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Active deformations of the Jura arc inferred by GPS and seismotectonics

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The Jura Mountain is the most recent expression of the alpine orogeny. At the northern end of the western Alps, its recent deformation is still a matter of debates. GPS data available in the Jura bear witness of disagreement between studies, as interpretations vary from uplifted belt to arc-parallel extension (Walpersdorf, et al., 2006) and very slow horizontal movements. Moreover, the traditionally accepted model of an active collisional activity of the Jura, in the dynamic continuity of the Alps, rises up the matter of its geodynamic origin. Indeed, the European Alps are in a post-collisional regime characterized by isostatic-related extension and uplift driven by interaction between buoyancy forces and erosional dynamics (e.g. Sue et al. 2007; Champagnac, et al., 2007; Vernant, et al., 2013.). We present a reappraisal of published focal mechanisms combined with a new GPS solution over the entire arc and surrounding areas. Although the Jura presents a low seismic activity, 53 focal mechanisms over the Jura have been inverted in order to infer the current stress field. Anyhow, we tested several combinations of f.m. inversions, by structural zones, in order to test the regional stress stability. It appears that the current stress field is very stable all over the arc, and following our different sub-datasets. Indeed, the stress field shows a stable near horizontal NW-SE-oriented s1, associated to a NE-SW-oriented s3. Therefore, the structural arc of the Jura seems to have very low or no impact in terms of current stress. Complementarily, we present preliminary velocity and strain fields from a GPS network composed of 25 permanent stations implemented between 1998 and 2014 all around the Jura arc. Indeed, we also integrated the recent GPS-JURA station (OSU THETA Besançon), but they are still too young to accurately constrain the strain of the belt. Preliminary results exhibit very slow velocities across the arc in term of baselines evolution, with infra-millimetric yearly velocity (0.1 to 0.3 mm/yr). They are compatible with low compression perpendicular to the arc. In terms of vertical motions, we obtain (very) low positives velocity (infra-mm), compatible with the results of Serpelloni et al. (2013) at the scale of the Alps. Actually, the Jura arc seems currently undergoing an overall transcurrent tectonism, both in terms of stress and strain field, with a (very) low uplift.

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