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Inclined transpression and lateral extrusive deformations along the Zagros Mountains, Iran

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In the last decades several theoretical and modelling studies have been carried out in order to unravel the sructural architecture and complex 3D finite and incremental deformation that controls the development of geological structures during oblique convergence. The northeastern margin of the African-Arabian plate is an example of an oblique convergence zone where exposed the Sanandaj-Sirjan Metamorphic Belt within the Zagros Mountains of Iran are systematically localized close to the Zagros Suture Zone. The Sanandaj-Sirjan Metamorphic Belt within the Zagros Mountains of Iran constituents a significant part of the Alpine-Himalayan orogenic system and represents a classic continental collision zone. Deformation structures of the Sanandaj–Sirjan Metamorphic Belt in the Neyriz area (SW of Iran) are consistent with dextral transpressional deformation, which is related to the oblique collision between the African–Arabian continent and the Iranian microcontinent. All microscopic and mesoscopic shear sense indicators with monoclinic structure as well as clear stair-stepping geometries (i.e. shear band/domino boudinages, monoclinic porphyroclasts and mica fish fabrics) or S/C and S/CC' fabrics confirm the dextral sense of shear.

Extensive quantitative and qualitative structural and microstructural investigations of the deformation structures within the study area indicated that these structural patterns are consistent with mathematical models that describe triclinic finite strain patterns in transpressional zones and are contrary to what is predicted in the model with monoclinic strain symmetry. In addition, semi-quantitative kinematic indicators suggest a major component of pure shear deformation and a stretching component parallel to the deformation zone boundary. Based on these structural associations, a combined inclined transpression and lateral extrusion model is suggested for this part of the Zagros orogeny.

Keywords: inclined transpression, vorticity, lateral extrusion, Zagros, Iran