



Location and source properties for the earthquake sequence occurred in the Western Getic Depression (Romania), December 2011 - January 2012

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A crustal earthquake sequence (40 earthquakes detected and located between 30 December 2011 and 10 January 2012) was recently reported in the western part of the Getic Depression (about 20 km east from the Tg-Jiu city). The main shock, occurred on January 1, 2012, 23:57 (45.04, 23.56, h=14 km, MD = 4.5) was preceded by 7 foreshocks (MD less than 3.6) within 65-hour interval. The largest aftershocks of magnitude 4.0 and 3.9 occurred within the first 30-minute interval. Seismic source properties are determined using multiple approaches: empirical Green's functions (EGF) deconvolution, spectral ratios technique and acceleration spectra analysis. For EGF and spectral ratios application, we selected co-located foreshocks and aftershocks ($2.1 \leq \text{MD} \leq 4.0$) in association to the main event (MD = 4.5). Two different methods were used to calculate the focal mechanism: a method using the polarities of Pg and Pn waves and the other one representing the waveform inversion of moment tensors. Our analysis reveals distinct features, such as the alignment of the foreshocks and aftershocks along a NW-SE direction. The focal mechanisms computed for the three largest events using both techniques are similar, showing a rupture plane in the same NW-SE direction. The relative location of the main shock indicates a unilateral rupture, from SE toward NW. In parallel, source parameters are retrieved from the analysis of the accelerometer spectra. The resulted source time functions are similar from one station to the other, suggesting negligible source directivity effects for the study events. The shape of the deconvolved source time function for the main shock of 1 January 2012 indicates a homogeneous rupture process in the focus.