

Seismic tomography of the oceanic crust

NEPROCHNOV YU.P. Shirshov Institute of Oceanology, Moscow, Russia

The development and application of method of seismic tomography (STOM) of oceanic crust is now an important problem of marine seismic investigations. Whereas the areal survey by single-channel continuous seismic profiling (CSP) and multichannel seismic profiling (MSP) allows rather detailed mapping of sedimentary layer and basement, the data on structure and physical characteristics of deep crystalline parts of the crust are extremely inadequate. They have been obtained until recently basically by seismic refraction method on single stations or along profiles, which are not comparable to detailed CSP, MSP, gravimetric and magnetometric survey. This hinders the interpretation of geophysical anomalies (magnetic, gravitational, geothermal) and decreases the reliability of tectonic and geodynamic reconstructions. STOM experiments were carried out during two expeditions of the Shirshov Institute of Oceanology for study of the oceanic crust in four regions: the Komandorsky Basin (the Barents Sea), the Murray F.Z., the East Mariana Basin and the Central Indian Ocean intraplate deformation, differing by tectonic setting, geodynamic conditions and crustal age. STOM experiment in each region was carried out in a square area with dimensions 40x40 km. Array of Ocean Bottom Seismographs (OBS), installed at the center and at corners of the square, was used for collection of refraction and wide-angle reflection data. One or two 30 L airguns shot with spacing 150 to 300 m along a dense grid of profiles. A single-channel hydrophone streamer and a digital recording system were used during shooting on profiles to collect vertical incidence reflection data. Experimental data characteristics, examples of processing and interpretation are presented for STOM regions.