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Central Asian Holocene climate variability inferred from laminated sediments of Lake Chatyr Kul (Tian Shan, Kyrgyzstan)

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The Holocene climate development in Central Asia (CA) was mainly driven by the interaction of large-scale hemispheric systems such as the mid-latitude Westerlies, the Asian Monsoon and the Siberian High. Furthermore, it is argued whether changes in the mode of the North Atlantic Oscillation (NAO) caused climatic/environmental system shifts in CA. Various regional paleoclimate records have shown that there are spatial and temporal discrepancies, either caused by uncertainties within chronologies or differing local responses to climate changes. To help resolve this issue, high-resolution proxy records with precise chronologies are required.

For this purpose, we investigated the sediments of Lake Chatyr Kul (Tian Shan, Kyrgyzstan), which are annually laminated (varved) throughout almost the entire Holocene. This record represents the first high-resolution (seasonal) archive from this region and allows to study past climate development in detail. The endorheic Lake Chatyr Kul is located at an altitude of 3530 m a.s.l. within a catchment composed of Paleozoic-Mesozoic siliceous and calcareous rocks with scattered Permian granites. It is mainly fed by meltwater runoff during spring as well as by summer precipitation. Several sediment cores were retrieved in summer 2012 from the deepest part of the lake ($\sim$20m) from which a composite profile of approx. 625 cm length was constructed. A preliminary age model based on varve counting and nine AMS ^{14}C ages of terrestrial plant remains yields a basal age of $\sim$11800 cal. a BP for the recovered composite profile.

Microfacies analyses combined with geochemical data (e.g. μXRF element scanning data, TOC, δ^{13}C, δ^{15}N) revealed two prominent changes at $\sim$4500 and $\sim$2200 cal. a BP. The correlation between e.g. Ca/Ti, δ^{13}C, δ^{15}N and δ^{18}Ovaries throughout the record, suggesting non-stationary proxy behavior. Additionally, variations in the varve structure demonstrate changes in seasonality through time, probably caused by shifts from dominating winter to summer precipitation. We will discuss the influence of lake level changes as well as precipitation and/or erosion intensity on the sedimentation patterns in Lake Chatyr Kul.

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