Latitudinal changes in sea surface temperature and salinity over the Eastern Arabian Sea during the Last Glacial Maximum through Holocene

B.S. MAHESH* AND V.K. BANAKAR

National Institute of Oceanography (CSIR), Goa, India.
(*correspondence: maheshsbadanal@gmail.com)

Three sediment cores dated by radiocarbon spanning the last ~35 kyr have been utilized to reconstruct the past hydrography in the Eastern Arabian Sea (EAS). These three sediment cores were collected in a North-South transect where significant hydrographic differences occur between their locations. The EAS receives significant amount of overhead precipitation as it borders the orographic barrier all along the western margin of peninsular India due to Deccan Mountains. As a result the sea surface temperature (SST) and surface salinity (salinity) in the EAS respond to subtle changes in the intensity of the monsoons. Here we reconstruct the SST and salinity from by the paired measurement of $\delta^{18}O$ and SST utilizing *Globigerinoides sacculifer*, an upper mixed layer dwelling foraminifera. The last glacial maximum (LGM) could be defined as the heaviest $\delta^{18}O_{G.sacculifer}$ (-0.07±0.08‰) and is evident between 23 – 15 ka BP. The $\delta^{18}O_{G.sacculifer}$ shift between the LGM and Holocene in all the three sediment cores is ~ 2‰. The SSTs show an overall warming of 2°C from the LGM to Holocene (28°C to 30°C). However, coldest SSTs are observed prior to LGM (~27 ka BP) in all the three records. The salinity is higher (~ 38 psu) throughout most of the last glacial period (32.5 – 15 ka BP) compared to the salinity during the Holocene (~36 psu). During the LGM, the North-South salinity gradient was higher than that of modern gradient. The increased North-South salinity gradient during LGM may suggest not only reduced summer monsoons but also relatively intensified winter monsoons. The higher salinity together with generally lower SSTs indicates sustained weaker summer or stronger winter monsoons. The deglacial warming is associated with rapid reorganization of monsoons and is reflected in decreased salinity to a modern level of ~ 36.5 psu within a period of ~ 5 kyr, which indicates process of intensification of summer monsoons during cold to warm climate transition.

Adsorption behaviour of copper in natural composite sedimentary materials

FLÁVIA MAIA* AND MÁRIO A. GONÇALVES

Dep. Geologia and CREMINER/LA-ISR, Fac. Ciências da Universidade de Lisboa, Campo Grande, 1749-016, Lisboa, Portugal,
(*correspondence: flavia.maia@amphos21.com)

The understanding of adsorption processes is important both to evaluate the potential hazard related to contaminants as well as to minimize their impact on the environment. The aim of this work is to carry out comprehensive adsorption experiments using composite natural materials corresponding to matrices of continental alluvial deposits (so called raña deposits) from Macedo de Cavaleiros in the NE of Portugal. These materials were considered to evaluate their capacity for the attenuation of metal dispersion, as well as for the retention of low to intermediate level radioactive waste. The main minerals present in the matrices include quartz, montmorillonite, illite and kaolinite, with abundant poorly crystallized iron oxyhydroxides. The matrices also contain substantial amounts of organic matter.

A protocol was developed to characterise the adsorption behaviour of copper onto the main constituents of the natural matrices (clay minerals, organic matter, and iron oxyhydroxides). They were designed as to reflect the removal efficiency of copper by the various constituents while maintaining the structural integrity of the clay minerals.

The adsorption behaviour of copper has been evaluated by carrying out batch experiments with Cu^{2+} on a series of samples without previous treatment, removal of organic matter, removal of Fe oxyhydroxides, and removal of both organic matter and Fe oxyhydroxides in a range of pH between 4 and 6.

The results show that the adsorption capacity of these materials is rather limitted but slightly enhanced as the pH gets higher. However, the pre-treatments had some influence on the enhancement of the adsorption results, especially Fe oxyhydroxides and organic matter. The low equilibrium pH of these samples was shown to be derived from the presence of organic matter which on itself is also likely to alter the adsorption capacity of these matrices.

Contribution of Project KADRWaste PTDC/CTE-GEX/82678/2006 funded by FCT (Portugal)