



## **Thick- and thin-skinned deformation in the Zagros Simple Folded Zone (Iran) indicated by uplift of geomorphic surfaces**

**J. Lavé** (1), B. Oveisi (1,2), P. van der Beek (1), J. Carcaillet (1), L. Benedetti (3)

(1) LGCA, BP 53, 38041 Grenoble, France \_ Email : jlave@ujf-grenoble.fr ; (2) Geological Survey of Iran, Meraj St, Azadi Sq, Tehran, Iran ; (3) Cerege, Aix en Provence, France

The Zagros is a young and active orogenic belt at the southern front of the collision zone between Arabia and Eurasia. Whereas the general features of the geology and structure of the Zagros belt are now well understood, detailed data on the distribution of active deformation and seismotectonic behaviour across the belt are still poorly constrained. We address here these questions applying tectonic geomorphology methods. Remnants of warped and tilted fluvial and marine terraces provide indeed evidence for recent fold activity and crustal deformation in the study area. Two major rivers of the western Fars Province, the Dalaki and Mand rivers, intersect several active structures, including two supposed deeply rooted faults, the Mountain Front Flexure (MFF) and the Surmeh fault. At crossing the MFF, the Dalaki fluvial terraces display a clear tectonic scarp demonstrating the tectonic activity of the MFF. Preliminary C14 and cosmogenic (Cl36, Be10) dating of these terraces indicate that uplift rates range between 1 and 3 mm/yr. Assuming rigid translation above the 36-42° dipping MFF ramp, we therefore estimate the shortening rate accommodated by the MFF fold to range between 1.5 and 5 mm/yr. Further East the zone of ample terrace incision extends up to 35km East of the MFF. Such feature could have been produced by a broad zone of uplift associated to a deeply rooted MFF. At the contrary, the terraces along the Mand river, further South-East, do not display any significant uplift at crossing the MFF or the Surmeh fault. Terrace uplift seems rather associated to superficial folded structures involving only the sedimentary cover. Finally, the most frontal folds, along the coast of the Persian Gulf, display similar evidence for only active thin skin deformation. The central Zagros is therefore characterized by the combination of different styles of fold deformation. Both thick- and thin skin deformation contribute to the Zagros

deformation. However, the thin skin deformation appears to predominate and to accommodate most of the Zagros shortening. Dating of the terraces abandoned across the frontal structures confirm in addition that they absorb between 0.5 and 4 mm/yr of shortening along the Persian Gulf, and around 4-5 mm/yr along the lower Mand river. In contrast, our morpho-tectonic analysis further East reveals that uplift rates are lower than 0.2 mm/yr in the internal Zagros : the frontal structures (one to three folds) would therefore experience much more active deformation than internal ones, which suggest that the majority of the shortening across the Zagros is transferred to the frontal part of the orogenic prism, as expected from SW migration of the deformation front in a normal sequence activation.