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Structure and dynamics of the volcano feeding systems from seismic tomography studies (overview)

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We consider several tomographic models for different volcanoes of the world and discuss some common features in structure and dynamics of the magmatic systems. First we present the result of 4D tomography model for the Klyuchevskoy volcano giving the information on the evolution of magmatic reservoirs in a time period from 1999 to 2009. We observe a clear correlation of seismic property changes with the main activation stages of Klyuchevskoy and Bezymianny volcanoes. The structure beneath the Bezymianny volcano has been enhanced using the data of a temporary seismic network (PIRE) operated between 2007 and 2010. In the derived seismic images, we have detected a conduit which directly links the Bezymianny volcano with the mantle sources. This is different of the Klyuchevskoy volcano, where several intermediate magma sources are observed in the crust.

Similar analysis has been performed for the Spurr volcano in Alaska. For this volcano, we have constructed a time-lapse seismic model which covers the period of permanent observations from 1989 to 2012. It can be seen, that during the activation phases of the volcano in 1994 and 2005 a clear conduit beneath the volcano is detected as an anomaly of high Vp/Vs ratio. For the last activation period in 2005, the results were enhanced using the data of relatively dense network which operated for several months.

We present also an integral of the results of tomographic inversions for other Alaskan volcanoes (Redoubt, Korovin, Akutan, Augustine, Makushin) and Popokatepetl in Mexico which allow revealing common features of the structure and dynamics of the magmatic systems beneath different volcanoes of the world.