



## **The 1908 Mw 7.1 Messina Earthquake Italy revealed: 5 m slip of an offshore 70 degrees east-dipping normal fault mapped in the geology**

Marco Meschis (1), Gerald Roberts (1), Zoe Mildon (2), Jennifer Robertson (1), Alessandro Maria Michetti (3), and Joanna Faure Walker (4)

(1) Birkbeck University, Institute of Earth and Planetary Sciences (IEPS), Department of Earth and Planetary Sciences, London, United Kingdom (marco.meschis.14@ucl.ac.uk), (2) School of Geography, Earth and Environmental Sciences, University of Plymouth, UK, (3) Università degli Studi dell'Insubria, Como, Italy, (4) Institute for Risk and Disaster Reduction, UCL, London, UK

The 28th December 1908 Messina earthquake (Mw 7.1), Italy, caused >80,000 deaths and transformed earthquake science by triggering the study of earthquake environmental effects worldwide, yet its source is still a matter of debate. To constrain the geometry and kinematics of the earthquake we use elastic half space modelling on non-planar faults to replicate levelling data from 1907 – 1909, and the geology and geomorphology of capable faults characterizing the Messina Strait in southern Italy. The novelty of our approach is that we (a) recognise the similarity between the pattern of vertical motions and that of other normal faulting earthquakes, and (b) for the first time model the levelling data using the location and geometry of a well-known offshore capable fault. Our results indicate slip on the capable fault with a dip to the east of 70 degrees and 5 m dip-slip at depth, with slip propagating to the surface on the sea bed. Our work emphasises that geological and geomorphological observations supporting maps of capable faults should not be ignored when attempting to identify the sources of major earthquakes.