

## OVERVIEW OF TEMPORARY SEISMIC NETWORKS ON ACTIVE VOLCANOES OF KAMCHATKA (RUSSIA)

**Jakovlev<sup>1,2</sup>, A., Koulakov<sup>1,2</sup>, I., Abkadyrov<sup>1,3</sup>, I., Shapiro<sup>4</sup>, N., Kuznetsov<sup>1,2</sup>, P., Deev<sup>1,2</sup>, E., Gordeev<sup>3</sup>, E., Chebrov<sup>5</sup>, V.**

<sup>1</sup>*Institute of Petroleum geology and Geophysics SB RAS, Geophysics, Novosibirsk, Russia*

<sup>2</sup>*Novosibirsk State University, Novosibirsk, Russia;*

<sup>3</sup>*Institute of Volcanology and Seismology, FEB RAS, Petropavlovsk-Kamchatsky, Russia;*

<sup>4</sup>*Institut de Physique du Globe de Paris, Paris, France;*

<sup>5</sup>*Kamchatka Branch of the Geophysical Survey, RAS, Petropavlovsk-Kamchatsky, Russia.*

We present details of five field campaigns carried out on different volcanoes of Kamchatka (Figure 1) in 2012-2018. Each campaign was performed in three main steps: (i) installation of the temporary network of seismic stations; (ii) autonomous continuous registration of three component seismic signal; (III) taking off the network and downloading the registered data.

During the first campaign started in September 2012, 11 temporary stations were installed over the Avacha group of volcanoes located 30 km north to Petropavlovsk-Kamchatsky in addition to the seven permanent stations operated by the Kamchatkan Branch of the Geophysical Survey (KBGS). Unfortunately, with this temporary network we faced with two obstacles. The first problem was the small amount of local earthquakes, which were detected during operation time. The second problem was an unexpected stop of several stations only 40 days after deployment. Nevertheless, after taking off the network in August 2013, the collected data appeared to be suitable for analysis using ambient noise (Koulakov et al., 2014).

The second campaign was conducted in period from August 2013 to August 2014. In framework of the campaign, 21 temporary stations were installed over Gorely volcano, located 70 km south to Petropavlovsk-Kamchatsky. Just in time of the network deployment, Gorely Volcano became very seismically active – every day occurred more than 100 events. Therefore, we obtain very good dataset with information about thousands of local events, which could be used for any type of seismological analysis. With use of this data the evidences for the very low Vp/Vs ratio beneath the Gorely volcano were found (Koulakov et al., 2015; Kuznetsov et al., 2017). Using the receiver function analysis depth of the main crustal and mantle interfaces beneath the volcano were found (Ivanov A. et al., 2016).

The third campaign started in August 2014. Within this campaign, we have installed 19 temporary seismic stations over Tolbachik volcano, located on the south side of the Klyuchevskoy volcano group. In the same time on Tolbachik volcano were installed four temporary stations and several permanent stations operated by the KBGS. All stations were taking off in July 2015. As result, we have collected a large dataset, which were used to investigate the plumbing system beneath the neighboring active volcanoes of Tolbachik, Bezmyanny, and Klyuchevskoy (Koulakov et al., 2017)

The forth campaign, started in August 2015. In framework of big international project KISS, a temporary seismic network consisting of 83 temporary stations were installed around the Klyuchevskoy volcano group in addition to 17 permanent stations of KBGS, covering area 150 km by 90 km. This network continuously operated until July 2016. Several stations were damaged due to different force major (lahar, bears, floods etc.) Data collected during this experiment now analyzed by several international groups with use of different seismological technics in order to investigate structure of the crust and the upper mantle beneath Klyuchevskoy volcano group and allow us understand the nature of significant variety in composition and behavior of different volcanoes of the Klyuchevskoy volcano group. Preliminary results of the complex structure beneath the Kluchevskoy volcano group obtained from the local travel time tomography were presented in Jakovlev et al. (2018). This experiment was supported by the grant of Russian Foundation of Science RNF 14-47-00002.

Finally, in the July 2017 a small network of 10 stations were installed around Bezmyanny volcano. This field campaign was performed in collaboration with GFZ-Potsdam. In addition, several photocameras were installed around the volcano. Recently, this andesitic volcano has erupted several times. The last eruption occurred in December 2017 and we expect that all stages of the eruption will be registered by our stations. This campaign was partly supported by the grant of Russian Foundation of Science RNF 14-17-00430.

