



Fault-associated magma conduits beneath the Colima volcano revealed from seismic velocity and attenuation tomography studies

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In this study we present the results of tomography studies for seismic velocity and attenuation in the area of the Colima Volcanic Complex (CVC). We use the data of body waves from local earthquakes recorded by the temporary seismic stations of the CODEX network in the Colima area and a few stations of the regional MARS networks, both deployed in 2006-2008. In addition to travel times of the P and S waves, we estimate the values of t^* representing the integral value of quality factor and use them to obtain both three-dimensional distributions of seismic velocities and attenuation in the crust beneath the CVC area.

At shallow depths, we observe a large negative anomaly to the south of CVC coinciding with the location of the Central Colima Graben. This anomaly may represent both deposits of pyroclasts and shallow magma reservoirs feeding the eruptions of Colima. In contrast, the volcano edifices of the Nevado de Colima and Fuego de Colima, which are built of rigid igneous rocks, are associated with high-velocity and low-attenuation anomalies at shallow depths. In deeper section, the major anomaly of high V_p/V_s , low V_s and high S-wave attenuation corresponds to the location of a large tectonic Tamazula fault. As it represents mechanically weakened zone of the crust, it may attract magma conduits and form the pathway that feed CVC. Both velocity and attenuation models show that the fault-associated conduit brought magma from the mantle through the lower crust to the depth of 15 km. Then, a light fraction of magma may continue ascending and form shallow reservoirs beneath the southern flank of CVC. This research is supported by the grant of Russian Foundation for Basic Research RFBR 18-35-00378.