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Destructive Vrancea (Romania) Intermediate-Depth Earthquakes: Intensity Distributions and Isoseismals

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The intermediate-depth (70-180 km) earthquakes of the Vrancea (Romania) source zone produce the most significant seismic hazard to Romania and its neighboring countries, in particular to the Republic of Moldova, Ukraine, and Bulgaria. Analyses of the macroseismic data of these events revealed several peculiar effects, which can be summarized as follows: the earthquakes affect very large areas with predominantly NE-SW trending extensions, and, in many cases local and regional geological conditions control the variation of the amplitudes of ground motions to a larger degree than magnitude or distance.

An extensive set of macroseismic data is now available for the four major earthquakes of the last century: November 10, 1940 (Mw = 7.7), March 4, 1977 (Mw = 7.4), August 30, 1986 (Mw = 7.2), and May 30, 1990 (Mw = 6.9). This study aims to achieve unified macroseismic data sets of these destructive Vrancea earthquakes. 'Unified' means the application of a single but common intensity scale to the entire macroseismic field of each earthquake. Partly, site intensities had to be retrieved by tracing back to original investigations or even to the primary raw descriptions, when necessary and available.

Concerning the data of the Romanian territory, major efforts were necessary to recover the macroseismic information. Due to the lack of access to original site observations or data-files, the information for every earthquake was retrieved by digitizing the original macroseismic maps compiled by different authors.

Since decades the 1940 November earthquake has caused considerable confusion in distinguishing the macroseismic scales, applied by different authors. This paper proposes a way to solve these inconsistencies. Furthermore, we present MSK intensities and the corresponding isoseismals of the March 4, 1977, the August 30, 1986 and the May 30, 1990 Vrancea intermediate-depth earthquakes. They are compiled and analyzed in a unified way over an area, which includes Romania, Bulgaria, Serbia, Hungary, Ukraine and the Republic of Moldova.