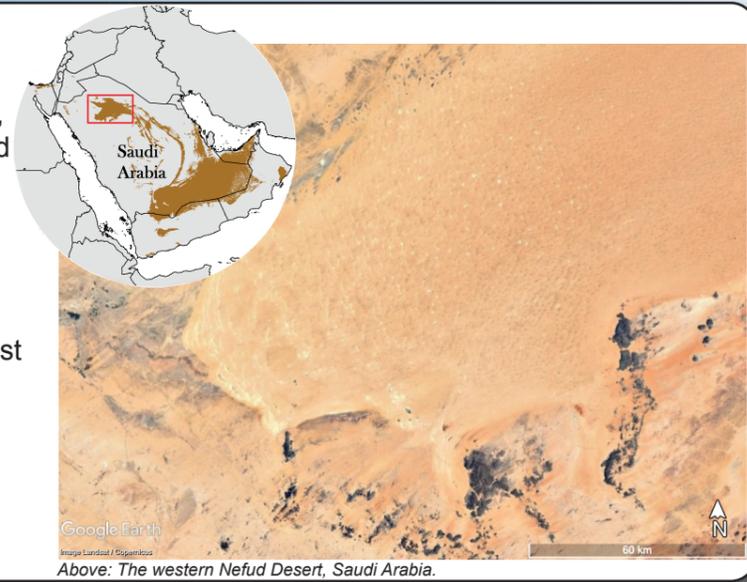


Palaeoenvironmental expression of humid phases in the western Nefud Desert over the past 500 ka

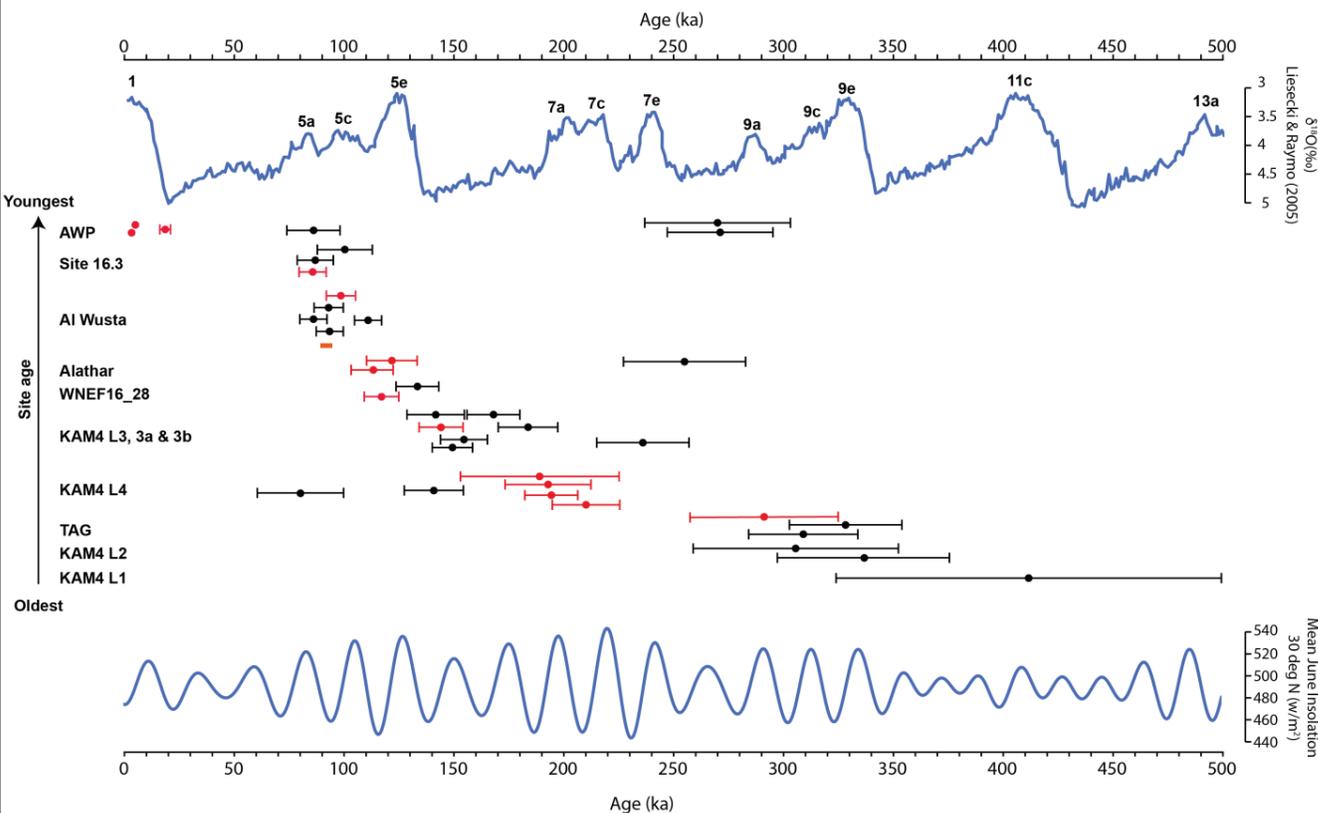
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1. Introduction

