



A Vrancea doublet of earthquakes on September 23 and December 27, 2016: comparative analysis of effects

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A pair of moderate earthquakes of similar magnitude ($M_w = 5.6$) occurred in the Vrancea seismic source, a well-defined seismicity nest located in the mantle, beneath the South-Eastern Carpathians Arc in Romania. The two events are separated in time by two months (September 23, 2016 at 23:11:20 GMT and December 27, 2016 at 23:20:55 GMT). They are located close each other (45.7140N, 26.6180E, $h = 92$ km, and 45.7090N, 26.6030E, $h = 99$ km, respectively) and could be considered as belonging to an earthquake doublet. Similar doublets generated in the same depth range were recorded in 01 August 1985 ($M_w = 5.2$ and 5.8) and in 30-31 May 1990 ($M_w = 6.9$ and 6.4). The main purpose of this paper is to investigate comparatively the macroseismic effects associated to the earthquake doublet of 2016 and to analyze possible correlations with source characteristics, acceleration distribution and focal mechanism. Macroseismic information is collected using the on-line questionnaires from the website of the National Institute for Earth Physics (NIEP) and of the European Mediterranean Seismological Center (EMSC). The two earthquakes were felt over an extended area covering most of the Romania, north of Bulgaria, Republic of Moldova and south of Ukraine. We estimate the maximum observed intensity at V (MSK-64 scale). Although the two events have similar locations, time of occurrence and focal mechanism, significant differences were reported in the way that they were felt: on September 2017 the effects were stronger toward NE (Moldova) and SE (Dobrogea), while on December 2017 they were stronger toward NW (Transylvania) and SW (Romanian Plain). Possible source effects (complexity, rupture size) are investigated in this respect.