, les paléolacs africains confirment l'humidité qui a prévalu à l'Holocène dans le Sahara et dans les régions situées de part et d'autre de la bande saharienne. Or, l'aridité actuelle du climat constitue une contrainte majeure pour le développement agricole et pour la vie dans ces parties de l'Afrique. Les eaux souterraines datées de l'Holocène inférieur dans le Sahara détiennent la mémoire des précipitations qui ont rechargé les aquifères. En outre, de pertinents indices géologiques et pédologiques, etc. témoignent des changements climatiques anciens en Afrique du Nord et de l'Ouest. Ils sont aussi révélés par les variations du niveau des mers, les marqueurs géomorphologiques et les paléolacs. A ces indices s'ajoutent, les restes de végétaux et d'animaux, etc.

<i>Abstract No. 04</i>	<i>Presentation 04</i>	<i>26/10/2009</i>	<i>11.30 – 11.45</i>
------------------------	------------------------	-------------------	----------------------

### **Climigration and Lake Chad**

**Joseph K. DOGBEY and Okuku A. EDIANG**

*Nigerian meteorological agency, pmb 1215 Oshodi Lagos Nigeria.*

The hydrological basin of lake Chad is shared between Algeria, Cameroon, Central Africa Republic, Chad, Niger, Nigeria, Sudan and some extend Libya. In the last four decades, the hydrological regimes of lake Chad has changed. The changes apparently reduced the water supply security for the population and economy (fishery and food production) in the Chad basin. The decline in the lake level is attributed to reduced rainfall (as result of the recent climate change) and Droughts. The research paper concludes that there is teleconnection between climigration in Nigeria and Lake Chad. This is evidence because climate change in Nigeria is having a very real impact and needs urgent attention especially in internal displacement of its people and one of the easiest ways of adapting to climate variability in Nigeria is internal migration.

<i>Abstract No.0 5</i>	<i>Presentation 05</i>	<i>26/10/2009</i>	<i>11.45 – 12.00</i>
------------------------	------------------------	-------------------	----------------------

### **La Limite Tertiaire / Pléistocène dans le bassin côtier togolais.**

**Yawoa Da COSTA, and Ampah Kodjo Christophe JOHNSON**

*Université de Lomé, Département de Géologie. B.P. 1515, Lomé, Togo*

La fin du Tertiaire dans la partie émergée du bassin côtier du Togo est caractérisée par un complexe sablo-argileux dépourvu de faune marine et généralement attribué au Continental terminal dans les bassins ouest-africains voisins. Bien que le passage Tertiaire/Pléistocène soit identifié au sein de ce complexe sablo-argileux dans la plupart des forages étudiés ainsi que dans la carrière de phosphates de Kpogamé, le manque de données de datation précise, en l'occurrence, les marqueurs paléontologiques, rend difficile la définition de cette limite. En l'état actuel de nos connaissances, cette limite se confond avec une paléosurface de ravinement, qui sépare les deux unités qui composent ce complexe sablo-argileux: la « formation à galets de Kpogamé » ou Continental terminal, sensu stricto, d'âge Miocène supérieur à Pliocène) et la formation de la « Terre de barre » d'âge quaternaire. Des études palynologiques ultérieures, permettront de mieux situer la limite Tertiaire/Pléistocène dans le bassin côtier du Togo.

<i>Abstract No. 06</i>	<i>Presentation 06</i>	<i>27/10/2009</i>	<i>12.00 – 12.15</i>
------------------------	------------------------	-------------------	----------------------

## **Climate Change, Impacts and Consequences on Nigerian Coastal Area**

**G.A Onyegbule, and A.O. Ediang**

*Nigerian Meteorological Agency, P.M.B. 1215 Oshodi Lagos, Nigeria.*

The impacts and consequences of climate change is a major concern to many countries in the world. The WMO Secretary General in 1977 noted that climate shapes our cultures, many of our settlements and all our landscape. Sea level rise would increase erosion and flooding along coastlines, threatening many cities. In Africa more than one quarter of the population live within 100km of the sea coast rendering a great number of people vulnerable to rise in sea level as a result of climate change. Rise in sea level would cause inundation along more than 70% of the Nigerian coastline placing land at risk many kilometer inland (Awosika et.al. 1992).

This paper examines climate change, its impacts and consequences in Nigeria generally and the coastal Area as a case study. Statistical analysis of temperature and rainfall in six major coastal cities for 25 and 50 years respectively, were made. The study reveals increase in temperature confirming global warming in coastal area of Nigeria. Decline in rainfall in most parts of the coastal area were revealed. Nigerian Coastal Area with its high population density and heavy economic activities faces the challenges and consequences of climate change ranging from storm surges, flooding, soil erosion, salination of surface and sub-surface water, toxic gas release, drought, health problems, etc.

<i>Abstract No. 07</i>	<i>Presentation 07</i>	<i>27/10/2009</i>	<i>12.15 – 12.30</i>
------------------------	------------------------	-------------------	----------------------

## **Dry conditions over coastal areas of West Africa during first decade of July 2007.**

**Ben N. Orji and Okuku A. Ediang**

*Nigerian meteorological agency P.M.B.1215 Oshodi Lagos, Nigeria*

The dry Conditions which occurred over Coastal areas of the West Africa during the first decade of July 2007, has been investigated. Using Global Model Charts (ARP-TROP) and Satellite Images (IR 10.8 MSG), the Factors leading to the observed dry Conditions were identified. This was with a view to understanding the dynamics and Thermodynamics aspects of the Processes involved.

Analysis of the data revealed that the ST. Helena Surface ridge actually extended into Coastal areas of West Africa during the Study Period. Also the Wing Flow at the 850 Hpa level exhibited anticyclonic Circulation over the domain of Study. The research paper concludes on and established that the 16°C isotherm at the 850 Hpa Level was crucial to the observed dry Conditions.

<i>Abstract No. 08</i>	<i>Presentation 08</i>	<i>27/10/2009</i>	<i>12.30 – 12.45</i>
------------------------	------------------------	-------------------	----------------------

### **Effects of Winds on Nigerian Ports and Harbours**

**\*Mutiat O. Sholademi and \*Okuku A. Ediang**

*\*Nigerian Meteorological Agency, PMB 1215 Oshodi Lagos, Nigeria.*

This work aims at identifying the pattern of wind in Nigerian coast and its effects on ports and harbour operations. The wind speed, wind direction and wind duration were graphically analysed. Their effects on near – shore ocean whose driven mechanism is mainly the local wind conditions were discussed and the associated weather phenomena highlighted.

Statistical analysis was used to investigate into the nature and characteristic of the coastal winds for the period of ten years, 1997 – 2006. This was carried out on monthly basis, using data from Victoria Island, Lagos. The analysis revealed that winds were predominantly from WSW and WNW directions. Winds from fetch area (lat. 10°S – 20°S and long 10°E - 20°W) generally increase from East to West with their strength lying between 6-20kts. This agrees with previous works carried out by other scientist e.g Afiesimama et al (2001). For the period of study, the weakest winds were observed between Oct – Jan while the strongest winds were mostly observed during summer period especially in the month of August which coincide with the period of little dry season.

There were no major interruptions of ports and harbours operation as a result of direct adverse wind flow. Ports and harbour installations, engineering works, shipping operations, etc however faced the risk of being damaged during summer period, if not well protected. Some wind related meteorological factors such as storm surges, fog, thunderstorms etc generally disrupt coastal activities including those of ports and harbours.

