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New kinematic constraints of the western Doruneh fault (Central-Eastern Iran), from interseismic deformation analysis

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We investigated the interseismic deformation along the western termination of the Doruneh Fault System (Central-Eastern Iran) by means of DInSAR. 90 ENVISAT images from three different tracks from ascending and descending orbits have been processed using the SBAS (Small BAseline Subset) approach. Two ground velocity maps show a significant interseismic signal. The processed datasets confirm the main left lateral transcurrent kinematics of this fault segment, but also reveal a compressional component as well, in agreement with recent field works.

Then we performed a 2-D modeling of the velocity field inverting the data on three profiles belonging to the central part of the fault. We used an elastic dislocation model assuming an infinitive length fault. Our analytical model fits successfully the observed data and quantifies the slip in $\sim$4 mm yr^{-1} of horizontal and $\sim$2.5 mm yr^{-1} of vertical displacement. The results represent a quantitative estimation of a vertical movement, unrevealed until now ; the horizontal velocity is compatible with the geological records.

Considering a single earthquake rupturing the entire $\sim$80 km of the western fault zone and assuming that all interseismic deformation is recovered with a single event, we estimate a characteristic recurrence interval of about $\sim$400 yr.