

ing effect of dust on the climate, estimate the probable dust concentration in the atmosphere from which deposition fluxes are calculated, generally using simplified parameterizations.

In contrast to greenhouse gases, it is unclear how globally representative the ice core record of dust is. Debating this issue, the participants raised two problems: i) Which grain size range should we investigate, as most records correspond to large dust particles? ii) If small size particles are being investigated, washout of the atmospheric dust load must be addressed through consideration of precipitation parameters along the dust transport pathway. This information is only available from models.

Another question was raised following the presentations related to the Chinese sequences. Contrary to European loess, they do not record Dansgaard-Oeschger-like events, yet reveal events apparently synchronous to the North Atlantic Heinrich events. What are the changes in the climatic zones driving millennial-scale variations in dust deposition? The time resolution of the records is particularly critical as highlighted during the meeting and must be improved, as it will impact the global versus regional comparisons.

As the different presentations referred to different time intervals, the participants discussed whether one or more whole glacial intervals should be considered, or whether one should focus only on par-

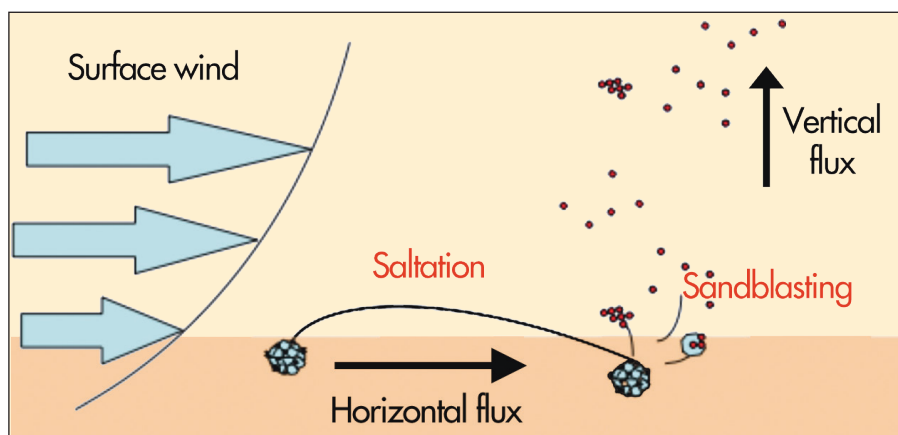


Figure 1: Schematic of the processes involved in dust emission. When wind velocity is of sufficient strength over a surface that is not totally protected by vegetation, stones or pebbles, the grains that constitute the superficial layer of the soil, begin to move. When these grains mobilized by wind (saltation) fall back to the land surface, a part of their kinetic energy is transferred to soil aggregates, which are disrupted, allowing finer particles (generally $< 20 \mu\text{m}$) to be emitted into the atmosphere (sandblasting) (modified from G. Bergametti, unpublished).

ticular events/intervals. Addressing these questions led to the following questions: What dust was really present in the atmosphere in terms of the size of the particles and quantities? Are the modern atmospheric processes compatible with the strong dust loading of the past?

Concerning the source areas, questions remain on the potential for dust emission and initial mixing altitude (low and high elevation), as well as the frequency and strength of particular dust events. For example, to what altitude can dust grains be uplifted under different climate conditions? Concerning more specifically the Greenland record, is the transport of possible emitted dust material from China still a robust assumption? Indeed the transport

pathway from China to Greenland is still questionable based on present-day models and geochemical analyses performed on dust particles. What is the history of air masses responsible for dust transport, and what role does seasonality play in the transport? Although it has been used to explain transport to Antarctica, the question also remains as to how useful radon is as a tracer of air mass transport. The second ADOM meeting, to be held early 2011 will aim to address some of these questions.

Acknowledgements

The organizers wish to thank the supporters of this workshop; PAGES, the European Science Foundation, and the French National Institute of Sciences of the Universe – National Centre for Scientific Research (INSU-CNRS).



The West African Quaternary Research Association inaugural international workshop

Ibadan, Nigeria, 26 – 30 October 2009

IZUCHUKWU MIKE AKAEGBONI

Department of Geology, University of Ibadan, Nigeria; izumike20022002@yahoo.com

The first West African Quaternary Research Association (WAQUA) international workshop aimed to enhance the growth of Quaternary paleoscience and generate interest among younger scientists in research works that focus on paleontology, archaeology, past environments and climate, coastal erosion and sea level changes in the West African subregion. The workshop also sought to promote regional collaborations and intensify scientific exchange. Sessions were held under the theme “The West African Quaternary Paleoclimatic/Sea Level Changes and Human Responses: Evidences from Marine and Terrestrial Sources” with the aim of understanding how information stored in geological archives can be used to reconstruct environmen-

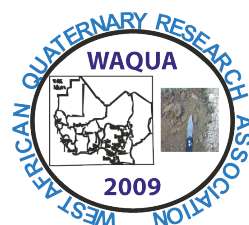
tal/climatic variability of the past 2 Ma, for climate modeling and forecasting of the future. The workshop further focused on human adaptations to climatic variations and coastal erosion during the Late Quaternary. A general discussion was also organized to identify research priorities and form working groups to address paleoscientific issues covering the last 2 Ma.

Workshop sessions

The workshop was attended by over 50 participants from different countries in West, East and Southern Africa. The first day opened with keynote presentations and a plenary session. Two keynote presentations were given that discussed the importance of Africa's paleo-climatic ar-

chives covering the last approx. 2 ka in determining climate change and human impact in Africa.

