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Morphological and paleoseismic evidence of surface faulting in the coastal Zagros, southwestern Iran

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The Zagros Mountains accommodate intense seismicity due to the ongoing deformation; however, surface faulting has been rarely observed and/or documented. The earthquakes of Furg (November 6th, 1990) and Qir-Karzin (April 10th, 1972) are unique events in the Zagros associated with a surface rupture. We use tectonic geomorphology and paleoseismology to document a previously unknown outcropped fault within the Zagros. This ~ 20 km fault zone lies between the Khormuj and Khaki anticlines, where the Simply Folded Belt (SFB) of the Zagros is physiographically known as the coastal Zagros as well. The Khormuj anticline, located in the northeast of the city of Khormuj, was previously linked to the Main Front Fault (MFF) on the southern limb of the anticline. Further to the south, the oblique-slip Khormuj fault zone with a strike of N120°–N125° cut the Quaternary sediments and displaced the streams and ridges laterally and vertically. Opposite to the dip of the MFF, the Khormuj fault dip is inclined to the southwest—approximately 75°—where the southern block is uplifted and marks an obvious trace on the ground. We carried out a kinematic GPS survey along the deflected ridges to measure the horizontal and vertical components. Our observations indicate significant dextral strike-slip displacements compared to the dip-slip offset. We observed a sequence of fluvial risers in three different levels along the Khormuj fault. We additionally studied a paleoseismological trench perpendicular to the Khormuj fault scarp evidencing at least two paleoearthquakes. The OSL age of the bottom of the colluvium wedge correlated with the older event indicates the latest event is younger than 25±8 ka considering the fault cuts these deposits up to the ground surface.