<i>Abstract No. 09</i>	<i>Presentation 09</i>	<i>27/10/2009</i>	<i>12.45–13.00</i>
------------------------	------------------------	-------------------	--------------------

### **Management of Domestic/Industrial Wastes in Enclosed Coastal Seas.**

**\*K. E. Enekwechi**

*\*Works Division, Federal Polytechnic, Oke, P.M.B. 21, Aguata, Nigeria.*

Marine Environments are important areas for human beings since they provide calm and beautiful coastal areas that are sustainable to developed cities, tourist centres, industries and other recreational activities. Coastal plains accommodate urban areas and industrial/commercial estates. Sea ports and harbors are often constructed so as to promote regional economic activities. Coastal waters hence become suitable grounds for fisheries and aquaculture. Such anthropogenic activities however, have adversely affected the environment of the enclosed coastal seas.



Economic growth has brought more pollution within the coastal regions and the attendant economic growth has brought more pollution loads to the enclosed seas, and consequently these have degraded the water quality of the enclosed seas. Reclamation from the sea has decreased the seaweed beds, tidal flats and natural beaches within the coastal areas. The approach to the environment management of the enclosed seas should, in addition to pollution control, include the conservation of the biodiversity, resorting and ensuring balanced and healthy hydrologic cycle, conserving the well-balanced material cycle and ensuring opportunities for contact with nature.

Sewage which is waste from human activities should be treated before its ultimate disposal in a receiving watercourse in order to reduce the spread of pathogenic organisms in the sewage and also to prevent the pollution of surface water and groundwater systems. The above two reasons are interdependent to the extent that a polluted body of water is a potential and frequently an actual vehicle of contamination and infection, particularly in hot climates. One of the best ways to prevent the pollution of surface water is to use the treated sewage to produce some tangible and beneficial end-products. The principal role of the economic re-use of sewage effluent is in protein production either as irrigation water or by stimulating the growth of algae and fish.

Wastewater management has three constituents, namely, collection, treatment and re-use. Collection of sewage is conveyed in pipes, known as sewers from its place of generation to its place of treatment and disposal. Chemical processes are additionally employed. The physical processes are screening, sedimentation and floatation. Biological processes which may be aerobic or anaerobic, involve the agency of bacteria and algae. These constitute by far, the most important methods of sewage treatment, particularly, in hot climates. The coastal areas of Lagos, Port Harcourt and Calabar in Nigeria which are within the South Atlantic ocean coastal plain generate a lot of domestic and industrial wastes as a result of human activities within the zones. These wastes need to be treated and disposed of properly, to prevent pollution and contamination of the Atlantic Ocean and also preserve the aquatic life of the enclosed seas.

<i>Abstract No. 10</i>	<i>Presentation 10</i>	<i>27/10/2009</i>	<i>14.30 – 15.00</i>
------------------------	------------------------	-------------------	----------------------

## **Environmental history and human interactions in the Great Lakes Region of Central Africa during the late Holocene**

**Julius B. Lejju**

*Department of Biology, Mbarara University of Science & Technology, PO Box 1410, Mbarara, Uganda;*

Evidence from multi-proxy analysis of microfossils from sedimentary records, together with historical and archaeological data, has provided evidence of vegetation dynamics and human environment interactions in the Great Lakes region of central Africa during the late Holocene. Pollen data from sedimentary records indicate a relatively wet and forested environment in the region, consisting of evergreen and semi-deciduous forest taxa. Climatically this period accommodates a transition to drier conditions, evidenced by a period of low lake levels in the central and eastern Africa that commenced in the mid-Holocene.

The period after ca. 3000 yr, BP is marked by a change to grassland vegetation around Lake Victoria followed by establishment of extensive semi-deciduous forest around ca. 2000 yr. BP, but declined towards ca 1000 yr. BP followed by increase in abundance of an open vegetation environment. However, the deforestation period occurred during a wet period as registered in the River Nile water records, suggesting a human induced deforestation in the region rather than reduced precipitation. The timing of deforestation in central Africa corresponds with archaeological data from major excavations in the region which indicate considerable immigration to the region by people who were reliant on cattle and other forms of food production and thus demanding land for farming.

This period from ca 200 yr BP, is marked by recovery of moist semi-deciduous forest and appears to reflect abandonment of the archaeological sites, as suggested by archaeological evidence, possibly following a period of prolonged drought and famine as recounted in the oral rich traditions of western Uganda and also reflected by low water levels of River Nile.

<i>Abstract No. 11</i>	<i>Presentation 11</i>	<i>27/10/2009</i>	<i>15.00 – 15.15</i>
------------------------	------------------------	-------------------	----------------------

### **Holocene Human Occupation of the Eastern Nigerian Scarp Lands: An Impact Assessment study**

**<sup>1</sup>Obianuju P. Umeji, <sup>2</sup>Anselm M. Ibeanu, and <sup>3</sup>Agwu, C.O.C**

<sup>1</sup>*Department of Geology University of Nigeria Nsukka*

<sup>2</sup>*Department of Archaeology, University of Nigeria, Nsukka*

<sup>3</sup>*Department of Botany, Kogi State University, Anka*

Palynological results from the 3000 BC archaeological sites on the Udi-Okigwe plateau has shown evidence of deforestation linked to human activities of subsistence agriculture armed with fire, stone and metal tools.

The purpose of this paper is to use the sporomorphs recovered from the excavated cave deposits to assess the climate and vegetation change from tree type to grass, given the presence nearby of hand-axe factories and iron-smelting sites; and to assess the impact of human activities on the environment. Pollen of plants associated with human impact was used to identify human influence on the vegetation.

Although there was increasing wetness of climate indicated by fungal spores, the forest clearance by man seems to have progressed at a faster rate than climatic change. Caves, hand-axe quarries and iron-smelting sites are all closely situated along the plateau.

<i>Abstract No. 12</i>	<i>Presentation 12</i>	<i>27/10/2009</i>	<i>15.15 – 15.30</i>
------------------------	------------------------	-------------------	----------------------

## **Holocene Pollen Depositions and Recent Vegetation Distribution of Obayi Lake, Nsukka**

**Reginald C. Njokuocha**

*Department of Botany, University of Nigeria, Nsukka*

The palynological analysis of a core (25cm – 116cm) from Lake Obayi, Nsukka yielded 78 pollen types belonging to 47 families. The results showed that discernable but not drastic changes have occurred in vegetation since the time of deposition of the oldest and youngest sections of the core. Human impact may have been a critical factor in the minor changes in the surrounding vegetation. The pollen diagram is divided into four zones; Zone I was characterized by moderate increase in forest and savanna species around the lake. The decrease in fern spores and the appearance of Podocarpus pollen indicates a wet and cool environment around the period of deposition. Zone II was characterized by an increase in *Elaeis guineensis* (15%) and Poaceae (40%) pollen as well as those of woody plants, indicative of open forest around the lake.

The sharp increase in fern spores probably indicates an abundance of fern spores (55%) due to shallow water and dry condition. Zone III was marked by an increase in pollen of Poaceae and savanna components and decrease in *Elaeis guineensis* pollen. Human impact became more prominent with increase in pollen types of anthropogenic species. This indicates more open forest-savanna mosaic vegetation. The decrease in fern spores and persistence of Cyperaceae pollen reflects an increase in water level and wet condition. Zone IV reflects a continuation of the forest-savanna mosaic vegetation with an increase in savanna components. The abundance of fern spores and aquatic taxa indicates a reduced water level with marshy vegetation at the time of deposition.

