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Structural analysis and tectonic implications of a shallow layer-parallel shear zone in the central Apennines (Italy).

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The central Apennines is a Neogenic NE verging fold-and-thrust belt, characterized by inherited lower Liassic structures and by different paleogeographic domains (with different rheological behaviours), which played a first order role in the tectonic evolution of the belt. The N-S trending Olevano-Antrodoco, one of the major thrusts of this area, is commonly interpreted as an oblique out-of-sequence structure, along which the Sabina slope domain (to the west) overthrusted the Latium-Abruzzi carbonate platform domain (to the East), reactivating the original Liassic to Miocenic boundary. Paleomagnetic data indicate that the Sabina domain and the Latium-Abruzzi domain were characterized by the occurrence of opposite vertical-axis rotations, clockwise and counterclockwise, respectively, in the two domains, suggesting a different tectonic evolution of these sectors. However, paleomagnetic data can provide only partial information on the kinematic evolution of this area because rocks suitable for paleomagnetic analysis are not widespread in the Latium-Abruzzi domain. Moreover, rocks exposed in the two domains do not allow performing analyses on sediments of the same ages. In this work, in order to provide additional kinematic and geometric constraints to the tectonic evolution of this part of Central Apennines, a mesostructural study was carried out in a decollement level, exposed in both Sabina and Latium-Abruzzi domains and located at the top of the meso-cenozoic carbonatic sequence. The Anisotropy of Magnetic Susceptibility (AMS) analysis was integrated with the structural analysis, representing an additional rock fabric indicator used to unravel the deformational history of the studied rocks. The analysed decollement was active in the early stages of the belt evolution and consists of a thick shear zone dominated by pressure solution cleavage oblique to bedding. The widespread exposition of this level, allows using the pressure solution cleavage as a regional mesostructural marker able to constraint rotations postdating its development. Data indicate that cleavage underwent two phases of rotations: (1) during thrusting and folding, when beds were folded; (2) in a later stage, when cleavage was rotated, together with thrusts and folds, about vertical axes.
Consistently with paleomagnetic data, we found that rotations about vertical axes define two domains coinciding with the Latium-Abruzzi and Sabina domains. This rotational phase is coeval with the development of the Olevano-Antrodoco, which is here interpreted as the surface expression of a deep N-S striking liassic normal fault, reworked as a dextral transpressive fault during the late stage of the compressional activity.