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Temporal correlation of fluvial and alluvial sequences in the Makran Range, SE-Iran

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The Makran region of southeastern Iran is an active accretionary wedge with a partially subaerial component. New investigations have revealed a rather complex geodynamic evolution of the Makran active accretionary wedge that is not yet fully understood in its entity. Ongoing convergence between the Arabian and Eurasian plates and tectonic activity since the late Mesozoic has extended all trough the Quaternary. We focus here on fluvial and alluvial sequences in tectonically separated basins that have been deposited probably in the Pliocene/Quaternary, based on stratigraphic classification in official geological maps, in order to understand the climatic and tectonic forces occurring during the ongoing accretionary wegde formation. Specifically, we investigate the influence of Quaternary climate variations (Pleistocene cold period, monsoonal variations) on erosional and depositional processes in the (semi)arid Makran as well as local and regional tectonic forces in the Coastal and Central Makran Range region.

Necessary for such an analysis is a temporal calibration of alluvial and fluvial terrace sequences that will allow an inter-basin correlation. We utilize the exposure age dating method using terrestrial cosmogenic nuclides (TCN) due to the lack of otherwise datatable material in the arid Makran region. Limited radiocarbon data are only available for marine terraces (wave-cut platforms). Our preliminary 21Ne and 10Be TCN-ages of amalgamated clast samples from (un)deformed terrace and alluvial sequences range from ∼250 ky to present day (modern wash). These ages agree in relative terms with sequences previously assigned by other investigations through correlation of Quaternary sequences from Central and Western Iran regions. However, our minimum ages suggest that all age sequences are of middle to late Pleistocene age, compared to Pliocene age estimates previously assigned for the oldest units. Although often suggested, a genetical relation and connection of those fluvial sequences to coastal terraces and wave-cut platforms is problematic due to ambiguous ages and obscured stratigraphic linkage.

Our data suggest that events of terrace formation are roughly coeval between basins, but do not indicate a distinct climate forcing, though there is some tendency that terraces were formed during interglacial periods. Preliminary incision rates derived from strath terraces are on the order of 0.1-3 mm/yr with non-steady intervals. This in turn is well in the range of uplift rates deduced from coastal terraces. Further investigations are on the way, especially resolving complex exposure histories based on combining cosmogenic radionuclides and 21Ne.