Evolution of paleoclimatic conditions and vegetation change in Himalaya from compound specific hydrogen and carbon analyses

F. PALHOL[1], V; GALY[1], C. FRANCE-LANORD[1], P. FAURE[2] AND L. FRANÇOIS[3]

[1] Centre de Recherches Pétrographiques et Géochimiques, BP 20, Vandoeuvre-lès-Nancy, France; fpalhol@crpg.cnrs-nancy.fr

[2] G2R, UMR-CNRS 7566, Université Henri Poincaré, BP 239, Vandoeuvre-lès Nancy, France

[3] Laboratoire de Physique Atmosphérique et Planétaire, Université de Liège, Belgium

Supplied by the Ganga-Brahmaputra fluvial system, the Bengal Fan provides an integrated record of the Himalayan basin history through time. The active channel-levee system fo the middle fan documents the last glacial/interglacial cycle. Organic geochemistry studies have shown that the organic matter contained in the Bengal Fan sediments is mainly of terrestrial origin.

We analysed terrestrial n-alkanes (C27 to C33) from Bengal Fan sediments and modern Ganga-Brahamaputra sediments. Comparison of compound specific hydrogen and carbon isotopic ratios in these samples allow us to follow the evolution of paleoenvironmental conditions since the Last Glacial Maximum.

Carbon molecular isotopic data on the odd-HMW n-alkanes show a shift of 4 ‰, corresponding to an evolution in the Himalayan system from a C4-dominated vegetation at LGM to a C3-dominated vegetation during the Holocene. It is now well known that C4 plants are more adapted than C3 plants to low atmospheric CO_2 concentrations and to relatively hot and dry climate.

In the same time, molecular D/H isotopic ratios measured on the same samples show an increase of the deuterium content of about 20 ‰ during the Holocene, which is consistent with lower temperature at the end of the LGM in the Himalaya.

As low temperature should favored C3 plants, the predominance of a C4 vegetation have to be linked with dryer conditions at the end of the LGM. Afterwards, the increase of the C3/C4 ratio in the Himalayan system is related to a concomitant increase of humidity and pCO_2 during the Holocene.