The West Crati Fault, Calabria (southern Italy): refined crustal extension rates constrained by geologic and GPS data.

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Geologic studies of preserved stairs-like uplifted marine terraces and continuous GPS data collected in subduction zones provide a unique opportunity to investigate, on different time scales, crustal deformation resulting from upper-plate extension. The West Crati Fault in Calabria, southern Italy, is a normal fault located within the seismically extending upper plate above the Ionian subduction zone. It is of interest because a thorough comparison of the extension rates inferred from geologic and GPS data has not yet been performed. This E-dipping fault lies in an area where a few historical damaging earthquakes occurred, examples are those in 1184 (M 6.7) and 1638 (M 6.7). Fault slip-rates and earthquake recurrence intervals for the West Crati fault are still subject of debate. We investigated raised marine terraces along the strike of the fault, on its footwall over its tips, located above the Ionian subduction zone, to derive refined uplift rates and study the role that known extensional faults contribute to observed coastal uplift. We also estimated short-term vertical and horizontal movements on the hangingwall of this fault by analyzing the data of 7 permanent GPS stations located along the N-S oriented strike of this fault.

Our preliminary results demonstrate that (i) GIS-based elevations of Middle to Late Pleistocene marine terraces, as well as temporally constant uplift rates, vary along the strike of this fault, mapped on its footwall; (ii) rates of short-term vertical movements vary along the strike of this fault on its hangingwall. This confirms active deformation, on different time scales, along the E-dipping West Crati Fault, suggesting that the fault slip-rate governing seismic hazard has also been constant through time. Our preliminary results show the importance of mapping crustal deformation within the upper plate above subduction zones to avoid unreliable interpretations concerning the mechanism responsible for regional uplift.