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Deciphering Past Desert-Margin Dynamics in Matmata, Tunisia

Sebastian Kreutzer[1,2], Sascha Meszner[3,4], Christoph Schmidt[5], Tobias Lauer[6], Melanie Bartz[5], Mathieu Duval[7], Moncef Bouaziz[8], Christopher-Bastian Roettig[3], Ulrich Hambach[9], and Dominik Faust[3]

[1]Geography and Earth Sciences, Aberystwyth University, Aberystwyth, United Kingdom (sebastian.kreutzer@aber.ac.uk)
[2]IRAMAT-CRP2A, UMR 5060, CNRS-Université Bordeaux Montaigne, Pessac, France
[3]Chair of Physical Geography, TU Dresden, Dresden, Germany
[4]JENA-GEOS-Ingenieurbüro GmbH, Jena, Germany
[5]Institute of Earth Surface Dynamics, Université de Lausanne, Switzerland
[6]Max Planck Institute for Evolutionary Anthropology, Department of Human Evolution, Leipzig, Germany
[7]Centro Nacional de Investigación sobre la Evolución Humana (CENIEH), Burgos, Spain
[8]Georesources and Environment Department, University of Sfax, Sfax, Tunisia
[9]BayCEER & Chair of Geomorphology, University of Bayreuth, Bayreuth, Germany

The terrestrial dust archives around Matmata (Tunisia) are unique in their morphological setting and grain-size composition (cf. Faust et al., 2020a, b). Located in front of the Grand Erg's parlour in a critical zone at the northern edge of the Saharan desert, up to 35 m thick plateau-like loess accumulations cover pre-existing landscapes. In conjunction with intercalated palaeosols, the sandy loess, or rather loess like sediment records, tapped fluctuations in aeolian dynamics related to rapid and large-impact climate boundary shifts. Some of them may have severely threatened local ancient cultures, and future changes may put modern settlements and agriculture projects in this region at risk. Palaeolandscape reconstruction, supported by reliable chronologies, helps us to chart the past landscape, assess today's dynamics, and maybe predict possible future scenarios.

The 'desert-loess' records around Matmata seem to engulf a wide temporal range back to Marine Isotope Stage (MIS) 9. Trapped charge dating techniques, such as luminescence and electron spin resonance (ESR) dating, are versatile tools to decipher the timing of past landscape changes. However, for archives such as the one in the neighbourhood of Matmata, conventional luminescence methods (e.g., optically stimulated luminescence, OSL) exceed reported temporal limits. Kreutzer et al. (2018) have convincingly shown that a multi-method approach, using infrared radiofluorescence (IR-RF) and OSL in conjunction with ESR dating, has good potential to tackle long-term landscape dynamics. Our contribution reports first trapped charge dating results from Matmata in Tunisia. We provide preliminary luminescence (IR-RF, OSL) and ESR dating results from seven different sites and discuss the challenges encountered during our methodological work. Finally, we attempt to link our findings to regional climate fluctuations and drainage alterations observed for the large endorheic salt lakes in the Matmata plateau's close purlieu.

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