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Late evolution of the inner Northern Apennines from the structure of the Monti del Chianti-Monte Cetona Ridge (Tuscany, Italy)

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The Neogene and Quaternary tectonic evolution of the inner Northern Apennines (i.e. southern Tuscany and northern Tyrrhenian Sea), as well as its crustal features (i.e. low crustal thickness, Neogene-Quaternary magmatism, widespread geothermal anomalies, lateral segmentation of the stacked tectonic units, extensive deep sedimentary basins), are framed in different geodynamic scenarios: compressional, extensional or both, pulsing. Consequently, the basin and range structure that characterises the northern Tyrrhenian Sea and southern Tuscany is considered as a consequence of (i) out-of-sequence thrusts and related thrust-top-basins, (ii) polyphased normal faulting that formed horst and graben structures or (iii) a combination of both. This paper provides a new dataset from a sector of the eastern inner Northern Apennines (i.e. Monti del Chianti - Monte Cetona ridge) contributing to this scientific debate. New fieldwork and structural analysis carried out in selected areas along the ridge allowed to define the chronology of the main tectonic events on the basis of their influence on the marine and continental sedimentation. The dataset supports for early Miocene - (?) Serravallian in-sequence and out-of-sequence thrusting. Thrusting produced complex stacking patterns of Tuscan and Ligurian Units. Extensional detachments developed since later middle Miocene and controlled the Neogene sedimentation in bowl-shaped structural depressions, later dissected by normal faults enhancing the accommodation space for Pliocene marine deposits in broad NNW-trending basins (Siena-Radicofani and Valdichiana Basins). In this perspective, no data supports for active, continuous or pulsing, compressional tectonics after late Serravallian. As a result, in the whole inland inner Northern Apennines the extensional tectonics was continuously active at least since middle Miocene and controlled the basins development, magmatism and structure of the crust and lithosphere.