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Flexural-slip and fold growing in the Tabas (central Iran) active folding deduced by AMS and structural analyses

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An integrated AMS and structural study was carried out in order to reconstruct the geometry of the Tabas fold system and the tectonic evolution of this sector of Central Iran.
The Tabas area is situated in the northern part of the Tabas block, where the Tabas Basin hosts a NNW–SSE trending fold system developed along the western foothills of the Shotori range. The Neogene sedimentary cycle of the Tabas Basin includes red marls with gypsum layers of the Upper Red Formation, which crop out along the cores of major anticlines and are overlain by a thick succession of fluvial and alluvial-plain conglomerates. In the southern and northern sector of the Tabas Basin these Neogene sediments are extremely thin, allowing in some places the fluvial conglomerates to lie directly on the pre-Neogene substratum, whereas toward the central and western part of the basin, they reach a thickness of several hundred meters.
In the Tabas fold system, 15 sites in the Neogene Upper Red Formation were sampled for AMS investigation. A mesoscopic structural analyses in the Tabas Neogene fold system was carried out with the aim to describe the geometry of the folds and of the associated brittle deformation to define the mechanism that drove the kinematic evolution of the thrust related fold system. In particular, two structural cross sections were carried out along the Sardar and Esphak river valleys because they develop almost orthogonal to the main anticlines, offering an excellent exposure of the Neogene and Quaternary units. In the Tabas area, AMS analysis shows, in most of the sites, a magnetic foliation parallel to the bedding plane, reflecting the diagenetic to post-diagenetic compaction processes. In some other cases the magnetic foliation is sub-vertical and not related to bedding, suggesting a tectonic overprint. At the same time, the maximum susceptibility (Kmax) direction and the intermediate susceptibility (Kint) direction axes are well clustered, with a mean NNW-SSE trend for Kmax direction (magnetic lineation), suggesting a tectonic origin of the magnetic lineation. In particular, the magnetic lineation is well defined in most of the analysed sites and it shows a preferred orientation, which finds a correlation with the main tectonic elements recognized in the study area. The magnetic lineation shows a N-S to NW-SE preferred orientation in all the analysed sites, which corresponds, at the site scale, the main fold-axis orientation, which ranges from a N-S trend to a NW-SE trend. The magnetic lineation is also orthogonal to the main slip direction (N70°E) deduced by slickenside orientation on the thrust fault planes soon after the 1978 Tabas earthquake.