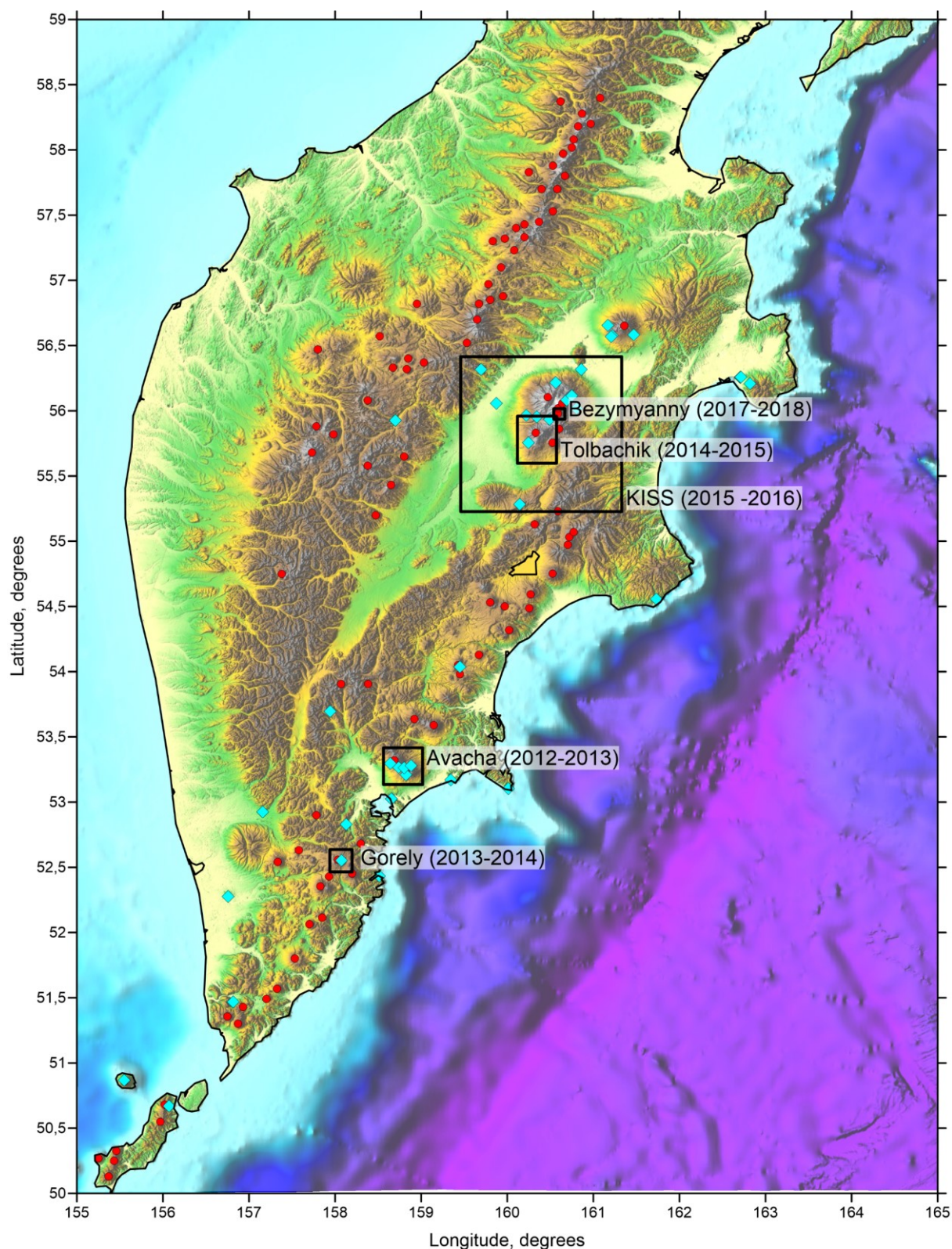


Figure 1. Overview map of the Kamchatka peninsula. Black rectangles show areas of the field campaign performed in 2012 – 2018 years. Red dots indicate recent volcanoes, blue diamonds – permanent KBGS seismic stations.

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