



PROPERTIES OF THE 2013 KALLIDROMO MOUNTAIN (CENTRAL GREECE) SEISMIC SEQUENCE

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On 7 August 2013 two moderate earthquakes (09:02:45 and 09:06:51 UTC), with moment magnitude $M_w=4.3$ and $M_w=5.4$ respectively, triggered a seismic sequence in Central Greece. The epicentral area was in Kallidromo Mountain to the east of Amfikleia town and to the west of Regginio village. The $M_w=5.4$ epicentre was manually located: $\varphi=38.701^\circ$, $\lambda=22.680^\circ$ at depth $d=8$ km, according to the National Observatory of Athens. These events were followed by a significant number of earthquakes with both small and intermediate magnitudes. On 16 September 2013 (14:42:39, UTC and 15:01:14, UTC) two moderate events occurred at the same region, with moment magnitudes $M_w=4.5$ and $M_w=5.2$, respectively. The $M5+$ events of 7 August and 16 September 2013, as well as the rich aftershock sequence of 2650+ events ($1 < M_L < 4.7$) of the three following months have been relocated. For this purpose the NonLinLoc software of Lomax et al. (2000) was used. A 1-D velocity model on the basis on the 3-D local earthquake tomography model proposed by Karastathis et al (2011) was used. The phase data set from National Observatory of Athens included more than 25.600 -P and 15.500 -S wave arrivals. Only events with at least 5 P-wave and 1 S-wave arrival, having an azimuthal gap lower than 180° , location RMS lower than 1.5s and travel time residual lower than 2.0s were selected for processing. The map distribution of the aftershock sequence point towards the reactivation of a $N70^\circ \pm 10^\circ E$ striking, south-dipping normal fault, which is in agreement with regional kinematics and stress patterns (Roberts and Ganas, 2000; Chousianitis et al., 2013). The second part of this study refers to the calculation of the moment tensor solutions for the larger aftershocks. Seismological broadband data from the Hellenic Unified Seismological Network were collected and analyzed in order to determine the source parameters of the events that occurred in Central Greece. For this purpose we

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selected and analyzed the data of 10 broadband seismological stations with three components. The source parameters of 41 earthquakes with magnitudes $3.5 < M_w < 5.4$ were calculated based on a moment tensor inversion, using regional waveforms at epicentral distances less than 3° . Usually we use at least four stations at different azimuth coverage and with an epicentral distance no more than 200 km. The preparation of the data, includes the deconvolution of instrument response, following the velocity was integrated to displacement and finally the horizontal components rotated to radial and transverse. According to our methodology the long period part of the signal is inverted. The σ_3 -axis (tension) of the local stress ellipsoid is oriented $N173^\circ E$ (or $N7^\circ W$) which provides further proof for the near-optimal orientation of the 7 August, 2013 seismic fault with respect the N-S extension of the crust in central Greece. The last part of this study includes statistical results on the properties of the aftershock sequence using the ZMAP software. We calculated the b-value, the p-value (rate of aftershock decay), the map distribution of b value, the resolution map and the map of standard deviation of b value among other parameters. From the study of the above properties we concluded that the $M_w=5.2$ earthquake of 16 September 2013 (15:11 UTC) was part of the aftershock sequence of that on 7 August 2013.

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