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U-series constraints on sediment residence timescales in semi-arid Australia

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Fractionation of uranium isotopes (^{234}U and ^{238}U) in fine-grained sediment (< 50 μm) can be used to quantify timescales of sediment residence i.e. storage in soils and associated transport in fluvial or aeolian systems. This information is invaluable for understanding the relationships between climate, tectonics and landscape evolution. In particular, how sediment transport and the landscape have responded to climate change over the past 100,000 yrs. (^{234}U/^{238}U) activity ratios have been measured in the fine fraction (2-50 μm) of palaeochannel sediments from the Katipiri Formation of the Cooper Creek in the Strzelecki Desert (south Australia). Cooper Creek is one of three major rivers feeding the Lake Eyre Basin, one of the largest internally-drained catchments in the world. Sediments were collected from six palaeochannels with depositional ages ranging from 119$\pm$11 to 22$\pm$ ka (optically-stimulated luminescence (OSL) dating). U-series and OSL data are combined in order to constrain the time elapsed between production by physical weathering of the source bedrock (comminution age) and the deposition age, to give an average residence time of the sediment in the catchment. Preliminary work yields sediment residence timescales between 66$\pm$10 to 107$\pm$17 ka. The inferred residence timescales for Cooper Creek sediments, in what today is a semi-arid environment, are comparable to sediment residence timescales (of similar depositional age) in temperate Australia. This suggests that the strong links observed between climate change and sediment transport during the last glacial cycle in temperate Australia maybe be witnessed Australia-wide. Future research is required to assess the contribution of wind-blown dust and its effect on calculated sediment residence timescales.