

Deep seismic researches with using high-power vibration sources at the profiles in the east of Russia

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Success of active seismology and deep seismic researches of seismically-active zones depends on technology and first of all on excitation sources. It is unacceptable to use strong explosions or powerful stationary vibration sources for this purpose because of ecologic reasons as well as poor spatial coverage. Low-power vibration sources (which are commonly used for seismic prospecting purposes) are also ineffective, because of low translucence aperture and small penetration depths. Field investigations using powerful (40-60 tons) transportable and high-power stationary (100-tons) vibrators have been carried out by Siberian Branch of the Russian Academy of Science since for 30 years. For the long period of researches in various regions of Siberia, technique of work with moveable unbalanced vibration sources was proved; a considerable experimental data volume was accumulated.

Use of powerful transportable vibro-sources was developed into effective working technology. Optimal transportation unit was developed for work in hard-to-reach areas on the base of high performance cross-country vehicles. There were recorded wave fields for both longitudinal and transverse waves reflected from a reference boundary in the Erath crust and Moho which were recorded for 0 – 300-400 km. Data show high stability and repeatability of vibration effects. There were carried out many experiments on comparison of explosive and vibration records n various distances. A database of records registered in near-field zone was accumulated for various geology (from low-velocity sediments to crystal rocks). Effectiveness of explosive and vibration effects for various geology and records at various tectonic zones was researched. We started to research grouping of high-power 40-60-tons moveable vibration sources at DSS work on the profiles in Siberia. There are achieved much success in using of combined system of observations with using vibration sources, explosions and pneumosources in transit (land – sea) zones.

We present some examples of using high-power transportable and stationary vibrators, recording equipment, observation systems, data of deep vibroseismic researches with high-power moveable vibrators at thousand-kilometer 2-DV geotranssects (Magadan - Vrangal Island), 2DV-A (Pevek - Valunistoe village – Anadyr – Khatyrka village) and 3-DV (Dzhalinda village – Tynda – Yakutsk - Khatyrka village) at the East of Russia.