



Study of seismic events in the Central Part of East European Platform

Ella Gorbunova, Irina Sanina, Galina Ivanchenko, Margarita Nesterkina, and Natalya Konstantinovskaya
Institute of Geospheres Dynamics, Moscow, Russia (emgorbunova@bk.ru)

A measurement system for location seismic events in the Central Part of East European Platform is situated within the Mikhnevo Geophysical Observatory of the RAS Institute of Geospheres Dynamics and consists of 12 seismic stations. One vertical station is located in the center of the group in a shaft tunnel. The other stations are located on the periphery in three concentric circles and are almost equally spaced with regard to the terrain to ensure full azimuth coverage to the maximum extent possible. The unique array identifies events with a magnitude up to 3 at the distances until 1000 km within the Central Part of East European platform.

Most of the events recorded by the Mikhnevo array at a distance of 60–500 km are man-made events represented by explosions in quarries during the development of mineral deposits. Long-term seismic records of explosions in quarries have been processed for the period from 2004 to 2014 to generate a database containing standard waveforms for each quarry. Some events of unknown origin appear in the records for this period; these do not correspond to the identified seismic forms for explosions in known quarries. Epicenter coordinates for these events do not match the coordinates of the known quarries.

A cosmotectonic map of the Central Part of East European Platform was compiled during the studies using the LESSA software package (Lineament Extraction and Stripe Statistical Analysis) and data on the deep crustal structure, which made it possible to define the morphostructural plan and evaluate the geodynamic conditions in the area. The deep basement structure through the sedimentary cover is expressed in the surface texture of the area under study. The region's neotectonics is closely related to the history of deep structures, in particular, aulacogens extending in different directions, which may show in the contemporary morphostructural plan, mainly as inversion and partially inherited forms.

Out of events of unknown nature identified during processing of seismic data from the Mikhnevo array, five events were selected that are associated with the north-eastern edge of the Dnieper-Donetsk aulacogen. The other events are located in various geological structures of East European Platform. If we group the events of undetermined nature in the area under the influence of a fault with strike-slip kinematics near the edge of the Dnieper-Donetsk aulacogen, which is active at the present stage, we may assume that these events are of tectonic origin.

The waveforms we obtained can be considered test forms during the interpretation of the nature of seismic signals recorded by the Mikhnevo array. Since the number of events is limited, it is impossible, at this stage of research, to draw any definite conclusions; seismic monitoring data need to be processed first to identify any endogenic events.