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Late Quaternary climate change on the Tibetan Plateau inferred from a 22.500 cal. BP lake sediment record of Nam Co, Central Tibet, China.

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Within the frame of the DFG funded Priority Programme "Tibetan Plateau: Formation – Climate – Ecosystems (TiP)" as part of the project "Lake System Response to Late Quaternary Monsoon Dynamics on the Tibetan Plateau" a subbottom profiling and coring campaign on Lake Nam Co, the second largest lake on the Tibetan Plateau, was conducted in September 2008. Gravity respectively piston coring led to the recovery of five gravity cores and one piston core of 11 meters length in total. The piston core (NC08/01) originates from the central part of Lake Nam Co, characterized by a water depth of 93 meters. In this study, preliminary results of sedimentological, mineralogical and geochemical analyses are discussed in terms of monsoon forced Late Quaternary climate change and the corresponding response of the lake system. In addition, 14C AMS ages are used to develop a reliable age-depth chronology for the lake sediments of Nam Co. Hereby, global climate events like the Younger Dryas event, the 8.2 ka event or even the Little Ice Age are linked to the sedimentary record. Relying on mineralogical and geochemical parameters of piston core NC08/01, two distinct units can be distinguished. Concerning Unit 1 (11.0 - 3.0 m core depth), dating results indicate high sedimentation rates from 22.455 cal. BP (10.6 m core depth) to 19.245 cal. BP (4.3 m core depth). Sediments are mainly composed of silt (74 Vol.-%) with minor contributions of clay (21 Vol.-%) and sand (5 Vol.-%), characterized by a more or less homogeneous geochemical and mineralogical signature comprising a low amount of variability. TOC values ranging from 0.2% to 0.7% in combination with TN values of 0.05% - 0.12% imply low levels of bioproductivity and nutrient supply. However, microfossil remains (mainly ostracod shells) found at the core base seem to indicate lake conditions at Nam Co even throughout the Last Glacial Maximum. The high sedimentation rates within this period are supposed to reflect glacier melt water associated sediment influx. From 19.245 cal. BP (4.3 m core depth) to 13.265 cal. BP (3.0 m core depth) a shift to decelerated rates of sediment accumulation can be detected, implying Late Glacial associated changes of sediment transport into the lake. Inverse age-depth relations within this section are still under debate, indicating slump activities at the coring location due to rapidly rising lake levels during the Late Glacial. Following up with Unit 2 (3.0 m – 0.0 m core depth) still lower levels of sediment accumulation are apparent throughout the Early and Middle Holocene. After 13.265 cal. BP levels of TOC are rising. This can be interpreted as a signal for increasing bioproductivity due to Holocene warming. Elevated values of TOC are accompanied by a high amount of sulphur, reflecting anoxic conditions at the lake bottom. The observed gradual decrease of both the Mg/Ca and the Sr/Ca ratios implies lake level rising, indicating an intensified monsoonal influence on the water budget of the system during the Holocene. For the uppermost sediments it can be stated that geochemical, mineralogical and sedimentological proxies clearly indicate a pronounced response of the sedimentary system to changing environmental conditions, which can be connected to climate events like the Medieval Warm Period (MWP) or the Little Ice Age (LIA).