



Source Parameters Estimate During the 1997 Umbria Marche (Central Italy) Seismic Sequence: Fluid Diffusion or Static Stress Interaction?

D. Piccinini (1), A. Antonioli (2) and M. Cocco (1)

(1) Istituto Nazionale di Geofisica e Vulcanologia, (2) University of Ulster

The 1997 Umbria-Marche seismic sequence consisted of six moderate magnitude earthquakes ($5 < M_w < 6$) and thousands of aftershocks that, in 40 days, activated a ~45 km long, NW-trending, fault system. It is one of the best studied seismic sequences in Italy and most of the seismic events have been relocated using a double difference technique (Chiaraluce et al., 2003). The migration of seismicity towards the south west and the impossibility of explaining all the main events with a direct Coulomb static stress redistribution (Nostro et al. 2005), together with evidence of the presence of fluids in the area, encouraged a different approach invoking pore pressure relaxation as a possible triggering mechanism (Antonioli et al. 2005, Miller et al. 2004). In this work, we analyze seismic activity during a 2 month period of temporary seismic network recording. We compute the radiated Seismic Energy, Seismic moment, Magnitude, Static Stress Drop and Apparent Stress for any single event of the sequence both directly from the waveforms and by derivation of the analytical relationships. By examining the measured seismic parameters it is possible to infer differences between events with purely tectonic mechanisms and events with potentially different triggering mechanisms. The lower stress drop estimated south of the sequence could be an indicator of fluid diffusion, especially after comparison with travel-time and attenuation tomography.