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Buried high-angle structures in the Marche foothills area (Central Italy)

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Some SW-NE seismic reflection profiles representing the central part of Umbria-Marche Apennine chain to the Adriatic sea, and kindly provided by ENI s.p.a., were interpreted. These profiles allowed to define the structural setting and main features at depth, and the evolution of the Marche Apennine sector with more details with respect to previous literature. Along three main parallel transects, crossing the Mio-Pliocene Apennine range and its external Plio-Quaternary sector, we highlighted important sub-surface and deep-rooted (> 10Km) Plio-Quaternary structures linked to outcropping ones. They are NW-SE or NNW-SSE oriented, with very steep geometry, and they probably involve the upper crust basement. In particular, these structures are interpreted as transpressive structures related to lower depth SW and NE-dipping high-angle reverse faults and up-thrusts (positive flower structures). These latter structures involve the Pliocene-Quaternary succession at surface. Moving from W to E, three of these main sub-surface positive structures have been identified in the Marche foothills. Ultimately, deep-rooted high-angle structures determine a predominat upwards and along striking tectonic transport and they can also have possible relationships with deep fluid circulation. The innermost structure nucleated starting from Lower Pliocene, the easternmost ones from Upper Pliocene, confirming a NE migration of the deformation. Furthermore, NE-dipping normal and transtensive faults are present west to the compressive structures and with their same age; they can be interpreted as accomodation structures, similar to that found in the Po Plain underground (Costa, 2003). The recognized structures are well framed within the general context where thrust activity in central Apennine almost ceased from upper Pliocene to Quaternary times, and recent focal mechanisms are mainly strike slip (Mazzoli et al., 2015). The NNW-SSE or NW-SE orientated deep rooting sub-vertical structures can be interpreted as the conjugate fault system with respect to the ENE-WSW or NE-SW seismogenic faults in the Adriatic, although they are probably active at different times, and they reactivate inherited discontinuities.

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