



Tomography studies of volcanic complexes

I. Koulakov (1), E.I. Gordeev (2), M. West (3), A.G. Yeguas (4), B.-G. Luehr (5), and A. Jakovlev (1)

(1) IPGG, Novosibirsk, Geophysics, Novosibirsk, Russian Federation (ivan.science@gmail.com), (2) Institute of Volcanology and Seismology FEB RAS, Petropavlovsk Kamchatskiy, Russia., (3) Geophysical Institute 903 Koyukuk Dr. Univ. Alaska Fairbanks, Alaska, USA, (4) University of Granada, Granada, Spain, (5) GeoForschungsZentrum, Potsdam, Germany

We present an overview of recent results of seismic tomography studies of different volcanic complexes performed in collaboration with different research teams. In first three examples corresponding to Central Andes, areas around Merapi volcano and Toba caldera, the tomographic images down to 100-200 km depth reveal the paths of fluids and melts which escape from the subducting plate and feed the arc volcanoes. In all these areas, the shapes of the paths are different depending on particular features of the subduction regimes, such as type of the overriding plate, age of the slab, rate of the subduction etc. Next group of studies covers detailed tomographic studies of local structures beneath selected volcanoes. Beneath the Spurr Volcano (Alaska) we clearly observe a thin vertical channel with anomalously high V_p/V_s ratio beneath the main cone. Beneath the volcanoes of Kluchevskoy group (Kamchatka) seismic images reveal complex structure of channels and intermediate magma reservoirs. In the mantle we detect an anomaly with very high V_p/V_s ratio reaching 2.2, which looks as a top of the mantle channel feeding the volcanoes of the group. For this group we observed the time variations of seismic structure based on more than 10 years of continuous data. We detect considerable variations in V_p/V_s ratio in the crust related to large eruptions of Kluchevskoy and Bezymyanny volcanoes in 2005. The last example is another time-lapse tomography model obtained for the El Hierro volcano in Canaries based on earthquake swarm occurred from July to October 2011. During this period we observe regular deepening of a large body with high V_p/V_s ratio, which is interpreted as a magma reservoir, together with lowering of seismicity.