The crustal quality factor in the southwest of Baikal rift system and surroundings

A.A. Dobrynina (1), V.V. Chechelnitsky, (2), and V.A. Sankov (1)

(1) Institute of the Earth's Crust, Siberian Branch of Russian Academy Sciences, Irkutsk, Russian Federation
(dobrynina@crust.irk.ru), (2) Geophysical Survey Siberian Branch of Russian Academy Sciences, Baykal Regional
Seismological Center, Irkutsk, Russia

The seismic quality factor (Q_C) and the attenuation coefficient (δ) of the crust in the southwest of Baikal rift system and surroundings have been studied analyzing coda waves, using the single backscattering model. For this purpose from regional earthquake catalogue were selected 58 local events with magnitude M=3.3–5.4, occurred within 2001-2007. The Q_C values were estimated at central frequencies 0.3, 0.75, 1.5, 3, 6, 12 Hz and five lapse time windows from 20 to 60 sec with a step of 10 sec. The values of $Q_C(f)$ and the attenuation coefficient δ were obtained for different tectonic blocks: stable Siberian platform ($129f^{0.47}$, δ=0.007 km^{-1}), Khamar-Daban block ($126f^{0.80}$, δ=0.007 km^{-1}), seismically active East Sayan Mountains ($94f^{0.96}$, δ=0.010 km^{-1}) and South Baikal depression ($99f^{0.87}$, δ=0.009 km^{-1}). The most large attenuation was determined for Tunka depression ($59f^{1.55}$, δ=0.015 km^{-1}). The quality factor Q_0, the value of Q_C at 1 Hz, calculated at different lapse time windows for all studying area show a significant variation from (106±10) to (255±18) and attenuation coefficient δ from 0.008 to 0.004 km^{-1}, corresponding to lapse time window lengths of 20 and 60 sec, respectively.

As a result of our study the frequency dependent attenuation model was obtained. The lateral variations of Q-factor are dependent on the degree of Cenozoic tectonic activity of the structures (including of young basalts localization) and the age of the crust. Observed changes of Q-factor for different lapse time windows are explained crustal vertical heterogeneity and its decreasing with depth. (RFBR 08-05-00992).