Geophysical Research Abstracts
Vol. 18, EGU2016-3457, 2016
EGU General Assembly 2016

Late Holocene climate change on the north-eastern Tibetan Plateau reconstructed from aeolian sediment sequences

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The north-eastern Tibetan Plateau is regarded as key area for the understanding of the Holocene paleoclimate in central Asia. Three main atmospheric systems are influencing the area, the Asian summer monsoon, the mid-latitude westerlies and the Asian winter monsoon. Many paleoclimate reconstructions are based on proxies from speleothems, lake sediments and tree rings. However, terrestrial archives provide additional information about the climate evolution. During the last decade a special emphasis has been placed on centennial to millennial scale climate fluctuations, especially in the context of the recent climate change. This study presents centennial scale climate fluctuations based on optical stimulated luminescence (OSL) ages from aeolian sediments from three catchment areas for the last 2000 years. Six phases of enhanced aeolian accumulation, each lasting around 80 to 200 years were identified. The first three phases (1630-1725 CE, 1450-1530 CE and 1250-1350 CE) occurred during the Little Ice Age; the other three (750-950 CE, 390-540 CE, 50-225 CE) during the so-called dark ages cooling. Aeolian processes were strongly reduced during the medieval climate anomaly. A comparison with other proxy records indicates that the formation of aeolian archives on the north-eastern Tibetan Plateau during the late Holocene is facilitated by cool and dry climate conditions during times of weaker Asian Summer Monsoon and probably enhanced Westerlies. The results show that short term climate fluctuations can be reconstructed from non-continuous and heterogeneous terrestrial archives in a semi-arid environment, provided a sufficient number of OSL ages from aeolian sediments.