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A releasing-bend at the northern termination of the Alfeo-Etna shear zone (Western Ionian Sea, Italy): seismotectonic implications and relation with Mt. Etna volcanism

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Offshore data in the western Ionian Sea indicate that the NW-SE trending dextral shear zone of the Alfeo-Etna fault system turns to N-S direction near the Ionian coastline, where the Timpe fault system occurs. This latter deforms the lower eastern slope of Mt. Etna, showing NNW-SSE to NNE-SSW orientation and resulting from E-W trending regional extension. They are seismically active having given rise to shallow and low-moderate magnitude earthquakes in the last 150 years. Morpho-structural data show that NW-SE trending right-lateral strike-slip faults connect the Timpe fault system with the upper slope of the volcano, where the eruptive activity mainly occurs along N-S to SW-NE trending fissures. As a whole, morpho-structural, geodetic and seismological data, seismic profiles and bathymetric maps suggest that similar geometric and kinematic features characterize the shear zone both on the eastern flank of the volcano and in the Ionian offshore. The Alfeo-Etna fault system probably represents a major kinematic boundary in the western Ionian Sea associated with the relative motion of Africa and Eurasia since it accommodates, by dextral transtensional kinematics, diverging motions in adjacent western Ionian compartments. Along this major tectonic alignment, crustal structures such as releasing bends, pull-apart basins and extensional horsetails occur both offshore and on-land, where they probably represent the pathway for magma uprising from depth.