






V25D-0136 - Source Mechanisms of Deep Long Period Earthquakes beneath the Klyuchevskoy Volcano Group (Kamchatka, Russia) Inferred from S-to-P Amplitude Ratios

 Tuesday, 14 December 2021
 23:00 - 01:00
 Convention Center - Poster Hall, D-F

Abstract

Long-period earthquakes and tremors are one of two main classes of volcano-seismic activity. Deep long-period (DLP) earthquakes are particularly interesting because usually they are attributed to the processes occurring in the deep magma reservoirs close the crust–mantle boundary. The physical mechanism of generation of these earthquakes is still not fully understood. The hypotheses of the DLPs origin include thermomechanical stresses associated with deep intrusions cooling, rapid CO₂ degassing from the oversaturated basaltic magmas, and secondary boiling.

In this work, we study the long-period earthquakes that occur at the crust–mantle boundary beneath the Klyuchevskoy volcano group in Kamchatka in order to reconstruct their source mechanism. We consider three possible sources (single force, shear slip and tensile crack) that can produce DLPs. With given hypocentral location and velocity model of the region we calculated synthetic seismograms for each of assumed mechanisms using Axitra software. Then, we compare obtained signals with real records measuring amplitudes of P and S waves at each channel and calculating their ratios. For each of the considered types of mechanisms, we perform a grid search in the parameter space and found an optimal solution that minimizes the misfit between the observations and the model prediction.

Our results show that the waveforms of DLPs observed in the studied region are better explained with a horizontal tensile crack expanded in the vertical direction. Such mechanism would be in agreement with a degassing of magma within a sill intrusion.

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