GC2024-U001

Macroseismiic studies: Historical earthquakes

Ruben Tatevossian[1]

[1] Institute of Physics of the Earth, RAS, Russia

ruben@ifz.ru

Macroseismology describes and studies the effects observed on the Earth's surface caused by an earthquake, as well as the relationship of these effects with the parameters of the earthquake source. To assess the intensity of shaking, macroseismic scales are being developed: they allow the comparison of reported effects with standard effects listed in the scale. The construction of scales does not require the assumption of any earthquake model. Vice versa, the solution to the other problem - determining the parameters of sources based on the macroseismic effect - requires the development of an equation for the macroseismic field, which necessarily contains a model. In addition, any macroseismic field equation by default assumes uniformity of the macroseismic scale (“distance” between each grade is equal), which has not been strictly proven. If the assumption is correct, then the path to quantitative macroseismology opens. Great achievements are associated with quantitative approach; all parametric catalogs of historical earthquakes owe their existence to it. At the same time, classical macroseismology is far from exhausted. It makes it possible to understand in which direction one should search for sources of information on earthquakes in historical documents, how to assess the reliability of information, and how to take into account the historical and cultural context of messages. In general, the purpose of the presentation is to demonstrate the capabilities of classical macroseismology. The presentation includes several blocks. The first block discusses the concepts of scale rank, hidden and explicit models (assumptions) in macroseismology. The second block examines historical earthquakes in Eastern Siberia. Various types of data source are recognized, and it is shown what advantages and disadvantages each of them has. The third block shows that classic macroseismology can significantly clarify knowledge on seismicity even for a period of time that cannot in any way be considered historical - the second half of the 20th century. The fourth block presents the problems faced by studies of remote earthquakes when data from the epicentral zone is not available.