Geophysical Research Abstracts, Vol. 8, 01784, 2006
SRef-ID:

Climate Drying and Forest Decline (˜4.0-3.0 cal kyr BP) Preceded Sedentary Maya Occupation in the Lowlands of Petén, Guatemala

Mueller, A.D. (1), Anselmetti, F.S. (1), Ariztegui, D. (2), Brenner, M. (3), Hillesheim, M.B. (3), Hodell, D.A (3) and Mc Kenzie, J.A. (1)

(1) ETH Zurich, Geological Institute, Zurich, Switzerland, (2) University of Geneva, Institute F.- A. Forel, Versoix, Switzerland, (3) University of Florida, Department of Geological Sciences, Gainesville, FL, United States, (andreas.mueller@erdw.ethz.ch / 0041446321075)

Sediment cores from Lake Petén Itzá, Guatemala, the deepest lake (˜160 m) in the neotropical lowlands, provide excellent archives for investigation of complex interactions among climate, environment, and ancient Maya civilization. Late Holocene forest decline and consequent soil erosion led to the deposition in Peten lakes of a thick detrital clay unit sometimes referred to as “Maya Clay.” Both forest decline and the resulting “Maya Clay” have been interpreted as consequences of ancient Maya deforestation and land use. Recent studies indicate that the palynologically-documented decline in high forest taxa predates archaeological evidence for sedentary human occupation in central Petén, that prevailed from ˜3.0 to 1.1 cal kyr BP. There remain questions as to whether the onset of vegetation changes was attributable to climate change, human disturbance, or both. Here we present sedimentological and geophysical data from cores taken in ˜30 m of water in Lake Petén Itzá that show the beginning of forest decline coincided with lake-level lowering and a related regression at ˜4.0-3.0 cal kyr BP. Beginning ˜4.0 cal kyr BP, previously-accumulated, laminated deep-water gyttja deposits were replaced by gastropod-rich sediments, indicating a shift to lower lake stage. The sedimentological change coincides with an unconformity seen in seismic data that is interpreted to be an eroded sediment layer in shallow water. A concurrent erosional hiatus in a shallow-water core from nearby Lake Salpeten supports the hypothesis of a synchronous lowering of lake levels in the region. The gastropod-rich unit was deposited during a phase of lower lake level and underlies the detrital “Maya Clay.” This suggests that drier conditions preceded, and may have contributed

to, initial tropical forest reduction. We propose that the regional forest loss initiated by climatic drying was followed by human settlement, which ultimately led to anthropogenic deforestation and soil erosion. Evidence for the onset of regional drying ca. 4.0 cal kyr BP is supported by data from a marine core record off northern Venezuela (Cariaco, ODP Hole 1002C). Furthermore, paleoclimate archives from several lakes in Africa, e.g. Lake Bosumtwi, indicate that the drying trend may have begun about 4.0 cal kyr BP on both sides of the Atlantic Ocean. These observations are consistent with a southerly displacement of the mean position of the Atlantic Intertropical Convergence Zone.