



Active kinematics of Italy and adjacent regions : fragmentation of the Africa-Adria plate

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How exactly is the active deformation of Italy and adjacent areas, which causes destructive earthquakes, related to the ongoing Africa-Europe convergence? Plate tectonic models such as Nuvel 1, which predict that Africa moves NNW relative to Europe at a rate of about 8 mm/yr at the longitude of Sicily, do not fit with recent GPS results that indicate about half this rate in a more northwesterly direction. Focal mechanisms of earthquakes suggest important changes, as well as gradients, of motion, with co-existence of zones of extension and shortening, both along the north edge of the African plate and along the sides of the Adriatic promontory. GPS data and field seismotectonic measurements along active faults in Italy and surrounding areas have become sufficient to better constrain the active kinematics of the central and western Mediterranean. After reviewing existing geodetic and seismotectonic observations, as well as previous kinematic models, we test the validity of a 2-D block model for the present-day deformation of peninsular Italy and adjacent regions. The model that best satisfies most of the combined dataset suggests that 1- subduction of the Ionian oceanic lithosphere beneath Calabria and the Peloritans no longer plays a significant role; 2- the divergent GPS vectors between Sicily and Apulia are consistent with the ongoing WNW-ESE extension observed along the Siculo-Calabrian rift (Messina rift), which extends at least from the Malta escarpment to the Gulf of Policastro; 3- most of the Africa/Europe convergence west of Calabria is absorbed along the southern edge of the Thyrrenian block ; and 4- the Adriatic promontory is cut in at least two blocks along an active, NE-SW trending oblique fault zone extending from the Gargano to the southernmost Dalmatian Islands. The consequences of this model on the mechanical behaviour of the lithosphere and on seismic hazard are discussed.