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# Tectonically induced drainage network reorganization, central Zagros mountains, Iran and possible effects on orogen shape and evolution

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The interactions and feedbacks that exist between tectonic and surface processes is a subject of intense geoscience research. Of particular interest is the effect of erosion on the distribution of deformation in orogens and the controls that tectonics exerts on drainage network organization. A record of tectonically induced drainage network reorganization is preserved in the central high Zagros Mountains of Iran. In the Zard Kuh area ($\sim$150 km WSW of Esfahan) the geology and topography suggest that rivers and streams draining the northern flank of Zard Kuh 000m) once flowed into the Zayandeh river, which flows northeast across the structural grain of the Zagros, through Esfahan and finally drains into Gavkhoni playa in central Iran ($\sim$120 km SE of Esfahan and 330 km from Zard Kuh). The upper reaches of the Zayandeh river valley now end abruptly at the dextral Kuhrang fault, where a ridge separates it from the Zard Kuh drainage basin that drains into the Kuhrang river. This river flows SE along the Kuhrang fault, parallel to the structural grain of the range, then to the SW, and finally to the NW ending in a dam 33 km SW of Zard Kuh after a circuitous journey

of more than 300 km. Based on the abrupt termination of the Zayandeh river valley at a shutter ridge and structural mapping along the Kuhrang fault we suggest that the upper Zayandeh river valley is a water gap and that is was linked to the north Zard Kuh drainage basin while the deformation in the region was dominated by dip-slip thrusting and folding. A kinematic shift from simple compression to transpression led to the activation of the dextral Kuhrang fault, which cuts the Kuhrang thrust and offsets the upper Zayandeh river valley by 3 to 4 km. If the geodetically derived dextral strike slip rate ($\sim$3 mm/yr) across the central Zagros is accommodated mainly on the Kuhrang fault, then the time of diversion of the Zayandeh river headwaters was 1-1.3 Ma. Given that a major headwater diversion would affect the volume, sediment load, chemistry and the oxygen isotopic signature of the Zayandeh river it is likely that a record of this event is preserved in the sediments beneath Gavkhoni playa. Furthermore, this type of tectonically induced shift is important for our understanding of how orogens evolve. At the local scale, diversion of a river and its erosive power can act to shut down active thrusts and folds as load is no longer removed from the system. Similarly, at the orogen scale, diversion and entrapment of major river systems that efficiently evacuated mass out of an orogen, into the orogen may impede or stop sediment flux and lead to intermontane basin development, crustal thickening and propagation of the orogen into its foreland. Finally, differential drainage entrapment and diversion that leads to along strike variations in sediment storage and erosion rate may play an important role in controlling the tectonic evolution and large scale morphology of orogens in general.