



Incipient extension along the active convergent margin of Nubia in Sicily, Italy: the Cefalù-Etna seismic zone

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Recent geodetic data are compatible with NNE-SSW tectonic extension at a rate of c. 5 mm/y in Sicily, southern Italy, within a broader region of net active compression along the Nubian plate margin (northern Africa). The structures that accommodate such extensional regime and its cause are still unknown. By field structural surveys and seismological analyses, the geometry, kinematics, structural architecture, and seismic potential of an extensional seismic zone linking Cefalù and Mt Etna in central-eastern Sicily are defined. The zone includes high-angle WNW-striking normal and right-lateral strike-slip faults and subordinate N- and NNE-striking strike-slip faults either right- or left-lateral. The occurrence of small discontinuous faults and the absence of related depressions and sedimentary basins suggest that the extensional regime is still in an incipient stage. The ongoing seismic activity possibly reactivates pre-existing faults. Instrumentally- and historically-recorded earthquakes are lower than about 6 in magnitude, and destructive events are historically unknown since at least 1300 A.D. This apparent upper bound of earthquake magnitudes is consistent with the maximum magnitude values estimated from the length of the longest mapped faults and sources of seismic swarms, which all together suggest a value between 6 and 6.5 as the maximum expected magnitude that can be proposed at the present stage of investigation for earthquakes in the study area. Lateral extension on pre-existing faults and upwelling of melt mantle material beneath Mt Etna are considered viable processes to explain, at least in part, the active extensional tectonics along the Cefalù-Etna seismic zone. Strike-slip seismic faulting beneath Mt Etna may be part of a previously-proposed diffuse transfer zone affecting northeastern Sicily and including the Tindari Fault.