

Environmental history recorded in eolian deposits under stone pavements, eastern Mojave Desert, USA

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Reconstructing the evolution of arid landscapes is challenged by the limited availability of appropriate environmental archives. A widespread surface feature of arid landscapes – stone pavement – traps eolian fines and can form an accretionary archive, growing with time and thereby recording essential information about the conditions under which it evolves. Based on a regional example in the eastern Mojave Desert, USA, seven stone pavement-covered soil-sediment sections on 560 and 270 ka old basalt flows are condensed to a correlation framework, comprising five distinct, successive sedimentological units. An OSL-based chronology enables correlation of this new sediment archive with other environmental archives from the region.

Three of the stratigraphic units are of accretionary nature and the top of each unit is mantled by a new generation of stone pavement. These stratigraphic units were deposited between >32.3-20.4 ka, 20.4-16.5 ka and younger than 16.5 ka, appearing to be strongly coupled with the history of the nearby ancient Lake Mojave and enhancing our knowledge of the eolian activity in this area. End-member modelling analysis of sampled grain-size distributions allows identification of a local detritus component, four separate eolian components and two distinct clay enrichment components, contributing different quantities of sediment sources to the five stratigraphic units. These findings improve current concepts about the evolution of stone pavements and their role as conveyers of information about environmental conditions in arid landscapes. Stone pavement-covered accretionary sediment deposits are a new key archive that allows quantifying the relative importance of dust accretion, slope processes, soil formation and vegetation cover.