Geophysical Research Abstracts
Vol. 18, EGU2016-2369, 2016
EGU General Assembly 2016


# Stacked palimpsests vs. the needle in the haystack: the challenge of reconstructing palaeoenvironments in drylands

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Drylands, incorporating the semi-arid desert margins vulnerable to desertification and drought, have overseen substantial climatic and environmental changes associated with the Quaternary. However, despite the extent of desert-marginal regions across the world, little is known about the nature and timing of environmental change in the past; likewise the trajectory for future change is uncertain. A major reason for our poor understanding of dryland palaeoenvironmets is likely to be a challenging combination of limited accessibility and the nature of archive preservation in these regions.

Here I propose a conceptual framework for reconstructing palaeoenvironments in drylands, based on two respective endmembers in the spectrum of sediment availability. Environments with low sediment availability constitute landscapes containing stratigraphic layers within which successive climatic events may be superimposed, the material traces of which are partially destroyed or reworked. The metaphor of a "stacked palimpsest" is hereby invoked to describe this situation. At the opposite end of the spectrum, sediment-rich environments may result in semi-continuous deposits tens of metres thick and representing a relatively short period of time. This situation represents a challenge to extract the most valuable palaeoenvironmental evidence among the large quantities of sediment, becoming a veritable "needle in the haystack."

I will enlarge on these two endmember concepts, using case studies from semi-arid Australia and the Eurasian loess belt to represent the "stacked palimpsest" and "needle in the haystack" metaphors respectively. Australian dryland landscapes are characterised by patchy, poorly preserved and spatially variable sedimentary deposits, and palaeoenvironmental records are consequently preserved over a large spatial and long temporal scale which can be viewed through the framework of the palimpsest model. By contrast, the thick Eurasian loess deposits which border the central Asian deserts present an overabundance of sediment from which extracting meaningful palaeoenvironmental information. Consequently, constructing an accurate chronological framework for long-term change in these regions can also be problematic. In both cases, the endmember concept can provide a useful framework from which to formulate systematic strategies for palaeoenvironmental reconstruction.