The keynote address by Mohammed Umer highlighted how the fragmentation of West African rainforest and major water bodies during the Last Glacial Maximum were associated with a shift to a drier climate. However, the mechanisms driving those changes that occurred abruptly after 5.5-5 cal ka BP need further investigation, such as the relation between insolation forcing and ocean temperature-vegetation feedbacks. He also noted that 19–23 ka precession cycles could be a forcing element for the enhanced monsoons at 35-30 cal ka BP, the Early Holocene and for the dry LGM (e.g., see Umer et al., 2004).



Continuous long and high-resolution sequences are needed for testing the effect of orbital forcing over full glacial-interglacial cycles.

Another keynote by Julius Lejju dealt with Holocene environmental history and human interaction based on sedimentary records and archeological findings around the Great Lake Regions of Central Africa. This paper reported significant changes in environmental and socio-cultural conditions from the Holocene to present.

This was followed by a series of plenary papers focused on the interdependencies of climate change and groundwater budget across the West African Sahel Zone, and the impact and consequences of sea level rise on coastal erosion. It was revealed that societal impacts associated with climate change include drought, land degradation, biodiversity loss, decreased human well-being and poor agricultural output, ultimately affecting food security.

Euloge Ogouwale then described the history of climate change during the Quaternary in West Africa citing examples from the Benin Republic. The results revealed that the impact of the dry climatic condition in Benin Republic is visible in the landscape vegetation.

The second day focused on climatic variability and human health, and the consequences of ecosystem changes on the livelihood and sustainability of humans in West Africa during the Holocene. The session highlighted integrated studies that combine marine and terrestrial proxies to correlate changes in oceanic, continental and atmospheric conditions. For example, Ilham Bouimetarhan presented historical records that show that the Sahel region has experienced several shifts towards



Figure 1: Participants of the 1st WAQUA international workshop.

more arid climate during the last glacial period. The data indicated that abrupt onsets of arid conditions in the West African Sahel co-occurred with cold North Atlantic sea surface temperatures during Heinrich surge events, which is explained by southward migration of the InterTropical Convergence Zone and its associated tropical rain belt by a few degrees latitude over West Africa. These results documented the occurrence of multi-millennial-scale droughts in the Sahel during the past 57 ka (see Ilham Bouimetarhan et al., 2009).

Post-workshop meeting

A general meeting was held immediately following the workshop sessions. The following actions were taken and decisions made:

- An interim committee was set up to run the affairs of WAQUA until a general election is conducted. Dr. Akaegbobi (Nigeria) and Dr. Yabi (Benin Republic) were nominated and approved as Chairman and Vice Chairman respectively. Other members include Mr. Ediang (Secretary), Prof. Anike and Dr. Mrs. Meludu.

- Four Working Groups were formed to develop topical research priorities: 1) Lake Sediments as Archives for Paleoclimatic Changes; 2) Coastal Sea Level Changes; 3) Ecosystem Changes and Human Livelihood; 4) Archeology and Paleontology.
- The papers presented during the workshop will be prepared for publication in a special volume in *Quaternary International*.
- The next WAQUA workshop will be held in Cotonou, Republic of Benin, in 2010.

Acknowledgements

The organizers would like to thank the following sponsors for their support of this meeting: The International Union for Quaternary Research, PAGES, Paleontological Scientific Trust, and HalalTech Quarrying and Construction Company Nigeria Limited.

References

- Bouimetarhan, I., Dupont, L., Schefuß, E., Mollenhauer, G., Mulitz, S., Zonneveld, K., 2009: Palynological evidence for climatic and oceanic variability off NW Africa during the late Holocene, *Quaternary Research*, **72**: 188-197.
- Mohammed, M.U., Legesse, D., Gasse, F., Bonnefille, R., Lamb, H., Leng, M. and Lamb, A., 2004: Late Quaternary Climate Changes in The Horn of Africa. In: Battarbee, R., Gasse, F., Stickley, F. (Eds) *Past climate variability through Europe and Africa*, Kluwer Academic Press.



PAGES Calendar 2010

Australasia 2k Workshop: Towards data synthesis

31 May - 2 June 2010 - Melbourne, Australia
<http://www.pages-igbp.org/science/2k/aus2k/aus2kmeeting2010.html>

PAGES Regional Workshop Japan

5 - 6 June 2010 - Nagoya, Japan
<http://www.pages-igbp.org/calendar/>

SCAR Open Science Conference: Witness to the past and guide to the future

3 - 6 Aug 2010 - Buenos Aires, Argentina
<http://www.dna.gov.ar/scar2010/index.htm>

Paleo-ocean acidification and carbon cycle perturbation events

26 - 28 Aug 2010 - Catalina Island, USA
<http://www.pages-igbp.org/calendar/>

10th International Conference on Paleoceanography

29 Aug - 3 Sep 2010 - La Jolla, USA
<http://icp10.ucsd.edu/>

2nd PAGES Global Monsoon Symposium

13 - 15 Sep 2010 - Shanghai, China
<http://www.pages-igbp.org/calendar/>

Regional Integration of human-environment interactions: Climate change "hotspots"

13 - 15 Sep 2010 - Southampton, UK
<http://www.pages-igbp.org/calendar/>

PAGES International Floodplain Lakes Workshop

16 - 19 Sep 2010 - Arkansas, USA
<http://comp.uark.edu/~shausman/PAGESworkshop/floodplain.html>