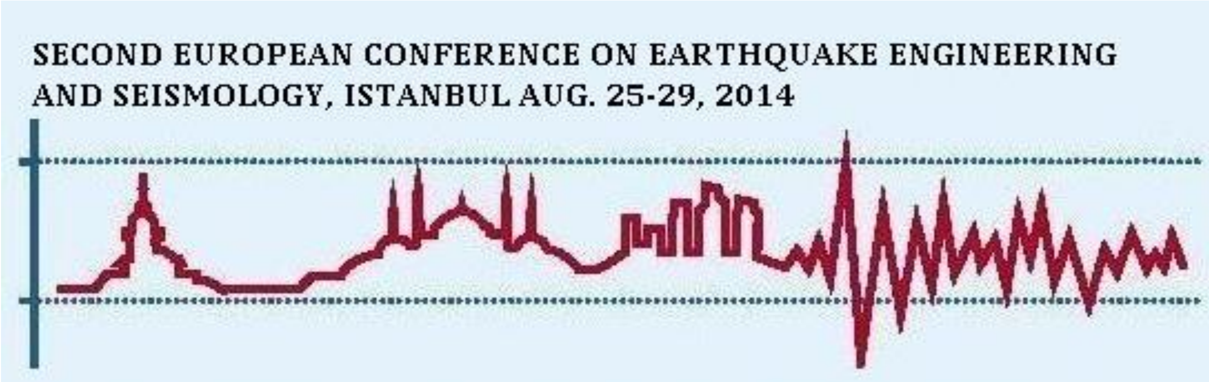


# IMAGING THE RUPTURE OF THE MW 5.2 OCTOBER 25, 2012 POLLINO (ITALY) EARTHQUAKE USING BACK-PROJECTION METHOD

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The Pollino Mts. area at the southernmost tip of Southern Apennines (Italy) has been struck between 2010 and 2012 by an intense seismic sequence characterized by more than 5000 small to moderate earthquakes. The strongest earthquake (Mw=5.2) of the sequence occurred on October 25, 2012 produced damage in the epicentral area corresponding to a maximum intensity of 6 on the European Macroseismic Scale 1998 (EMS-98). Because of this earthquake, more than a thousand people were evacuated and emergency actions have been carried out by Civil Protection authorities.

We present rupture details of this earthquake derived by back-projecting local recordings from a virtual seismic array. We report the first application of this method for a relatively low magnitude earthquake, showing that it is possible to image the finiteness of source by using data recorded at local distances (within 150 km from the epicenter). We also frame the so obtained information concerning the mainshock rupture process in an overall description of the seismic sequence evolution primarily coming from high-quality earthquake locations.

We found that the Pollino earthquake ruptured with a complex behavior having source time function and earthquake duration of about 10 seconds. Two discrete pulses of energy occurred: the first near the hypocentre and a secondary smaller southwards at 0.9 sec later and 4-5 km shallower. The horizontal distance between these points is about 4 km and the overall distance is about 6 km. The back-projection can be considered a step forward in imaging earthquake rupture. In fact, using different techniques (e. g. finite fault) it is necessary to impose certain constraints in order to regularize the inversion and reduce the number of degrees of freedom. Commonly the fault geometry is assumed, as well as a rupture velocity, and slip is prohibited to occur behind a healing front. Even so, there remains a significant degree of non-uniqueness in finite-fault models. On the other hand, the back-projection method gives variable results depending on array geometry, frequency band, and other tuning parameters. It is less affected by uncertainties in velocity model, has minimal assumptions about fault geometry and no assumptions on rupture kinematics and size are got in consideration. Ideally, both approaches would be combined to give the most robust model of earthquake rupture. The back-projection technique is potentially very fast and it is possible to obtain an image of the rupture process within 20-30 minutes of the origin time. This information can be important to governmental agencies in order to guide emergency response and rescue together with other traditional methods such us ShakeMap.

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