<i>Abstract No. 14</i>	<i>Presentation 14</i>	<i>27/10/2009</i>	<i>9.00 – 9.15</i>
------------------------	------------------------	-------------------	--------------------

## **Impact des changements climatiques au Pléistocène sur la carbonate fluorapatite des phosphates de Hahotoé-kpogamé (Togo).**

**Ampah Kodjo Christophe Johnson**

*Université de Lomé, Département de Géologie. B.P. 1515, Lomé, Togo*

L'une des particularités du bassin côtier du Togo est la présence du gisement de phosphate de Hahotoé –kpogamé d'âge Eocène moyen, actuellement en exploitation. Outre le comportement spécifique des principaux minéraux argileux (kaolinites, smectites et palygorskites), l'évolution verticale des principales phases minéralogiques phosphatées traduit une transformation continue par altération lessivante soustractive de la série phosphatée. D'une façon générale, il apparaît de bas en haut du complexe phosphaté une suite minéralogique évolutive carbonate-fluorapatite, fluorapatite, crandallite et wavellite. La carbonate-fluorapatite originelle des niveaux inférieurs se

transforme en fluorapatite dans la partie médiane du complexe à cause de l'altération météorique différentielle, aboutissant dans les niveaux supérieurs, par l'enrichissement du milieu en aluminium, à la crandallite, qui à son tour, sert de support à la wavellite. La minéralogie de la

francolite et celle des minéraux argileux qui l'accompagnent rendent bien compte de l'impact de l'altération météorique et latéritique. Les fluctuations de la nappe phréatique pendant la glaciation pléistocène et l'action des eaux d'infiltration sont vraisemblablement les facteurs les plus importants dans les multiples phases d'altération survenues durant cette période. Le gisement que nous voyons au Togo, aujourd'hui, est incontestablement le résultat de plusieurs cycles d'altération qui ont contribué à l'élaboration du minerai commercial sous sa forme résidentielle

<i>Abstract No. 15</i>	<i>Presentation 15</i>	<i>27/10/2009</i>	<i>9.15 – 9.30</i>
------------------------	------------------------	-------------------	--------------------

## **Climate Change Impacts on Geological Processes and Management of the African Coastal Zone**

**Theophilus Clavell Davies and Jason Samuel Ogola**

*Department of Mining and Environmental Geology; University of Venda for Science and Technology  
Private Bag X5050, Thohoyandou 0950; Limpopo Province, South Africa.*

A cursory examination of existing literature reveals the documentation of a number of geological and geophysical studies, including seismic and stratigraphic analyses of shear-type margins along the East and West Africa coastal regions. Similar studies in the southern Africa coastal waters also, have greatly improved our understanding of the geological structure and evolution of several segments of the southern Africa coastal zone. These results have been applied with varying degrees of success to oil exploration, particularly in the Gulf of Guinea. However, geological processes operating further away from the continental margin, along the continent's coastlines, have been much less understood, although of greater concern from an environmental standpoint.

Predicted global warming and sea level rise will have far-reaching consequences for Africa's coastal provinces where the great majority of the population live and work. One of the observed impacts of global warming is sea level rise. A rise in sea level which in many places may be accentuated by the phenomenon of subsidence, would aggravate the already existing ecological problems through increased rates of coastal erosion, more persistent flooding, loss of wetlands, increased salinisation of groundwater and soil, as well as lead to a greater influx of diverse pollutants. A eustatic rise in sea level would alter wave characteristics and tidal ranges in rivers and bays, change the depositional environments of sediments, and cause a decrease in the amount of light reaching the sea floor. The richly endowed coastal zone of Africa would be adversely affected by these impacts due to the generally low-lying nature of the coastal zone.

The great concentration of national resources in Africa's coastal zones makes it imperative that coastal change is well understood and monitored. In light of this purview, it was decided to put together a collection of papers in a 'Special Issue' of the Journal

“Environmental Geosciences” (AAPG; ISSN: 1075-9565), to address issues associated with thresholds and complexities of Africa’s coastal geological processes. The ‘Series’ it is hoped, would embrace research results as well as reviews from geoscientific institutions

from around Africa and beyond, aimed at deciphering the late Quaternary morphotectonic evolution of the continent’s coastal zone, and dynamics of its present day geological processes. Specifically, submitted papers would seek to identify climate change impacts on these processes in a way that would enable the formulation of possible response strategies and guidelines to mitigate these impacts, including the advancement of some coastal management and development guidelines.

Abstract No. 16	Presentation 16	27/10/2009	9.30 – 9.45
-----------------	-----------------	------------	-------------

### **Reconstruction of Paleodepositional Environment in parts of Dahomey Basin using lagoonal Quaternary Sediments Archives.**

**\*Izuchukwu M. Akaegbobi, \*A.T. Onabanjo and \*O.G Akinola**

*\*Department of Geology, University of Ibadan, Ibadan - Nigeria*

The Lagos Lagoon is an open, shallow and tidal lagoon. It provides the only opening to the sea for the nine lagoons of South Western Nigeria. An integrated study involving palynological analyses was carried out in some parts of the Lagos Lagoon to understand the past climate and to determine the various environmental processes that prevailed in the past in order to predict the future climate. A total of 36 surface samples were collected with a grab sampler at various locations in the Lagos Lagoon. Standard palynological procedure for extracting pollen and spores were used. The resultant for each sample was mounted on a labeled slide and a total of 102 forms were recognized, out of which 13 were unidentified.

The dominant and most occurring palynomorphs recovered are; *Z.ramonae*, *M.annulatus*, *Psilatricolporites operculatus*, *Elaeis guineensis*, *Crassoretitriletes vanraadshooveni*, *Cyperaceae* and *Striatricolporites catatumbus*. The presence of the above mentioned palynomorphs indicates a continental source for the fossil pollen and spores. *Zonocostites ramonae* is the most abundant of all the fossils palynomorphs (2-444). Its presence depicts a mangrove swamp environment. As a result, the mangrove swamp environment may be said to be most prevalent environment in the Lagos lagoon. Comparing *Zonocostites ramonae* with *Monoporites annulatus*, both are marker species, the high abundance of *Z.ramonae* and low diversity of *M.annulatus* indicates nearness to the shoreline environment, a wet environment and possibly, a high stand system tract.

*Podocarpus milanjanus* is the only fossil palynomorphs that shows a true representation of the Quaternary age. However, detailed work should be carried out in terms of core sampling in order to establish the prevalence of the mangrove environment and to identify possible fossil palynomorphs that depicts Quaternary age as this study is in its foundatory stage.

Abstract No. 17	Presentation 17	27/10/2009	9.45 – 10.00
-----------------	-----------------	------------	--------------

## **Holocene Vegetational and Coastal Environmental Changes in the Rainforests Of South-Western Nigeria**

**Emuobosa Akpo Orijemie**

*Palynology Laboratory, Department of Archaeology and Anthropology, University of Ibadan, Ibadan, Nigeria.*

In 2004, M.A. Sowunmi carried out a palynological study of an 11m terrestrial core obtained from Ahanve, Badagry area of Lagos State. The reconstructed palaeoenvironment by M.A. Sowunmi revealed that, during Early and Mid Holocene times, the landscape was dominated by the Mangrove Swamp Forest (MSF) and Lowland Rain Forest (LRF). The MSF, represented by abundant *Rhizophora* species, suddenly declined and subsequently disappeared completely by -30cm dated to ca. 3109± 29yrs B.P. The MSF has since been replaced by coastal savannas. The disappearance of the MSF coincided with increases in secondary forest species, fresh water swamp species and coastal savanna elements indicating an opening of the formerly dense lowland rainforest. This drastic vegetation change has been attributed mainly to the dry climate that occurred throughout West Africa between 4500-3500yrs B.P. This dry climatic phase resulted in hydrological changes; these changes affected the salinity of the soil in the area, concomitantly with an influx of fresh water. These environmental changes led to the destruction of the MSF.

