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Why does it rain in the desert? The dust record in Tunisia.

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North Africa is one of the regions identified by UNESCO as experiencing severe water stress, and further drying could be devastating for region that is also insecure. Tropical semi-arid regions, such as North Africa are highly sensitive to climate change, and climate predictions for this area suggest that this region will experience drying in the next decades and centuries. This contrasts with findings from palaeo-studies which show that, during the Pleistocene, global warming often correlates to humid phases. This project uses speleotherm records with palaoedust (loess) archives to assess the climate record over humid and dry periods to improve our understanding of past climate change in the sensitive but under-represented central northern Africa region. This presentation will focus on findings from the most important loess deposit in northern Africa, at Matmata in Tunisia.

The loess sections within the Matmata Plateau have loess and soil horizons relating to a series of humid and arid phases during the Quaternary, a sequence that provides valuable insight into the origins and dynamics of desert deposits and the interplay between continental and maritime weather systems. Previous work, in the 1990s, on the Matmata loess has shown onset of loess deposition to be during a humid phase (~70 ka) with loess deposition continuing as the climate becomes more arid into the Upper Holocene. It is currently assumed that the source of this material is the Grand Erg Orient, based on a relatively old study (1987). However, new OSL data presented here shows that the onset of loess deposition was much older than previously thought (~300 ka), with the top of the sections dated at ~24 ka. It appears that deposition was not continuous with a large gap in the record from 143 – 45 ka. Gaps in sedimentation for the section older than ~140 ka are difficult to determine due to limited reliability of older OSL ages.

Provenance analysis has been undertaken on many of the dated samples to establish past

transport directions. Detrital zircon U-Pb data suggest that there is dominant Algeria-type source with some input from the north. The amount of this input varies over time with samples older than 200 ka showing a larger input from the north. $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ isotopes from different grainsize fractions tell a similar story, with a dominant west African source.