

Crater palaeolakes in the Tibesti mountains (Central Sahara, North Chad) - New insights into past Saharan climates

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For the first time continuous lacustrine sections were sampled from the volcanic Tibesti Mountains (Chad): In the 900 m deep crater of Trou au Natron at Pic Toussidé (3,315 m a.s.l.) and from the 800 m deep Era Kohor, the major sub-caldera of Emi Koussi (3,445 m a.s.l.). The remnant diatomites on their slopes are located 360 m (Trou au Natron) and 125 m (Era Kohor) above the present day bottom of the calderas.

These sediments from highly continental positions in the central Sahara are keys for the reconstruction of the last climatic cycles (Kröpelin et al. 2015). We report first results from sedimentary-geochemical (total organic and total inorganic carbon contents; total nitrogen; major elements; mineralogy) and palynological analyses for palaeo-environmental interpretations.

The diatomites from the Trou au Natron comprise 330 cm of mostly calcitic sediments with relatively low organic carbon (<2.5 %) and strongly varying aragonite and gypsum contents. Major elements (Ca, Fe, K, Mg, Mn, Na, P, S, Sr), elemental ratios (Sr/Ca, Mg/Ca, Fe/Mn) and the mineralogy are used to interpret the lake's salinity, productivity and ecological conditions. Trilete spores are preserved throughout the sequence, probably reflecting local moss/fern stands. Regional pollen rain—e.g. grasses and wormwood—is scarcely represented. Golden algae dominate in the lower section. The results of the first palynological samples suggest a small sedimentation basin. Two ¹⁴C-dated charcoals out of the upper part of the section indicate mid-Holocene ages and a linear extrapolation based on a sediment accumulation rate of 1.4mm^a-1 would lead to tentative dates of ~8650 cal a BP for basal lacustrine sediments and ~4450 cal a BP for the cessation of this lacustrine sequence.

The diatomites from the Era Kohor reflect a suite of sections that in total sum up to 145 cm of mostly silica-based sediments with very low carbon contents (<2% TC). Calcite dominated sediments are only present in the topmost 15 cm. Grasses and wormwood are dominating throughout the sequence, probably reflecting the main constituents of the regional vegetation. Cattail (*Typha/Sparganium*) and especially milfoil (*Myriophyllum*) are recorded abundantly and continuously throughout the sequence. In combination with green algae like *Pediastrum* the first pollen spectra indicate a lake shore and shallow fresh water vegetation. This seems to be in agreement with the preliminary observations of the fossil diatom contents, which show a diatom flora mainly composed of benthic and tychoplanktonic species, indicating a shallow freshwater lake.

Both diatomite sequences thus suggest shallow lakes throughout their deposition—whether this is due to their marginal position within the large calderas and/or shallow waters covered the entire calderas is an outstanding question that will be addressed with planned additional investigations.

Kröpelin, S. et al (2015): New data on the unresolved paradox of the Tibesti crater paleolakes (Central Sahara, North Chad). Abstract #64322 AGU-Fall-Meeting-2015.