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Tectonic indicators from river basin morphology in the Zagros fold-and-thrust belt

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Tectonic indicators from river basin morphology in the Zagros fold-and-thrust belt
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We examine landscape responses to tectonism in the Zagros fold-and-thrust belt using river incision, Hypsometric Integral (HI) of river basins and the normalized steepness index (Ksn) of river profiles. These indices preserve landscape responses to tectonic drivers. In particular, we examine geomorphic changes along the strike of the range which may relate to differences in climate (precipitation). Results from five swath profiles (length ∼300 km, width 50 km) taken across structural strike, show changes in incision. The Sinjar, Kirkuk and Dezful profiles nicely show entrenchment of the Tigris, Lesser Zab and Karun rivers respectively, which could relate to high relief and relatively high precipitation. Such entrenchment is not found in rivers of the Fars region, which is much drier, with lower relief. 230 analysed river profiles across the Zagros show broad regions of Ksn < 50 m0.9 distributed across the Zagros foreland and the Turkish-Iranian Plateau. Higher values, >50 m0.9, are situated in higher relief and slope areas (e.g. Bakhtiari Culmination) where the high power streams are able to dissect and modify the landscape created by active geological structures. This result is in agreement with the HI results for 17380 third order river basins, where HI <0.3 is found across the foreland and the plateau, and HI >0.3 characterises area of higher relief and slope in the intervening fold-and-thrust belt. The geomorphic differences between the Dezful/Bakhtiari and Fars regions, expressed in incision patterns, and the location of the low/high HI transition (with respect to the thrust seismicity cut-off) might relate to their relatively wet and dry climate conditions. Our analysis also shows the effectiveness of using basin-scale HI in regional tectonic analysis.