Palynological, anthracological and archaeological studies of another 2m sediment core, obtained some 3m away from M.A. Sowunmi's core in 2008, were carried out. These studies were aimed at shedding more light on the vegetation history and human interactions with the environment of the area. The preliminary results of these new studies support those obtained by M.A. Sowunmi. However, these studies also provide anthracological and archaeological data which were hitherto unavailable. Results from anthracological studies of the core and archaeological excavations of the area, indicate the interactions between humans and the environment, and the impact of the former on the latter. The significant increase in microscopic charcoal counts beginning from -50m indicates a more intensified use of fire. Furthermore, the abundance of charred palm kernel, macro-charcoal particles, iron slag and hearth recovered from the archaeological excavations is suggestive of the use of fire and iron implements in the felling of forest trees presumably for fuel and agriculture. The reduction of the lowland rain forest and the increased secondary forest, especially the spread of the economic tree, *Elaeis guineensis* (the oil palm) seems to have been exacerbated by human action.

<i>Abstract No. 18</i>	<i>Presentation 18</i>	<i>27/10/2009</i>	<i>10.15 – 10.45</i>
------------------------	------------------------	-------------------	----------------------

**Climate change: Enhancing sea level rise adaptation options in coastal areas of Nigeria through systematic data collection and management.**

**Regina Folorunsho and Larry Awosika**

*Nigerian Institute for Oceanography and Marine Research. P.M.B. 12729 Victoria Island, Lagos*

The Nigerian coastal area stretching from Badagry in the west to the mouth of Calabar Estuary in the east is composed of several coastal systems ranging from barrier lagoon, mud coast, delta and mangrove swamps. These coastal areas, harbor large coastal population and infrastructure. According to IPCC report, the Arctic, low-lying coasts, natural ecosystems, and water resources will be at risk from the adverse effect of climate change. The IPCC estimates that the global average sea level will rise between 0.3 and 2.9 feet (0.09 to 0.88 meters) in the next century. Concomitant sea-level rises and some other events have the potential to cause very large impacts, especially after the 21st century in the coastal and low lying areas of Nigeria. Sea Level rise adaptation options require enhancement of management skills and research to collate, analyze historical climate data and associated met ocean data; developing of human and infrastructural capacity for flooding and salt water intrusion, enhancing human capacity to conduct research into land-ocean interaction to identify the impacts of atmospheric change, variability and extremes; strengthening national capacity by developing and implementing Integrated Coastal/Fresh Water Area Management plan; and, developing capacity for modeling, evaluating and designing physical structures (e.g. groin, breakwaters, dykes, and sea wall) to combat sporadic flooding and coastal erosion. These adaptation options require systematic collection, and analysis. Nigeria lacks behind many countries in the world in the implementation of these adaptation options.

<i>Abstract No. 19</i>	<i>Presentation 19</i>	<i>27/10/2009</i>	<i>10.45 – 11.00</i>
------------------------	------------------------	-------------------	----------------------

**Effect of Climate Change on Agricultural Productivity and Adaptation Strategies**

**Nkiru T. Meludu**

*Department of Agricultural Extension and Rural Development, University of Ibadan, Ibadan. Oyo State Nigeria*

Agricultural production is central to the overall wellbeing of the populace. This is why different countries place high premium on agriculture and strive to develop and protect the sector, thereby guaranteeing sustainable food security, employment opportunities amongst others. Nigeria farming used to be one of our major sources of income. However, the role it plays in the regional and economic development Nigeria has diminished over the years due to the dominant role of the crude

oil sector in the economy. Over 75% of the population, mostly rural dwellers are involved in agricultural activities, yet accounting for less than 5% of the foreign exchange earnings, the sector

remains largely subsistent, primitive and undeveloped with high dependency on rain. The amount of rainfall is reducing effecting yield and other aspect of agricultural production.

Climate change is adversely distressing practically all economic sectors. This change is associated with scarce water, declining agricultural yields, encroaching desert and damaged coastal infrastructure. The debate on climate change and its impacts on agriculture are therefore very crucial to the very survival of the Nigerian populace. Nigeria is in the continent that is particularly susceptible to climate change because of its poverty level and underdevelopment. Therefore, this paper will highlight the causes of climate change, effect on agricultural productivity and adaptive strategies.

<i>Abstract No. 20</i>	<i>Presentation 20</i>	<i>27/10/2009</i>	<i>11.00 - 11.15</i>
------------------------	------------------------	-------------------	----------------------

### **Années Pluviométriques Extrêmes Récentes Au Bénin**

**Yabi Ibouraima, Michel Boko and Fulgence Afouda**

*Laboratoire Pierre Pagney "Climat, Eau, Ecosystème et Développement (LACEEDE), Département de Géographie, Université d'Abomey-Calavi (République du Bénin)*

L'abondance ou le déficit pluviométrique sont source des difficultés socioéconomiques et de perturbations écologiques sous les latitudes tropicales. La présente recherche s'intéresse donc à la répartition spatiotemporelle des années pluviométriques extrêmes depuis les origines des stations ou postes pluviométriques jusqu'à nos jours.

Les données utilisées extraites du fichier de l'Agence pour la Sécurité de la Navigation Aérienne en Afrique et Madagascar (ASECNA) et sont relatives aux hauteurs pluviométriques annuelles collectées dans dix (10) stations réparties sur toute l'étendue du territoire national. L'utilisation de la statistique descriptive (déciles, fréquence, etc.) a été mise à contribution pour le traitement des données et l'analyse des résultats.

Les années pluviométriques extrêmes (excédentaires et déficitaires) se sont toujours alternées à l'échelle nationale ou régionale sans aucune périodicité apparente, mais depuis puis la fin des années 1960, il y a eu une tendance à une forte occurrence de ces années particulières. Dans tous les cas, les activités agricoles, les infrastructures urbaines, etc. sont affectées au cours des ces années et les décideurs devront dorénavant en tenir compte dans la définition des politiques de développement.



<i>Abstract No. 21</i>	<i>Presentation 21</i>	<i>27/10/2009</i>	<i>11.15 – 11.30</i>
------------------------	------------------------	-------------------	----------------------

## **Pleistocene Geology in Relation to Pedogenesis and Classification of Soils on a Prominent Catena in the Accra Plains, Ghana**

**Peter Ndubuisi Eze**

*Department of Soil Science, University of Ghana, Legon*

Five dominant soils developed on different physiographic positions along Legon hill catena in the Accra Plains, Ghana, were studied. The morphological, physical and chemical properties of these soils were characterized, and their pedogenesis established in relation to their geology. The soils were also classified in accordance with the current USDA Soil Taxonomy (Soil Survey Staff, 2006) and World Reference Base (WRB) (IUSS Working Group, 2007). Accra Plains soils were first studied as far back as 1960s. Since then, areas such as soil classification, mapping and laboratory analyses have undergone changes due to modern technological advances; hence the need for this study.

