

Precursory activity of volcanic tremors of the 8 October 2016 explosive eruption of Aso volcano, Japan

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Aso Volcano, one of the most active volcanoes in Japan, resumed magmatic eruption in November 2014 after a 21 years dormancy. Magmatic eruptions continued until May 2015 followed by phreatomagmatic eruptions on 14 September and 23 October, 2015. After that, several phreatic explosions intermittently occurred until March 2016. About 6 months after the 2016 Kumamoto earthquake, a phreatic eruption occurred at 21:52 on October 7, 2016 (JST), followed by an explosive eruption at 01:46(JST) on October 8.

Two seismic pulses called long period pulse (LPP) were observed 6 minutes and 2 minutes before the eruption, Based on the particle motions at each station, we estimated the source location of LPPs. In addition, compared with the location of the crack-like conduit under the crater (Yamamoto et al. 1999), LPP sources are on or close to the crack.

We also investigated the spatial distribution of LPP amplitude to find that the amplitude distribution is very similar to that of long period tremor (LPT) with a period of 15 second. Thus, it is inferred that same conduit behavior, a resonance of the crack-like conduit (Yamamoto et al. (1999)), can be a source model of LPPs.

Static tilt and strain changes were observed at the same time of LPP1 and LPP2 at an observation tunnel (1000m south-west from the crater). It is found that these tilt and strain changes are attributed to not only an expansion of the spherical pressure source under the crater which was shown in Kawakatsu et al. (2000) but also an expansion of the crack itself. These results show that a rapid pressure increase occurred just before the explosive eruption.

Main References

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