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Short-time (<10 ka) denudation rates as a marker of active folding in the Zagros Fold Belt (Iran)

Marine Collignon (1), Negar Haghipour (2), Maarten Lupker (2), Ali Mohammadi (2), Marcus Christl (3), and Jean-Pierre Burg (2)

(1) Department of Earth Sciences, University of Geneva, Geneva, Switzerland (marine.collignon@unige.ch), (2) Geological Institute, ETH Zürich, Zürich, Switzerland, (3) Ion Beam Physics, ETH Zürich, Zürich, Switzerland

The interaction between tectonic, climatic and surface processes shapes the Earth's surface. Constraining denudation rates is a key to quantify the mass balance in active orogens and to understand the evolution of topography as a response to tectonic and climatic forcing. The extent of the coupling between tectonic deformation and surface processes is often difficult to isolate from other compounding factors. In this study, we investigate the response of denudation rates to crustal deformation in the Fars Province of the Zagros Fold Belt (ZFB). The ZFB is a reference area to study the effects of fold growth on the drainage network morphology and sediment routing. The active deformation pattern has been documented by the seismicity and GPS data and corresponds to the shortening rates derived from terraces incision rates integrated over the last 10 ka using fold kinematic models. The large-scale surface response of the ZFB to this deformation pattern has yet not been quantified. We present 10Be concentrations in seventeen sand samples from the Mand River, which drains a large part of the Fars Province. Denudation rates are generally low (ca. 0.05 to 0.1 mm a-1) but increase to ca. 1 mm a-1 near the Halikan anticline, where changes in precipitation, lithology or hillslope gradient are insignificant. The denudation rates upstream and downstream of the Halikan anticline are consistent with the GPS convergence rates in these areas. The sharp increase in denudation rates over the Halikan anticline denotes its growth as previously detected from terrace incision. The 10Be data also reveals small wavelength coupling between crustal deformation and erosion previously not observed by the scarce GPS data and/or measured terrace incision rates.