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New earthquake catalogue of the Caucasus

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The Caucasus is one of the most active segments of Alpine-Himalayan continent-continent collision. High seismicity of the area reflects general tectonics of the region. The main seismo-tectonic feature is the junction between Arabian and Eurasian plates. The Caucasus has a documented historical catalog stretching back to the beginning of the Christian era. Most of the largest historical earthquakes prior to the 19th century are assumed to have occurred on active faults of the Greater Caucasus, but size and location of those events have high uncertainties and can not be directly assigned to one or another active tectonic structures in the area. Instrumental seismic observation in the Caucasus began in 1899, when the first seismograph was installed in Tbilisi (Capitol of Georgia). Seismic network grew over the years. During Soviet era number of stations increased in the region, providing better network coverage and valuable data set for the research. Data of many thousand of earthquakes recorded by the regional network were stored as the seismic bulletins in a paper form.
The Southern Caucasus countries started joint project “Probabilistic Seismic Hazard Assessment in the Caucasus ” supported by LLNL, USA (Lawrence Livermore National Laboratory). The major goal of the project was to compile regional seismic data in order to provide reliable input for the Hazard map calculation.

First arrival and amplitude data for 15 000 earthquakes were digitized from the old bulletins. Participant countries provided data for the events with magnitude more than 3.7 of both: analogue and digital seismic networks. Data was stored in the web database, developed particularly for the project.

In this study we present relocated 15 000 regional events of 118 years of observations time in the Caucasus as the major input for hazard analyses. Compiling Soviet magnitude data K, MLH, MPV, we derived new relation formulas of Soviet and modern magnitude scales. Newly compiled catalogues has unified Mw magnitude scale.

The results of this study will tremendously improve National Seismic Hazards maps of the Southern Caucasus Countries.