[JJ] Evening Poster | S (Solid Earth Sciences) | S-VC Volcanology

[S-VC41]Active Volcanism

convener:Yuta Maeda(Nagoya University), Takahiro Miwa(National research institute for earth science and disaster prevention), Yosuke Aoki(東京大学地震研究所, 共同), Takeshi Nishimura(Department of Geophysics, Graduate School of Science, Tohoku University)
Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
This session discusses various aspects of active volcanisms including, but not limited to, recent and historical eruptions, various phenomena associated with the volcanic activities, underground structures of the volcanoes, and developments of new instruments based on geophysical, geochemical, geological, and multidiscipline approaches. We also welcome studies on understanding and predicting the transitions of the eruptive activities from observational, theoretical, and experimental approaches.

[SVC41-P50]Comprehensive detection of volcanic and semi-volcanic deep low frequency earthquake all over Japan based on matched filter technique

*Ryo Kurihara[1], Kazushige Obara[1], Takuto Maeda[1], Akiko Takeo[1] (1.Earthquake Research Institute, The University of Tokyo)
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Low frequency earthquake (LFE) is a type of earthquake whose dominant frequency is lower than that of normal earthquakes of the same magnitude. LFE is divided into three types according to the place of its occurrence: (i) volcanic LFEs that occur at underground near an active volcano, (ii) LFEs that occur at plate subduction zone such as southwest Japan and composes low frequency tremor, and (iii) isolated LFEs that occur at other places such as Osaka-bay and east part of Shimane prefecture.

It is known that some volcanic LFEs occur not just beneath a summit of the active volcano but where is about 10 km far from the active volcano (Hasegawa and Yamamoto 1995). Since isolated LFEs have similar frequency characteristics to volcanic LFEs, they are called as "semi-volcanic" LFEs (Aso et al., 2011; Aso et al., 2013). A cooling magma model (Aso and Tsai, 2014) was proposed for the mechanism of volcanic and semi-volcanic LFEs. However, the relationship between volcanic LFEs and the volcanic activity is still unclear. In addition, some semi-volcanic LFEs occur near a Quaternary volcano that is not active now, however, there are semi-volcanic LFEs that occur far from any Quaternary volcanoes.

In this study, we investigated the temporal variation of volcanic and semi-volcanic LFE activities in 30 regions in Japan, where LFEs often occur. We detected LFEs using the matched filter technique (Ribbons and Ringdal, 2006; Shelly et al., 2007). We used LFEs occurred from 2004 to 2016 in the catalog of JMA as templates. We used four years continuous seismic data, from 2010 to 2013, recorded by NIED Hi-net. The resultant number of detected LFEs is about 10 times of the number of LFEs occurred at the analyzed period in the catalog of JMA.

We investigated temporal changes in LFE activities. It is found that swarm-like activity of LFEs occurs in western Tochigi-prefecture, northern Kanto area. This activity has the duration of about two weeks. At Mt.Ontake, in central Japan, many LFEs that have pulse-like signal are observed for 1 hour at Feb 3, 2010. The interval of the LFEs is 10−15 seconds. At Mt.Kirishima in Kyushu region, the number of

LFEs from Nov. 2010 to Mar. 2011 is large. This time corresponds to the time of eruption of Mt.Shinmoe-dake, one of the active volcanoes in Mt.Kirishima. This result may show the existence of a relationship between LFEs and eruption of a volcano.

We compared characteristics in dominant frequencies and durations of LFEs. As a result, the duration of LFE varies by each region. During the swarm-like activity of LFEs, in addition, the duration and the frequency characteristic of LFE is different from that of LFE occur at other time.