Seismic imaging of the Klyuchevskoy Volcanic System, Kamchatka

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The Klyuchevskoy volcanic group (KVG) is a cluster of 13 closely spaced stratovolcanoes, situated at the northern end of the Kamchatka volcanic arc, where it coincides with the Aleutian Arc. Klyuchevskoy volcano at its centre is one of the most active in the world, erupting on average 1 cubic metre of rock per second over the last 10000 years. Many international flight routes cross the Kamchatka peninsula, where eruptions from volcanoes of this group occasionally fill the air with ash. Between August 2015 and July 2016 an international collaboration conducted the KISS experiment, a temporary network of 83 seismographs, to investigate what drives the unusually high volcanic activity here. Combined data from the temporary stations and a permanent monitoring network, are now available to investigate the volcanic and tectonic seismic sources, velocity structure, and magmatic processes within the volcanic group.

Here we present seismic velocity structure results from ambient noise derived Rayleigh (ZZ and RR) and Love (TT) wave dispersion observations. The radial-radial correlation is vital for Rayleigh wave observations at short distances, as the vertical correlation functions are influenced by strong signal at zero time lag (possibly originating from teleseismic P-wave seismic noise). ZZ correlation functions can therefore only be used for surface wave measurements at distances greater than 50 km. Estimated Greens Functions are optimised by selectively stacking the daily noise correlation functions with high coherence, which are not contaminated by seismic tremor during eruptive activities at Klyuchevskoy Volcano. Our seismic imaging aims to constrain the distribution of magma supply beneath these highly active volcanoes, and to determine whether the underlying magma reservoirs are fed by a single large interconnected volcanic complex.