



Neogene fluvial landscape evolution in the hyperarid core of the Atacama Desert

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Cosmogenic nuclide exposure dating of ancient extensive alluvial fan surfaces and fluvial features in the hyperarid coastal Atacama Desert provide new insights about the onset and variability of aridity. Depositional systems in the Coastal Cordillera are significantly influenced by tectonic activity, creating sedimentation space, re-arranging drainage pathways and protecting fluvial depositional fan surfaces from subsequent burial or erosion. The predominantly (hyper-) arid conditions help to preserve evidence for climatic variation and/or slow tectonic changes. Applying single clast ^{10}Be and ^{21}Ne terrestrial cosmogenic nuclide (TCN) dating, we find evidence for episodes of enhanced fluvial erosion and deposition at prior to ~ 19 Ma, and ~ 12 Ma, and around 8-9 Ma. Fluvial modification of surfaces essentially ceased 2-2.5 Ma ago. The presence of pre-Miocene clast ages (two clasts with 29 Ma and 35 Ma old ages) points to slow or stagnant landscape development during the Oligocene. Our data implies the early onset of (hyper-) aridity in the core region of the Atacama Desert, interrupted by wetter but probably still arid periods. The apparent conflict with interpretations by others, favouring a later onset of (hyper-) aridity, can be reconciled when the climatic gradients within the Atacama Desert are considered.