Geophysical Research Abstracts
Vol. 15, EGU2013-3268, 2013
EGU General Assembly 2013

Multi-method assessment of fluvio-lacustrine sediments in the Central Sahara (NE-Niger)

Jens Brauneck (1) and Jan Krause (2)

(1) Julius-Maximilians-University, Institute of Geography and Geology, Physical Geography, Wuerzburg, Germany (jens.brauneck@uni-wuerzburg.de), (2) Freie Universität Berlin, Department of Earth Sciences, Institute of Geographic Sciences, Physical Geography

Surveys to the Central Sahara, executed by members of the Universities of Wuerzburg and Berlin, starting in the 1970′s have discovered the existence of paleolakes and fluvial archives that are suitable for reconstructing the areas late quaternary paleoenvironment. Allthough fluvial archives in arid regions are of only limited existence, they can contribute to a general understanding in terms of precipitation dynamics and discharge of specific drainage areas. Using a combination of radiocarbon dating, sediment analysis and hydrological modeling, we investigated Early Holocene sediments as well as detailed channel cross profiles obtained from DGPS measurements.

The investigated archives are located in a tributary of the Enneri Achelouma (NE-Niger) and provide information for a short-term humid period of several centuries (9.5-8.8 ka cal BP). Environmental change led to the accumulation of these fluvio-lacustrine sediments due to natural dams and the subsequent removal of the damming situation, probably due to increasing precipitation variability. The profiles provide information of a very small catchment, due to their position in the upper reaches of the valley. As indicated by geochemical values and mineralogical composition, the paleoenvironmental information obtained from these sediments show only minor changes in precipitation throughout the accumulation period.

We used an event based discharge modeling approach in order to iteratively hindcast precipitation values. The hydrologic model HEC-HMS is based on the discharge estimation carried out for the channel cross profiles. Next to the present flood bed two terrace levels can be detected throughout the tributary. The discharge estimation is carried out by two approaches for flow velocity estimation: Manning-Strickler (bankful discharge) and Costa (peak discharge) for all three runoff levels.

Our results show good agreement with current precipitation maxima in the area. Although a precise determination of the timing of increased precipitation is not possible, it can be narrowed down to 2 plausible time periods of mid Holocene or late Holocene age. The results support existing evidence from other archives and help to fill stratigraphic gaps in the paleoenvironmental history of the Central Sahara.