The sediment fill of Lake Petén Itzá, a large lake in the neotropical lowlands of northern Guatemala, provides an archive to investigate the impact of the Maya civilization (~3000 to 1100 cal. yr BP) on their environment. Sedimentation rates determined on a series of long piston cores document a dramatic increase in deposition during the period of Maya occupation of the watershed (Fig. 1). At this time, sediments are marked by a thick inorganic clay-rich unit, termed the 'Maya-Clay', reflecting increased soil erosion and runoff from the watershed to the basin. This unit has been traditionally interpreted as a consequence of anthropogenic deforestation and land use change by the Maya (Deevey et al., 1979).

New data from Lake Petén Itzá as well as from a small nearby lake (Lake Salpetén) document that the onset of increased sedimentation began in the Preclassic Period, when population densities were still relatively low (Rice and Rice, 1990). Rather than linked to changes in population densities, sedimentation rates correlate to an increase in pollen disturbance taxa, which replace early Holocene high-forest vegetation (Leyden et al., 1987). The increased sedimentation rates in the Preclassic Period could reflect initial clearance by early settlers and consecutive rapid erosion of easily erodable top soils.

Although human-induced deforestation was at least partially responsible for increased erosion in the Preclassic Period, other data also suggest that Holocene climate variations could have played an important role in changing the vegetation cover and accelerating soil erosion. Seismic stratigraphic analysis of the basin fill, calibrated with lithologic changes documented in long piston cores, reveal a peculiar carbonate-rich unit predating the 'Maya-Clay'. This unit is composed mostly of autochthonous carbonate and is dated at ~4000-3000 cal. yr BP. This time coincides with an unconformity seen on seismic data expressed as eroded sedimentary layers in shallow water depths between 10 and 15 m. Both the increased carbonate content as well as the erosional feature suggest a lake level lowering at ~4000-3000 cal. yr BP, which roughly coincides with the onset of increased sedimentation rate. Such a lake level lowering could have been likely the consequence of climatic drying, which also could have affected the vegetation cover and thus potentially contributed to the observed deforestation (Brenner et al., 2002). The hypothesis, that the deforestation and the elevated lacustrine sedimentation rates may not only be a result of Maya impact, but that they may also be affected by...
climate change, is additionally supported by nearby circum-Caribbean climate records indicating a regional drying trend beginning at ~3500 cal. yr BP. Measurements of oxygen isotopes in CaCO$_3$ of gastropods from Lake Petén Itzá, however, do not record a clear signal of $\delta^{18}$O values between 4000–3000 cal. yr BP so that a potential lake level lowering could not be confirmed yet by stable isotope analysis.

REFERENCES