- The Nefud Desert, Saudi Arabia lies in a critical position for human dispersals between Africa and Asia, as it is only ~550 km southeast of the Sinai Peninsula - the only terrestrial landbridge between Africa and Asia.
- The Nefud Desert experiences orbitally-driven humid phases, and these are represented in the landscape by numerous interdunal carbonate/siliceous deposits (Breeze et al., 2015; 2017).
- Little is known about the nature of water bodies these deposits represent and this limits our ability to test hypotheses regarding human populations dispersing across or inhabiting the Nefud Desert.
- **Here we present a chronology and multi-proxy palaeoenvironmental analysis of interdunal carbonate/siliceous sequences from the western Nefud Desert, Saudi Arabia that span the past c. 500 ka.**

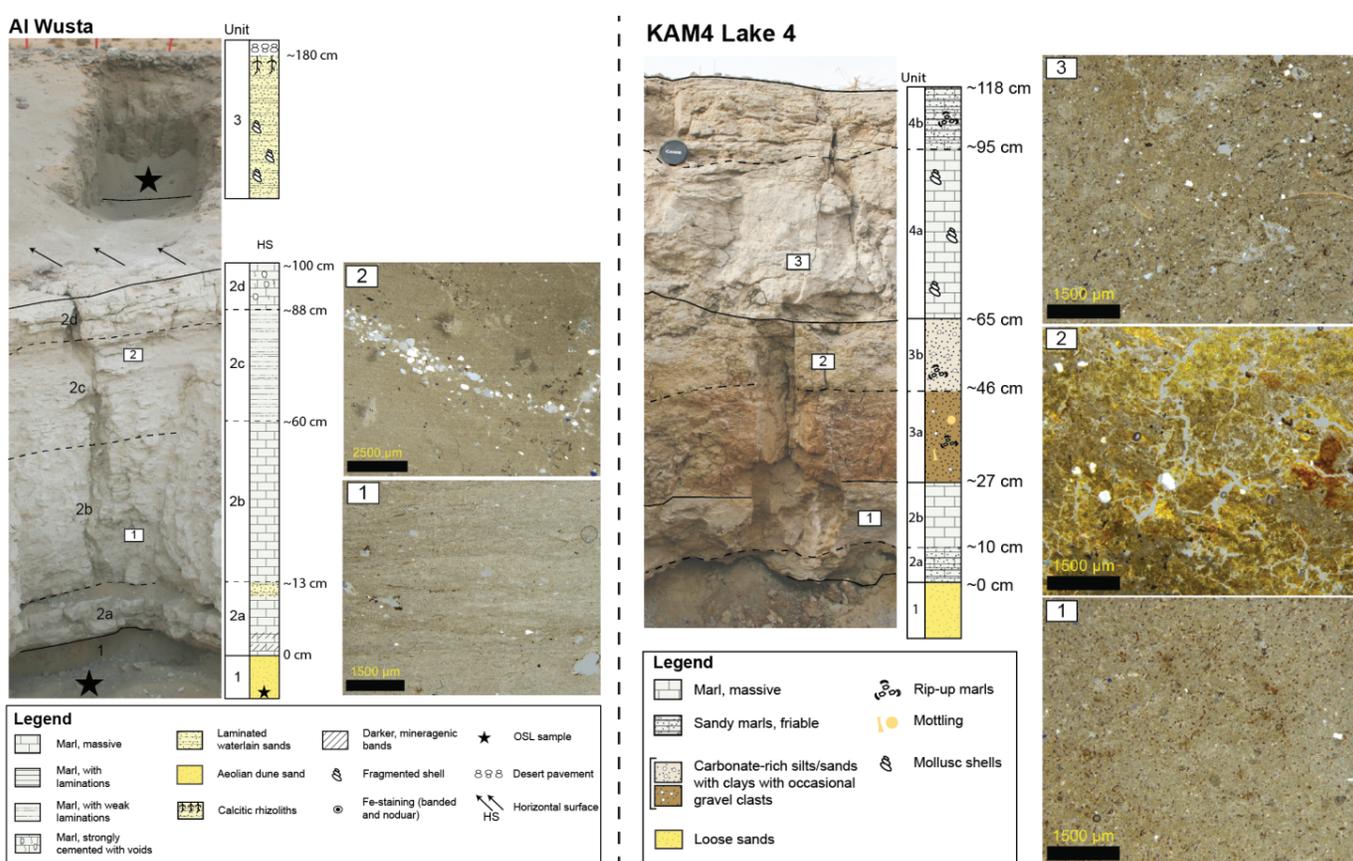


2. Luminescence results



- Underlying dune sands, palaeolake sediments and overlying fluvial sands were targeted in order to bracket the age of each deposit. Red dates = wetland sediments. Black dates = aeolian dune sands.
- Ages are presented in order from youngest at the top (AWP) to oldest at the bottom (KAM4 lake 4).
- Deposits date to interglacial/interstadial periods (MIS 5a, 5e, 7, 9, 11/13), consistent with previous research (Rosenberg et al., 2013).
- There is no evidence for carbonate or siliceous lake deposits of Holocene age. AWP relates to dated waterlain silty sands and gravels deposited in a recharge playa in the Al Wusta interdunal basin, where carbonate deposits of MIS 5 age exist higher in the basin.
