

CHARACTERISTICS OF GEODYNAMIC PROCESSES IN THE REGION OF SEMIPALATINSK TEST SITE USING SHORT-PERIOD SHEAR WAVE ATTENUATION DATA

Kopnichev Y.F. (1), Sokolova I.N. (2)

(1) Institute of physics of the Earth of the Russian Academy of sciences, Moscow, Russia

(2) Branch "Institute of Geophysical Research" RSE NNC RK, Kurchatov, Kazakhstan

e-mail: yufk777@mail.ru

We have been studying attenuation field structure in the Balapan and Degelen areas using seismograms of calibration chemical explosions in the region of the Semipalatinsk test site (STS). We analyzed characteristics of short-period coda envelopes (at frequencies of 1.25 and 5 Hz). Abnormally high S-wave attenuation in the earth's crust and uppermost mantle is observed in the Balapan area, where two large deep fault zones pass. Attenuation within such depth range in the Degelen area is essentially lower.

Temporal variations of the amplitude ratio of Lg and Pg waves (Lg/Pg parameter) were studied using recordings of more than 260 underground nuclear explosions (UNEs), obtained by station TLG, situated in the region of North Tien Shan, at distances of 730-770 km from the STS. It was established that this parameter changes in time by essentially different manner for Murzhik, Degelen and Balapan areas. Considerable increase of S wave attenuation within the earth's crust is observed for the Balapan explosions in 80-th. We considered temporal variations of the Lg/Pg parameter using seismograms of quarry explosions conducted since 2002 to the north of the Balapan area and recorded by station MKAR, situated in the region of the eastern Kazakhstan. It was shown that the value of this parameter grows in 2002-2006 and later is approximately at the same level till 2021.

It is supposed that spatio-temporal variations of the attenuation field structure are connected with ascending deep-seated fluids through large deep fault zones due to long intensive influence of powerful explosions and subsequent migration in horizontal direction. Such the mechanism allows also to explain existing large thermal anomaly in the region of north-eastern Kazakhstan including STS.