The methodology was the use of climatic data, results from both field and routine laboratory investigations to establish the pedogenesis of these soils and classify them, Nyigbenya and Toje series were on the higher upperslope and lower upperslope of the catena respectively, and they developed from weathered Togo quartzite schist; Adenta and Haatso series were on the middleslope and footslope of the catena respectively and developed from Tertiary deposits over Togo quartzite schist and phyllites. Alajo series developed on the toeslope and was formed from Recent/ Quaternary alluvial deposits. Nyigbenya series had abundant petroplinthite nodules/concretions throughout the profile – an indication that this iron-rich soil had in the past been exposed to repeated wetting and drying. Plinthization was evident in only Nyigbenya series. The reddish to reddish-brown colour of Nyigbenya and Toje series indicates the presence of iron (III) oxide, which also accounted for the subangular blocky structure of the soils. Ferrugination, lessivage, illuviation and erosion were the dominant pedogenic processes. Adenta series had imperfect drainage and few mottles were present. Oxidation, reduction, illuviation, braunification and erosion were active in the pedogenesis of Adenta series. Due to sedimentary differentiation of soils and sediments along the catena, Haatso series was predominantly sandy in texture.

Redoximorphism, leaching and high rate of organic matter mineralization were accountable for the formation of Haatso series, hence its pale colour and weak structural development. Alajo series showed vertic properties (cracks less than 2 mm in diameter at depth below 50 cm) Pedo-, argilli-, flora-, and faunapedoturbation, calcification and salinization were the pedogenetic processes active in Alajo series. Geology of the soils was generally responsible for their textures. The coarse nature of quartz and sandstone was reflected in the sandy texture of Nyigbenya, Toje, Adenta and Haatso series. Alluvial deposits and phyllite was responsible for the clayey nature of Alajo series. According to the US Soil Taxonomy, Nyigbenya and Toje series were classified as a Rhodic Kandustalf; the differences in their characteristics were evident only at the family level of soil classification. Adenta series keyed out as a Typic Kandustalf. Haatso series as a Kandic Paleustalf and Alajo series as a Typic Natraquet. Using the WRB framework for international classification,

correlation and communication, Nyigbenya series keyed out as a Pisoplinthic Lixisol (Hypereutric, Rhodic), Toje series as a Haplic Lixisol (Hypereutric, Rhodic), Adenta series as a Vetic Lixisol

(Orthoeutric), Haatso series as an Endogleyic Lixisol (Orthoeutric) and Alajo series as a Sodic Vertisol (Calcaric)

<i>Abstract No. 22</i>	<i>Presentation 22</i>	<i>27/10/2009</i>	<i>11.30 – 11.45</i>
------------------------	------------------------	-------------------	----------------------

### **Understanding Ocean Surges and Possible Signals over the Nigerian Coast.**

**\*Okuku A. Ediang and \*\*Izuchukwu M. Akaegbobi**

*\*Nigerian Meteorological Agency PMB 1215 Oshodi Lagos Nigeria.*

*\*\*Department of Geology, University of Ibadan, Ibadan - Nigeria*

Twenty Seven occurrences of ocean surge events. Over the beach of the Victoria island in Nigeria were recorded between 1994 to 2008 and each with its devastating consequences resulting from the massive flooding and erosion. Statistical analysis and parametric wind-wave model were used to investigate the ocean atmospheric interactions in terms of their characteristics, especially before during and after every surge event from 1994-2008.

It revealed that all ocean surges apart from the surge of March 2002 were experienced in summer months of April to October, but more frequent in August. Analysis of the trend and pattern of sea surface temperature variations were carried out with the obtained sea surface temperature data. The mean monthly observations for each year of storm surges for the period 1994 – 2008, excluding 1999, 2003, 2004, 2006 due to lack of data. Were statistically treated to obtain the mean yearly sea surface temperature values and dates of storm surges. Further investigations revealed that the ocean surges are influenced by moderate winds (between 15 – 18kts in the strength on the average) over the retch (Lat. 10<sup>0</sup>S – 20<sup>0</sup>S and Long 0<sup>0</sup>E – 10<sup>0</sup>E). These winds were observed to be generally strongest three to two days before the even. They can generate wave height of about 1.8m and with favorable cross equatorial flow, the swell may reach the coast in about 2 – 4 days and when they coincide with high tide they can inundate the beach. The highest mean wind speed is between 5.8m in 1994 and 4.1m in 2002 and 3.6m in 2005 respectively.

Abstract No. 23	Presentation 23	28/10/2009	11.45 – 12.00
-----------------	-----------------	------------	---------------

## Measurement of Remaining Storage and Rate of Siltation of the Ahmadu Bello University Farm Lake at Zaria

<sup>1</sup>Adama Baba, <sup>2</sup>Krzysztof. Schoeneich and <sup>3</sup>Izuchukwu M. Akaegbobi

<sup>1</sup>Nasarawa State University, Keffi ,

<sup>2</sup>Geology Department Ahmadu Bello University, Zaria.

<sup>3</sup>Department of Geology, University of Ibadan, Ibadan – Nigeria

Ahmadu Bello University Teaching Hospital at Shika, 547 beds and water demand 154 m<sup>3</sup>/d, suffers from inadequate and irregular water supply. But there is a nearby abandoned impounding reservoir constructed around 1966, with original storage capacity 636,300m<sup>3</sup>. The authors propose to use this reservoir as main source of water for Shika Hospital. However, it is not known whether after 43 years of siltation, the reservoir still contains enough water to meet water demand from the hospital.

To determine, how much water is still available in the impounding reservoir after many years of siltation, the authors then embarked on a boat and measured the remaining storage of the reservoir as 349,911m<sup>3</sup>. Thereafter they calculated rate of siltation between years 1966 and 2009 as 6,600m<sup>3</sup>/y, rate of erosion in the drainage basin during the same period as 0.559mm/m<sup>2</sup>y, and safe yield during 176 days of hydrological dry season as non existing, because after deduction of losses to evaporation calculated as 194,560m<sup>3</sup>/y and deduction of 272,700m<sup>3</sup> of environmental reserve - minimum necessary to preserve aquatic wildlife, there is no active storage left. Since there is no active storage, there is also no safe yield and there is no water for Shika Hospital. The authors conclude that the University Farm Lake cannot serve as source of water for Shika Hospital, unless it is dredged to its original storage capacity. The impounding reserve will soon be lost. In some year to come there will be little or no more water in it because it will completely be silted up as there will even be no trace of it seen on the maps.

Abstract No. 24	Presentation 24	28/10/2009	12.00 – 12.15
-----------------	-----------------	------------	---------------

## Potential Signatures of Sea Level Rise Impact on the Nigerian Coast as Inferred from Tidal Oscillations

Effiom Antia<sup>1</sup> and Siyan Malomo<sup>2</sup>

<sup>1</sup> National Centre for Marine Geosciences, Nigerian Geological Survey Agency, NDU- Wilberforce Island, Bayelsa State; <sup>2</sup> Nigerian Geological Survey Agency, Abuja

Impact of sea level oscillation on the coastal region is a complex product of interaction between natural conditions and anthropogenic factors. Both the complexity and consequences of sea level change on man and the coastal biosphere are well articulated in the literature, albeit in many cases in a hypothetical and exploratory manner. This is quite evident from the different sea level rise scenario-type postulates, which clearly underscore the need for localized evaluation of the problem in spite of the regional or eustatic context of the phenomenon of sea level change. The Nigerian coast provides an excellent platform to evaluate the impact of various scenarios of sea level change, using the coastwise variation in amplitude of tidal oscillations as surrogate. We present field-based monitoring results which suggest that sea level rise will cause (1) present-day active beaches to gradually recede and become inundated (2) change in littoral processes pattern (3) salinization of coastal groundwater, and (4) modification in coastal biodiversity belts. First-order response in many coastal settings will be evolving strategies to mitigate and/or manage land and property loss, which in extreme case will entail abandonment of homeland and livelihood. Possible adaptation options for the various segments of the nation's coastal region define the focus of our future studies.

