



Refinement of parameters of weak nuclear explosions conducted at the Semipalatinsk test site on the basis of historical seismograms study

Inna Sokolova

Institute of Geophysical Research, Almaty, Kazakhstan (sokolova@kndc.kz)

Many researchers working in the field of monitoring and discriminating of nuclear tests encounter the problem of lacking in seismic catalogues the information about source parameters for weak nuclear explosions. As usual, the information about origin time, coordinates and magnitude is absent, there is information about date, approximate coordinates and information about explosion yield. Huge work conducted on recovery of parameters of small underground nuclear explosions conducted at the Semipalatinsk Test Site using records of analogue seismic stations of the USSR located at regional distances was conducted by V. Khalturin, T. Rayutian, P. Richards (Pure and Applied Geophysics, 2001). However, if underground nuclear explosions are studied and described in literature quite well, then air and contact explosions were small and were not recorded by standard permanent seismic stations. In 1961-1962 maximum number of air and contact explosions was conducted at Opytnoye polye site of the STS. We managed to find and analyze additional seismic data from some temporary and permanent stations. That time IPE AS USSR installed a network of high-sensitive stations along Pamir-Baykal profile to study earth crust structure and upper mantle, the profile length was 3500 km. Epicentral distance from some stations of the profile to Opytnoye polye was 300-400 km. In addition, a permanent seismic station Semipalatinsk (SEM) located 175 km away from the site started its operation. The seismograms from this station became available recently.

The digitized historical seismograms allowed to recover and add parameters for more than 36 air and surface explosions. Origin time, coordinates, magnitudes m_{pv} , MLV and energy class K were determined for explosions. A regional travel-time curve for Central Kazakhstan constructed using records of calibration chemical explosions conducted at the STS in 1997-2000 and ground-truth underground nuclear explosions was used to determine kinematic parameters of explosions.

MLV, m_{pv} , and energy class K were determined for all underground nuclear explosions conducted at the STS using historical seismograms from Central Asia stations. Dependencies of regional magnitudes on yield were received for air and underground nuclear explosions.

Thus, application of historical seismograms at regional distances allows to recover and replenish the seismic catalogues of past nuclear explosions for further use in scientific investigations and monitoring tasks.