



Hydroclimate variability in NE Brazil over the last 2K

Utida Giselle (1), Bouloubassi Ioanna (2), Cruz Francisco (1), Schefuβ Enno (3), Sifeddine Abdel (2,4), Klein Vincent (2), Etourneau Johan (5), Zocatelli Renata (6), Zular André (1), Cheng Hai (7,8), and Edwards R. Laurence (8)

(1) Departamento de Geoquímica e Geotectônica, Instituto de Geociências, Universidade de São Paulo, São Paulo-SP, Brazil, (2) LOCEAN-IPSL, Sorbonne Universités, Univ.Paris 6, CNRS, IRD, MNHN, Paris, France, (3) MARUM - Center for Marine Environmental Sciences and Department of Geosciences, University of Bremen, Germany, (4) LMI "PALEOTRACES" (URD/UFF/Uantof-Chili), Dept. de Geoquímica - Universidade Federal Fluminense, Niterói-RJ, Brazil, (5) INSU-CNRS, Paris, France, (6) Université d'Orléans, CNRS/INSU, BRGM, Orléans, France, (7) Institute of Global Environmental Change, Xian Jiaotong University, Xian, China, (8) Department of Geology and Geophysics, University of Minnesota, Twin Cities, Minneapolis, Minnesota, USA

Precipitation associated with the South American Summer Monsoon (SASM) and the Intertropical Convergence Zone (ITCZ) supplies more than 70% of tropical South America's annual precipitation and is fundamental in sustaining the water regime for regional socioeconomic activities. Motivated by the fact that the greatest uncertainty in model projections of future precipitation trends lies in the tropics, and particularly in South America, a number of recent proxy and modeling studies have aimed at understanding SASM spatiotemporal variability regarding its dynamics, driving mechanisms and teleconnections. Exact reconstructions of past meridional ITCZ displacements (timing, sign, amplitude), however, are currently lacking, mainly because of the paucity of suited high-resolution archives. This restricts our ability to assess regional rainfall variability at decadal to centennial timescales, especially in the hydroclimatic-sensitive semi-arid Nordeste, needed to understand the interactions between SASM and ITCZ and to evaluate the impact of Pacific-Atlantic climate interactions on the regional rainfall variability at decadal/multi-decadal scale.

Here we present two new and complementary high-resolution records of past precipitation over the last 2K from the north area of Nordeste, an area ideally located to track fluctuations in the southernmost edge of ITCZ movement. We present a new δO_{18} record from a local speleothem and combine it, for the first time, with δD analyses of wax lipids in well-dated sediments from a nearby lake. The two independent records show a remarkable similarity and are characterized by strong decadal to multidecadal variability as well as century-scale changes. The period 250-450 yrs CE appears as the wettest phase over the last 2K, while the Medieval Climate Anomaly (MCA) is characterized by extremely dry conditions. Following the MCA, the Little Ice Age (LIA) is a relatively wetter phase. The data document fluctuations of southern meridional ITCZ movements during the last millennium that compare well with available records of fluctuations in northern ITCZ extension (Cariaco Basin). Comparisons to proxy records from tropical South America regions affected by the SASM and the South America Convergence Zone (SACZ) allow evaluating the SAMS/SACZ-ITCZ linkages. Furthermore, the data are discussed in terms of the role of the Atlantic and Pacific modes of variability in modulating regional hydroclimate.