Abstract No. 25	Presentation 25	28/10/2009	13.15 – 14.00
-----------------	-----------------	------------	---------------

## Vulnerability of the Health Sector to Climate Variability and Change: Ghana

<sup>1</sup>Ama K. Essel and <sup>2</sup>W. Agyeman-Bonsu

<sup>1</sup>University of Ghana Medical School, Accra, Ghana; <sup>2</sup>Environmental Protection Agency, Accra, Ghana

Climate variability and climate change plays a role in the incidence of vector, food and water-borne diseases as well as air pollution diseases. Weather affects human health because of its effect on pathogen transmission and proliferation. Severe weather or catastrophic events like heat waves may influence the timing and intensity of infectious outbreaks and their incidence on seasonal patterns. It is important to study seasonality thoroughly to be able to detect changes due to increased climate variability and extreme weather events. To do this an initial systematic description of seasonal pattern is essential. Reliable data with appropriate temporal resolution, daily, weekly or even monthly rates are needed.

Predictions have indicated that malaria incidence and upper respiratory tract infections will go up as temperature and rainfall patterns change. In Ghana malaria and upper respiratory tract infections are in the top four causes of morbidity. This will have huge impacts on the already vulnerable

health sector in a developing country like Ghana, with implications for policy and national adaptation plans. Not much epidemiological studies have been done to establish this and to attempt

to quantify the effect of climate variability and change on malaria incidence in developing nations such as Ghana.

This preliminary study which forms part of a larger national adaptation project spanning three and a half years seeks to:

1. Describe the temperature and rainfall patterns in Ghana from 1965-2008
2. Describe the seasonal patterns of malaria and upper respiratory tract infections in Ghana
3. Quantify the effect of climate variability on malaria and upper respiratory tract infection
4. Make recommendations of further studies and actions to be taken

Climate variables (mean air temperature, maximum air temperature, minimum air temperature, rainfall and relative humidity data from the Meteorological Services Department and monthly outpatient data are used in the study. Weather variables are described and seasonal patterns described. The northern and southern sector data are used. The study is still in the preliminary phase. Preliminary results have shown increasing temperatures and decreased rainfall patterns. Malaria incidence may be increasing.

It is important that the study is completed so malaria control programme managers, the Ministry of Health (disease surveillance unit) and adaptation planners will be properly informed for planning and strategizing their programme of work.

<i>Abstract No. 26</i>	<i>Presentation 26</i>	<i>28/10/2009</i>	<i>14.00 – 14.15</i>
------------------------	------------------------	-------------------	----------------------

### **Climate variability and change over the Nigerian coastal area in the last half a century and its social economic implication.**

**S.O. Gbuyiro**

*Dept of Meteorology, Fed University of Tech. Akure*

Nigeria's coastal zone is within latitudes 4°10' to 6°20'N and longitudes 2°45' to 8°35'E panning about 850km of low-lying coastline. The zone can be divided into four distinct geomorphic parts. Global mean surface temperature rise of between 0.3 and 0.6 °C over the last 100 years, has resulted in global sea level rise of 1cm to 2 cm (IPCC, 2004). The implications of this sea level change on coastal areas are coastal erosion and flooding, salination of surface and subsurface water. The concentration of CO<sub>2</sub> in the atmosphere is already 30% higher than the level, which existed before the Industrial Revolution, as about six billion tones of carbon are released as Carbon dioxide every year from. The ocean acts as sink for the CO<sub>2</sub>. and hence modifies the climate of the coast. This paper attempts to provide answer to the following pertinent question: - Is the climate of the Nigerian coastal areas changing? And what are the implications?( in relation to flooding, erosion, storm surge and its socio-economic implications). The methodology used were the time series and climatological variability analyses, Flood, storm surge and erosion reports. Temperature and rainfall data for the period 1905-2005 from six coastal stations namely: Lagos, Ikeja, Benin, Warri, Port-Harcourt and Calabar were used in the study. Preliminary results showed that:

- Persistent wetness occurred between 1927 – 1931, 1969 – 1972 and 1987–1996 (with dry period in 1989, 1992) over the entire Nigerian Coast.
- Persistent dryness or drought occurred between 1920 – 1924, 1934 – 1937 and from 1969 – 1986 with recoveries between 1978 – 1980.
- Although one could notice some large spatial and temporal variation in the characteristics of rainfall, there were no regular pattern associated with the rainfall values except for some dry and wet years which alternate every 2 -3 years especially between 1940 – 1969.
- The Temperature trend indicated an upward increase from 1977 to 1996 with decadal increase of 0.3°C.
- The implication of an increase of 0.42degree C or more over the coastal areas is significant. An inundation of up to a land area of 10,000 square kilometers in the coastal area of Lagos state can result due to attendant sea level rise of between 0.5m and 1.0m as observed now. The barrier-lagoon coastline in the western extremity with the high real estate at Victoria Island and Lekki could lose well over 584 and 602 square kilometers of land from erosion while inundation could completely submerge the entire Lekki barrier system. Such adverse impacts will affect the residential, commercial and tourist facilities on the Victoria, Ikoyi and Lagos islands valued at well over U.S. \$12 billion. Lagos has been witnessing heavy rainfall of short duration in the last 5years causing more frequent storm surges and serious erosion of the Lagos beach, which is put at 30m/year. In total, over 1800 square kilometer or 2 percent of the Nigerian coastal zone and about 3.68 million people are also at risk with a projected one-meter sea level rise.

Abstract No. 27	Presentation 27	28/10/2009	14.15 – 14.30
-----------------	-----------------	------------	---------------

## **Temporal Analysis of Respiratory Diseases and Weather Parameters in Two Eco-climatic zones in Nigeria**

**<sup>1</sup>Akinyemi Gabriel Omonijo and <sup>2</sup>Olusegun Oguntoke**

*<sup>1</sup>Department of Agricultural Technology, Rufus Giwa Polytechnic, P.M.B. 1019, Owo, Ondo State, Nigeria, E-mail: akingab@yahoo.com and <sup>2</sup>Department of Environmental Management & Toxicology, University of Agriculture, Abeokuta, Ogun State, Nigeria.*

This study examined the temporal pattern of selected respiratory diseases, and the influence of specific weather parameters on their morbidity in Rain-forest (Ile-Ife) and Guinea savanna (Ilorin) locations. Meteorological data including rainfall, maximum and minimum temperature, relative humidity and wind speed from 1992 to 2002 were collected from the Nigeria Meteorological Agency, Lagos. In addition, information on respiratory disease from 1992 to 2002 was extracted from the diagnostic card of patients at selected hospitals in Ile-Ife and Ilorin. These two categories of data were analyzed using descriptive and inferential statistics such as t-test, trend analysis, correlation and regression. Out of 2,056 and 2,647 cases of respiratory diseases (bronchial asthma, bronchopneumonia, lobar pneumonia, bronchiolitis, cardiac asthma, pulmonary tuberculosis, sinusitis, tonsillitis and upper respiratory tract infection) reported in Ile-Ife and Ilorin, 60% and

48% occurred in ages less than ten years while patients aged 80 years and above accounted for 1.2% and 1.7% respectively. There is a significant ( $p < 0.01$ ) variation in the morbidity pattern of respiratory diseases among age groups at each location.

