

## The crustal structure in the cinder cones zone of Plosky Tolbachik volcano, Kamchatka

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Regional zone of cinder cones of Plosky Tolbachik volcano (Tolbachik Dol) is situated in the southwest area of the Klyuchevskaya group of volcanoes in Kamchatka. The most important historic eruption of this area is the Large Tolbachik Fissure Eruption (LTFE) 1975-1976. Among the described big fissure eruptions of the world, the LTFE is distinguished by a unique variety of phenomena and is considered as one of the largest basaltic eruption in the Kuril-Kamchatka volcanic belt and one of the most studied volcanic eruptions. However, some aspects require extended studies. In particular, these are the issues related to the structure and properties of shallow magmatic chambers and feeding channels, as well as the main peculiarity of the eruption - the change in the composition of erupted basalts. In order to restore the deep structure of Tolbachik Dol a passive seismic technique - low-frequency microseismic sounding method (Gorbatikov et al., 2008) - was applied. In this technique surface Rayleigh waves of different frequencies are used as sounding signals. The method is based on the fact that the crustal heterogeneities distort the spectrum of the low frequency microseismic field in the vicinity of the underground object. The spectral amplitudes on the Earth's surface decrease above high velocity heterogeneities and increase above low velocity ones.

Registration of the wide frequency band microseismic field was carried out in Tolbachik Dol along 3 linear parallel profiles (14-15 km in length, step of measurement 500 m) embedded transversely to the line of cinder cones through 3 very much alike volcanic fissure vents of different ages: Northern Vent of LTFE, 1975; Vent-1004 occurred about 2000 years ago; Vent-Alaid occurred about 1500-1000 years ago.

The crust vertical cross-sections, reflecting the distribution of relative velocities of transverse seismic waves up to 20 km were constructed.

The detected structural heterogeneities were interpreted with consideration of previously received data of complex studies of Tolbachik Dol and LTFE. We confirmed the existence of shallow magma chambers on the depth 2-3 km, 7-8 km and 15-20 km under Northern Vent of LTFE found during previous geophysical investigations. The same objects were detected under Vent-1004 and Vent-Alaid too. So we assume the regularity in the configuration of magmatic system in the cinder cones area (in central part of Tolbachik Dol). A new result is localization of magma conduits of the eruptions. Configuration of the conduits allows the possibility of magma supply to the surface from various deep sources, and this is the possible reason for changes in the erupted basalt composition. The structure of the areal volcanism zone was shown in detail with obviously expressed change in the character of magma intrusions from a consolidated basement to sedimentary crust: subvertical magmatic channels are replaced with a system of inclined ones and sills.