The Unified Scaling Law for Earthquakes in the Friuli Venezia Giulia Region

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The parameters of the Unified Scaling Law for Earthquakes (USLE) in the North Eastern part of Italy, namely in the Friuli Venezia Giulia Region (FVG) and its surroundings, have been studied. For this purpose, the updated and revised bulletins compiled at the National Institute of Oceanography and Experimental Geophysics, Centre of Seismological Research (OGS catalogue) has been used. In particular, we considered all magnitude 2.0 or larger earthquakes, which occurred in the time span 1994-2013 and within the territory of homogeneous completeness identified for the OGS data.

The USLE parameters A, B and C have been evaluated at each of about 300 seismically active cells of $1/16° \times 1/16°$ size. The parameter A corresponds to the logarithmic estimate of seismic activity at magnitude 3.5, normalized to the unit area of $1° \times 1°$ and to the unit time of one year. The obtained values of the parameter A range between -0.9 to 0.2; these values correspond to an average occurrence rate for magnitude 3.5 earthquakes that varies in the range from one event in 8 years to one event every 7.5 months. The values of the coefficient of magnitude balance, parameter B, concentrate in the interval from just above 0.5 to 1.0. The fractal dimension of the earthquake epicenter locus, parameter C, spreads from 0.6 to 1.3.

The obtained values of A, B, and C have been used to characterize the seismic hazard and risk for the territory under investigation, based on estimates of N(M) at each of the analysed cells. In fact, it has been shown that long-term estimates of the USLE coefficients permit to define seismic hazard maps in rather traditional terms of maximum expected magnitude, macroseismic intensity or other ground shaking parameters that can be derived from the computed magnitudes. Accordingly, preliminary estimates of the seismic hazard for the FVG region have been computed, at the level of 10% exceedance in 50 years, from the corresponding magnitude assessment based on the USLE. The obtained estimates have been compared with those from earlier studies and have been used to evaluate the seismic risk for the main cities in the region.