Males in Ile-Ife and Ilorin reported about 56.7% and 59.0% of the specific respiratory diseases. Specifically, males accounted for higher percentage (52.9 to 76.6%) of each respiratory disease except cardiac asthma (Ile-Ife), sinusitis and upper respiratory tract infection (Ilorin). At Ile-Ife, the seasonal pattern of respiratory diseases is of the order: Late Dry>Late Wet>Early Dry>Early Wet and at Ilorin: Late Wet>Late Dry>Early Dry>Early Wet. Both the annual trend and monthly pattern of specific respiratory diseases at Ile-Ife and Ilorin vary significantly ( $p < 0.01$ ) within the study period. High occurrence of bronchial asthma is associated with temperature of 27.0°C to 30.0°C and relative humidity of 78.0 to 91.0% in the months of June to October at Ile-Ife. At Ilorin, bronchial asthma peaked at lower temperature (26.0°C and 27.0°C) in the months of July to September. High occurrence of lobar pneumonia is associated with temperature between 30.0°C and 35.0°C in the months of January to March at Ile-Ife and 30.0°C to 32.0°C in the months of January to April at Ilorin. High occurrence of lobar pneumonia is associated with low relative humidity (67.0 to 77.0%) and wind speed between 3.0ms<sup>-1</sup> and 4.0ms<sup>-1</sup> in the months of January to March at Ile-Ife. High sinusitis morbidity occurred at temperature above 30.0°C at Ile-Ife while high cardiac asthma morbidity is associated with temperature between 26.0°C and 28.0°C (June to September) at Ilorin.

Further analysis showed that maximum temperature accounted for 46.6% ( $r=0.68$ ) and 43.3% ( $r=0.66$ ) of bronchial asthma ( $p < 0.05$ ) at Ile-Ife and Ilorin. Similarly, temperature explained 39.1%, 39.8% and 43.8% of bronchopneumonia, cardiac asthma and lobar pneumonia occurrence at Ilorin respectively. Relative humidity accounted for 36.3% of tonsillitis morbidity and in combination with wind speed, explained 82.1% of lobar pneumonia at Ile-Ife. Maximum temperature and wind speed accounted for 69.3% of the occurrence of sinusitis at Ile-Ife. The study recommends that continuous monitoring of weather parameters should be incorporated into environmental management system.

Abstract No. 28	Presentation 28	28/10/2009	14.30 – 14.45
-----------------	-----------------	------------	---------------

### **Holocene climatic and oceanic variability in and off western Sahel related to the latitudinal migration of the ITCZ**

**Ilham Bouimetarhan<sup>1</sup>, Lydie Dupont<sup>2</sup>, Enno Schefuss<sup>2</sup>, Gesine Mollenhauer<sup>1,3</sup>, Jan-Berend Stuut<sup>2</sup>, Stefan Mulitza<sup>2</sup>, and Karin Zonneveld<sup>1</sup>**

<sup>1</sup> Department of Geosciences, University of Bremen, P.O. Box 330440, D-28334 Bremen, Germany

<sup>2</sup> MARUM-Center of Marine Environmental sciences, University of Bremen, P.O. Box 330440, D-28334 Bremen, Germany

<sup>3</sup> Alfred-Wegener Institute for Polar and Marine Research, 27570 Bremerhaven, Germany

Pollen and organic-walled dinoflagellate cyst assemblages from core GeoB9503 retrieved from the mud-belt (50 m water depth) off the Senegal River mouth have been analyzed to reconstruct paleoceanographic and paleoenvironmental changes in western Sahel during the late Holocene (from 4200 to 1200 yrs BP). Our study emphasizes significant coeval changes in continental vegetation, hydrological cycle, and oceanic conditions in and off Senegal. Initial dry conditions

were followed by a period of increased precipitation and riverine discharge occurring around 2900 years BP when the environment became enriched in woody plants and plants requiring wet

conditions. This interval is also characterized by the occurrence of dinoflagellate cysts of river plume affinity. We interpret these observations as the result of enhanced Senegal River runoff with high terrigenous input into the ocean and by inference, greater monsoonal humidity between ca. 2900 and 2500 yrs BP which we refer to as “little humid phase”.

Since 2500 yrs BP, the environment slowly became drier again, as indicated by slight increases in sahelian savanna and desert elements. Around 2200 years BP, a trend towards wetter conditions is evident from the data, with strong fluctuations in fluxes of pollen and dinoflagellate cysts as well as fresh water algae, and plant cuticles, suggesting episodic flash flood events of the Senegal River. The driest phase developed after ca. 1800 yrs BP characterized by the decrease of arboreal pollen and its replacement by pollen from the Saharan group and occurrence of pollen of *Pinus* and *Olea* that have their source areas in North Africa suggesting strong trade winds. These alternating arid and humid phases during the late Holocene reflect most probably the strengthening and weakening of the African monsoon, potentially driven by the latitudinal migration of the Intertropical Convergence Zone (ITCZ) and its associated tropical reinbelt.

Abstract No. 29	Presentation 29	28/10/2009	14.45 – 15.00
-----------------	-----------------	------------	---------------

### **Climatic and Environmental changes over Niger lower basin during the Late Quaternary**

**A.T. Adegbe<sup>a\*</sup>, R.R. Schneider<sup>b</sup> and G. Wefer<sup>c</sup>**

<sup>a</sup> Nigerian Institute for Oceanography and Marine Research (NIOMR), P.M.B. 80108, Victoria Island, Lagos, Nigeria.

<sup>b</sup> Geologie Paläoozeanographie und Marine Paläoklimaforschung, Ludewig-Meyn-Straße 10, D-24118 Kiel, Germany.

<sup>c</sup> Fachbereich Geowissenschaften, Universität Bremen, Klagenfurter Strasse, D-28359 Bremen, Germany.

\*Corresponding author. Nigerian Institute for Oceanography and Marine Research (NIOMR), P.M.B. 80108, Victoria Island, Lagos, Nigeria.

Deep-sea core GeoB 4901-8 (02°40.7'N, 006°43.2'E: water depth 2184 m) from the Niger fan was investigated to give information about climate change over western central Africa and the response of the surface ocean in the Gulf of Guinea during the last 245,000 years. X-ray fluorescence (XRF) of terrigenous element (Fe, Ti) intensities and the stable oxygen isotope ( $\delta^{18}\text{O}$ ) of *Globigerinoides ruber* (pink) and *Globigerinoides sacculifer* monitored the intensity of chemical weathering and the surface water hydrography respectively.

The isotopic curves and the XRF counts show oscillating climatic conditions in the late Quaternary. Fe/Ti ratio expressed as indicator for chemical erosion reveals more humid conditions marked by increased African monsoonal precipitation during interglacial and warm phases of cold periods. This is in correspondence with strong hydrographic fluctuations expressed by the  $\delta^{18}\text{O}$  record of *Globigerinoides ruber* (pink).

