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Aeolian-fluvial sediments as palaeoenvironmental records in the eastern Qaidam Basin, NE Tibetan Plateau, since MIS6

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Aeolian sediments sensitively respond to climatic changes. Continuous Quaternary loess deposits plays important roles in palaeoclimatic reconstructions. However, application of aeolian sand for such reconstructions is limited by its discontinuous depositional nature. Aeolian-fluvial sediments are widely distributed in arid and semi-arid regions where dunefields interact with watercourses. These palaeoenvironmental archives have been sparsely studied mainly due to their mixed character that requires new interpretation approaches.

We have found that climate fluctuations lead good preservation of aeolian sand deposits that underlay fluvial sediments, making the sedimentary records more continuous. In this study, aeolian and fluvial sediments (elevation of 3400-3500 m a.s.l.) were studied in the eastern margin of Qaidam Basin (QB), northeastern Tibetan Plateau to reconstruct palaeoenvironmental and palaeoclimatic changes since the MIS6, based on sedimentary facies, 120 OSL ages (with age range of 143-1 ka), grain size distribution, MS, TOC, and carbonates.

Within a deeply (10-65 m) incised 1.5-km-long valley, aeolian-fluvial cycles displayed frequent dune-damming of a stream since MIS6. Dune sands were dated to MIS's 6, 5d, 4, 3c, 3a, and the last deglaciation, while fluvial and dune-dammed lake sediments were dated to MIS's 5c, 3c, 3a, and deglaciation.

Large-scale A-F interactions mainly occurred during MIS3 and deglaciation, when the QB dunefields were still mobile after LGM and MIS4 and precipitation started to increase. No ages fall within LGM, suggesting an extremely arid and windy environment in which the dune sand kept reworking and cannot record OSL ages. This further confirms that only with the covering of fluvial sediments, aeolian sand can be well preserved. On the other hand, OSL ages of aeolian sand might only present periods when aeolian activities were not too strong.

During the Holocene, loess-paleosol accumulated in the QB margins, with loess accumulation since 10 ka and development of paleosols during ca. 8.5-3 ka, the Holocene optimum. These results demonstrate that aeolian-fluvial sediments are important palaeoenvironmental records in arid region and indicate that the climate of the eastern QB was mainly controlled by the

temperature (solar insolation) and precipitation (Asian Summer Monsoon) changes since MIS6.

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