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# Holocene palaeoenvironmental changes in the central Sahara (NE-Niger)

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Although a high number of investigations focussed on the succession of climatological conditions in the Central Sahara, some uncertainties still exist as some of the results show discontinuities and mostly are of low temporal and spatial resolution. Two expeditions in 2005 and 2006 headed to the northeastern parts of Niger to investigate the known remains of palaeolakes and search some new and undetected ones. The sediments found at several sites were investigated in order to receive a complete picture of the Late Quaternary environmental settings and to produce high-resolution proxies for palaeoclimate modelling.
The most valuable and best-investigated study site is the sebkha of Seggedim, where a core of 15 meters length could be extracted which revealed a composition of high-resolution sections. Stratigraphical, structural and geochemical investigations as well as the analysis of thin sections allow the characterisation of different environmental conditions throughout the core. Most importantly, a complex age-depth model could be constructed, based on 21 accelerator mass spectrometry (AMS) radiocarbon measurements and reaching from Early to Mid Holocene. Driven by climate and hydrogeological influence, the water body developed from a water pond of several metres depth within a stable, grass and shrub vegetated landscape, to a freshwater lake in a more dynamic environmental setting. Radiocarbon dates set the beginning of the stage at about 10.6 ka cal BP, with an exceptionally stable regime to 6.6 ka cal BP (at 12.6 metres' depth), when a major change in the sedimentation regime of the basin is recorded in the core. Increased erosion, likely due to decreased vegetation cover within the basin, led to the filling of the lake within a few hundred years and the subsequent development of a sebkha due to massive evaporation. Due to the lack of dateable material in the upper core section, the termination of the lake stage and the onset of the subsequent sebkha stage cannot be determined precisely but can be narrowed to a period around 6 ka BP.
The results obtained from the core are compared with those from terrestrial and lacustrine sediments from outside the depression, situated a few hundred kilometres further to the north. Within the plateau landscape of Djado, Mangueni and Tchigai, two depressions and a valley containing lacustrine deposits, were investigated for palaeoenvironmental reconstruction. Depending on modifying local factors, these sediment archives were of shorter existence than the lake, but reveal additional information about the landscape dynamics from Early to Mid Holocene. These supplementary study sites are required to validate the information obtained from the coring, as it showed no noticeable signs of climatic alterations until Mid Holocene. Nevertheless, the supplementary sediment archives evidence the previous onset of aeolian activity and simultaneous presence of alternating amounts of precipitation and therefore indicate major variations in the timing and extent of lacustrine and aeolian periods.
The Early Holocene can generally be considered a period of wetter conditions, although the different study sites showed major variations in the timing and extent of lacustrine and aeolian periods, depending on modifying local factors. Evidently, a transitional time has existed between 7 to 5 ka BP where alternating climatic influences prevailed. In a landscape of limited palaeoenvironmental archives, where solitary under favourable conditions information has been conserved, only the investigation of several dissimilar spots within a designated study area has the potential to provide a complete picture of landscape succession. Therefore, the objective of further environmental reconstruction is to provide not only a multi-proxy but also a multi-habitat approach.