During this period, the  $\delta^{18}\text{O}$  difference ( $\Delta\delta^{18}\text{O}$ ) between shallow-dwelling planktonic foraminifera *Globigerinoides ruber* and *Globigerinoides sacculifer* and the XRF record of Fe/Ti ratio reveal that the Niger river terrigenous sediment load in relation to surface ocean conditions has not only fluctuated in tune with the 23 kyr astronomical precession of boreal summer insolation, but in



addition to high frequency periodicities (11.5, 8.4 and 5.8 kyr) of the sub Milankovitch cyclic variations which are also observed as a component of the atmospheric forcing controlling the

African monsoonal intensities. The correspondence of high terrigenous (Fe/Ti) input and strongly depleted oxygen isotope values of *Globigerinoides ruber* with low-latitude insolation maxima strongly corroborate the supposition that African monsoon precipitation and chemical weathering was enhanced during periods of increased central African heating.

INQUA REPORT (Invited)		28/10/2009	15.00 – 15.30
---------------------------	--	------------	---------------

**INQUA and the Development of Quaternary Science in Africa**

**Margaret AVERY**

PAST. REPORT (Invited)		28/10/2009	15.30 – 16.00
---------------------------	--	------------	---------------

**From South-Africa to Pan-Africa: How PAST Supports Palaeo Sciences Research and Education on The Continent**

**Andrea LEENEN**

<i>Abstract No.</i>	<i>Poster</i>	
---------------------	---------------	--

**Modeling of Biogeochemical Processes in a Mangrove Dominated Ecosystem**

**Akintoye Edward Akinnigbagbe**

*Nigerian Institute for Oceanography and Marine Research*

Mangroves are a diverse group of predominantly tropical trees, shrubs, palms and ground ferns growing above mean sea level in the marine intertidal zone. The term 'mangrove' is used to refer to the habitat although equally often the habitat is called a 'mangrove forest' or 'tidal forest'.

Mangrove is an important part of coastal system acting as the largest supplier of nutrients to the system and also as a shelter to several species of organisms. Kristensen et al., 2007 also confirms

“mangrove as a highly productive ecosystem with the capacity to efficiently trap suspended material from the water column”.

Mangrove as an active site for biogeochemical processes which offers an opportunity for any related research in area that involves the pathways, transportation and composition of carbon, oxygen and nutrients in such system .The biogeochemical processes operating in Mangroves are respiration/ oxidation, photosynthesis, calcification and dissolution each been driven by the physical forces. Mangrove ecosystem is among the most productive and biogeochemically active ecosystems and is an important sinks of carbon in the biosphere; careful management of mangrove ecosystems thus has the potential to produce a ‘measurable’ gain in CO<sub>2</sub> regulation a characteristic likely to acquire greater attention with the forecasted global warming. Therefore modeling the biogeochemical processes will go a long way in understanding the trend of events in a mangrove dominated ecosystem.

Abstract No.	Poster	
--------------	--------	--

### **Glacial millennial-scale fluctuations in central African precipitation recorded in terrigenous sediment supply and freshwater signals offshore Cameroon.**

**A.T. Adegbe<sup>a\*</sup>, R.R. Schneider<sup>b</sup>, H. Arz<sup>b</sup>, Y. Kim<sup>b</sup>, U roehl<sup>b</sup> and Wefer, G.<sup>b</sup>**

<sup>a</sup> Nigerian Institute for Oceanography and Marine Research, (NIOMR), P.M.B. 80108Victoria Island, Lagos, Nigeria.

<sup>b</sup> Fachbereich Geowissenschaften, Universität Bremen, Klagenfurter Strasse, D-28359 Bremen, Germany.

Evidence of rapid climatic oscillations like those observed in the Greenland ice cores and sediments from high latitudes of the northern Atlantic have been recognized in the pulses of terrigenous material to continental margin sediments off Cameroon. Fe/Ca ratios used as a parameter to quantify the relative proportions of terrigenous fluxes versus marine carbonate monitor the variability of the west African monsoon. They reveal the history of abrupt changes in precipitation over western and central Africa during last 52 kyr.

These rapid changes are particularly pronounced during the last glacial period and occur at timescales of a few thousand years. Stable oxygen isotope ( $\delta^{18}\text{O}$ ) records of *Globigerinoides ruber* (pink) show high negative values reflecting periods of high monsoon precipitation. The Fe/Ca pattern is very similar to the Dansgaard-Oeschger cycles from the Greenland ice cores. The good correspondence between the warm interstadials of the Dansgaard-Oeschger cycles from the Greenland Ice Sheet Program (GISP2) ice core records and the high pulses of Fe/Ca sedimentation in our core suggest a strong teleconnection between the low latitude African climate and the high latitude northern hemisphere climate oscillations during the last glacial. This climatic link is probably vested in the west African monsoonal fluctuation that alters tropical sea surface temperatures, thermohaline circulations and in turn net export of heat from the south to the north Atlantic, coupled with the variability of the low latitude southeast (SE) trade winds.

<i>Abstract No.</i>	<i>Poster</i>	
---------------------	---------------	--

## **Climate Crisis Adaptation: Essential investment in our common future, and recent greenhouse gas emission insight**

**B. I. Odoh, B.C.E. Egboka and E. Okoro**

*Department of Geological Sciences; Nnamdi Azikiwe University; P.M.B 5025, Awka,  
Anambra State, Nigeria.*

Africa gives off less greenhouse gas than any other part of the world, but it is the most threatened by climate change. A warming planet will spread disease, shrink water resources and deplete crops, creating conditions that produce more famine and conflict. The developed countries have a responsibility to slow these trends – through mitigation and by changing the way they use energy. Across Africa, there is bountiful wind and solar power; geothermal energy and bio-fuels. From the Rift Valley to the North African deserts; from the Western coast to South Africa’s crops – Africa’s boundless natural gifts can generate its own power, while exporting profitable, clean energy abroad.

Cutting greenhouse gas emissions and trying to mitigate climate change is one part of global response to the issue. We must get serious about adaptation which is both a practical need and a moral imperative.

Some studies estimate the internet will be producing 20% of the world’s greenhouse gases in a decade. That is clearly the wrong direction. That is clearly unsustainable. Most people don’t appreciate that the computer on your desk is contributing to global warming. Studies have highlighted the growing energy demands of computers. A 2007 report from research firm Gartner, for example, estimates the manufacturing, use and disposal of information and communications technology generates about 2% of the world’s greenhouse gases- similar to the level produced by an entire aviation industry. Data centers – massive buildings housing hundreds, if not thousands, of power hungry servers storing everything from Facebook photos and YouTube videos to company web sites and personal emails- are often labelled as the worst offenders when it comes to harming the environment.

In 2002, global data center emissions amounted to 76 million tons of carbon dioxide – a figure that is likely to more than triple over the next decade, according to a 2008 study by the Climate Group and Global e-Sustainability Initiative (GeSI). The following practical steps are recommended for adapting to climate crisis: Provisions where affluent nations provide assistance to vulnerable and poorer states to adapt. We must invest in making our communities more resilient and in reducing our vulnerability to natural disasters. And we must invest in the ecosystems that sustain us; Gathering of more detailed scientific data on climate impact so that local and national authorities can target resources where they are needed mostly; Reduction in disaster risk wherever possible; Planting of mangrove trees on unprotected coastlines and the boost of community education and evacuation plans as relatively inexpensive ways in mitigating disaster risks; Creating a green Internet ecosystem is not only imperative but also urgent; The world needs to ‘green’ its development efforts so that “climate resilience, sustainability and low- carbon growth become the foundations of future prosperity