

MAGNITUDE AND ENERGY PARAMETERIZATION OF EARTHQUAKES IN PRACTICE OF EARTHQUAKES PROCESSING IN KAZAKHSTAN

Irina ARISTOVA¹ and Natalya MIKHAILOVA²

The works on creating of a new map of seismic zoning the informational and seismological basis for which is an earthquake catalogue from ancient time to 2013 are currently conducted in Kazakhstan. Creation of the earthquake catalogue for long time period is characterized by large data heterogeneity in terms of assessment of earthquake focus “size”. For more than hundred years of instrumental observations, the methodical approaches for earthquake force parameterization has been changed, different scales were developed and applied. Released seismic energy and magnitude were determined by macroseismic data. In different years, various magnitude scales were applied in the practice of routine seismic observations: by type of used seismic waves (by body and surface waves, by coda-waves), by instrument type (short-period and mid-period instruments), by type of used calibration curves. Recently, the moment magnitude calculated via seismic moment is more and more applied in the world practice. In addition to magnitude scales, the energy class scale introduced into observation practice by Rayutian T.G. was widely used on the territory of the USSR. The energy class has direct relation to the seismic energy released in the focus. This scale is currently used in Kazakhstan and in all Central Asia countries of the former USSR. For some time, the energy class of Rayutian T.G. was applied in parallel with energy class of Aptikayev F.F., featured by variable-sized reference-sphere. One event in the catalogue may have one or several different parameters characterizing its value. At joint application of catalogue data for different time periods to construct seismological maps, to make calculations for seismic hazard assessment etc. there is a task to recast different magnitude types and energy class into one characteristic (homogeneous magnitude). This work solves two issues: 1) what type of magnitude should be selected as a basic one, so that its values are calculated for all events in the catalogue, i.e. to obtain a catalogue homogeneous by magnitude; 2) how to obtain these values from different types of parameters. The investigations on recasting of different information about magnitudes and classes determined in different years by various processing Centers on different scales into one type of homogeneous magnitude were conducted. Two types of magnitudes were selected as basic – magnitude on surface waves M_s and moment magnitude M_w . The algorithm was developed, and calculations of these magnitudes were conducted for the earthquake catalogue of Kazakhstan for the whole period. Data by different parameters are well correlated, the orthogonal regression equations to relate all magnitudes and energy class K with values M_s and M_w were obtained. The obtained catalogue can be used for solving different tasks of seismology.

¹ Institute of Geophysical Research AEC MINT RK, Almaty, i.aristova@kndc.kz

² Dr., Institute of Geophysical Research AEC MINT RK, Almaty, mikhailova@kndc.kz