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Central Asian sand seas climate change as inferred from OSL dating

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Luminescence dating techniques have become more accessible, widespread, more accurate and support studies of climate change. Optically stimulated luminescence (OSL) is used to determine the time elapsed since quartz grains were last exposed to sunlight, before they were buried and the dune stabilized. Many sand seas have been dated extensively by luminescence, e.g., the Kalahari, Namib the Australian linear dunes and the northwestern Negev dune field, Israel. However, no ages were published so far from the central Asian sand seas. The lack of dune stratigraphy and numerical ages precluded any reliable assessment of the paleoclimatic significance of dunes in central Asia.
Central Asian Sand seas (ergs) have accumulated in the Turan basin, north-west of the Hindu Kush range, and span from south Turkmenistan to the Syr-Darya River in Kazakhstan. These ergs are dissected by the Amu-Darya River; to its north lies the Kyzylkum (red sands) and to its south lies the Karakum (black sands). Combined, they form one of the largest sand seas in the world. This area is understudied, and little information has been published regarding the sands stabilization processes and deposition ages.
In this study, OSL ages for the Karakum and Kyzylkum sands are presented and analysis of the implications of these results is provided. Optical dates obtained in this study are used to study the effects climatic changes had on the mobility and stability of the central Asian sand seas.
Optically stimulated luminescence ages derived from the upper meter of the interdune of 14 exposed sections from both ergs, indicate extensive sand and dune stabilization during the mid-Holocene. This stabilization is understood to reflect a transition to a warmer, wetter, and less windy climate that generally persisted until today. The OSL ages, coupled with a compilation of regional paleoclimatic data, corroborate and reinforce the previously proposed Mid-Holocene Liavliakan phase, known to reflect a warmer, wetter, and less windy climate that persists until today and resulted in dune stabilization around the Mid-Holocene.
This study, solidifies our results regarding the Kyzylkum and Karakum sand seas dynamics, ages, and emphasizes the importance of regional climatic control on aeolian activity.