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# ABSTRACT BOOK

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## **A multidisciplinary analysis for a 3D modelling application in seismotectonic: The case study of Quaternary Faults in southern Calabria**

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Active normal faulting and uplifting dominate the Quaternary tectonics of the southern Calabria, consistent with WNW-ESE oriented extensional dynamics. The main fault structures of this sector of the Calabrian Arc (e.g., Serre, Cittanova, S. Eufemia and Scilla faults) are considered responsible for the 1783 seismic sequence (M 6.5-7; Jacques et al., 2001). A multidisciplinary approach was applied to define, through a 3D analytical model, the geometry, kinematics and dynamics of the Cittanova and Serre fault planes. Their geometry was defined using the distribution of crustal seismicity projected on a schematic geological section, reconstructed through the interpretation of CROP seismic profiles and morpho-structural investigations. Modelling is performed in MOVE software through the Faults Response Modelling module which use the TDE (Triangular Dislocation Elements) analytical method (Meade, 2007). The geometric, seismological and kinematic features of the modelled faults have been validated by comparing them with empirical models (e.g., Wells & Coppersmith, 1994). A first attempt to invert the available GNSS data is carried out to constrain an analytical Okada model (Cannavò, 2019 and references therein) of the studied faults. The models obtained from the different approaches will be compared to improve our knowledge of the considered area. The study methodology applied in this paper, may represent a guideline that can be used to modelling other quaternary seismogenic structures in the Calabrian Arc.

Cannavò, F. (2019) - A new user-friendly tool for rapid modelling of ground deformation. *Comput. Geosci.*, 128, 60-69.

Jacques E., Monaco C., Tapponnier P., Tortorici L. & Winter T. (2001) - Faulting and earthquake triggering during the 1783 Calabria seismic sequence. *Geophysical Journal International*, 147(3), 499-516.

Meade B.J. (2007) - Algorithms for the calculation of exact displacements, strains, and stresses for triangular dislocation elements in a uniform elastic half space. *Computers and Geosciences*, 33(8), 1064-1075.

Wells D.L. & Coppersmith K.J. (1994) - New Empirical Relationships among Magnitude, Rupture Length, Rupture Width, Rupture Area, and Surface Displacement. In *Bulletin of the Seismological Society of America*, 84(4), 974-1002.