- **The point above implies the Holocene, in contrast to all other interglacials over the past 500 ka, was not humid enough to lead to interdunal lake development in the western Nefud Desert.**

3. Palaeoenvironmental results



Al Wusta: The sedimentary sequence and microfacies from Al Wusta is typical of all sequences from MIS 5a - MIS 11, with the exception of MIS 7. Calcite dominated, little/no evaporites, and no evidence for desiccation/pedogenesis.

KAM4 Lake 4: Dated to MIS 7 and records a complex sequence relative to all other sites, that reflects lacustrine (1) → palustrine (2) → lacustrine conditions (3). This sequence is reflected in the three microfacies displayed alongside the sediment log.

Additional palaeoenvironmental data:

- $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ isotopes rarely show significant covariance and have ranges $<5\text{‰}$.
- Diatom palaeoecology, where data is available, is dominated by freshwater species with little or no brackish or saline tolerant species present.
- Multi-proxy analysis is consistent with perennial, shallow and freshwater lakes.

4. Key conclusions

- **Humid phases & lake development follow simple pattern during MIS 5a, 5e, 9 and 11/13.**
- **MIS 7 appears to show a more complex sequence (KAM4 Lake 4).**
- **The Holocene humid phase does not produce interdune lakes in the western Nefud, in contrast to other interglacials over the past 500 ka.**