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Fluid injection at the 1st crater of Aso volcano

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An active crater at Aso volcano, Japan, is typically filled with green colored hot water, which is seen as a crater lake. The water is sometimes dried up and then an eruption occurs. Although these two stages seem to be quite different, both may be same in essential quality. The author applied the cross correlation method of infrasound and seismic signals (Ichihara et al., GRL, 2012) to data observed at the small events of gas emissions in 2011, and also the data after the eruption period. As a result, clear patterns of cross correlation functions (CCFs) during the eruptive period, May-June 2011, could be recognized; a stable node of the CCFs was positioned around dt=0, and the seismic data had a pi/4 phase delay relative to the infrasound. It suggests that infrasound signals were generated at the gas emissions and they thus induced ground motions at local area around the station, although we could not identify the signals from the original infrasound wave traces. Characteristic patterns of CCFs were also identified several times after the eruptive period, when the crater was perfectly refilled with hot water. The patterns in these post-eruption periods had different features from the ideal ones; the maximum value of the CCFs was seen at the lag time far from the expected pi/4 phase delay of the seismic data, and the position of the node was not same as those during the eruptive period. In some cases, the seismic data had a phase ahead of that of the infrasound. From numerical calculations, it was confirmed that these seemingly-peculiar features are owing to continuous tremors in the background (Takagi et al., JVGR, 2009). When the patterns of CCFs were observed, whether they were affected by the background continuous tremors or not, the source location of the infrasound signals were determined as the central part of the crater based on analysis of infrasound network data. Therefore, it is interpreted that some kind of events which emit infrasound signals also occurred in the crater after the eruption. One possible candidate of this infrasound source is an ejection of thermal fluids into the crater lake from the bottom, which made the water surface just above the vent swing. If much stronger ejections occur, we will be able to observe them as jets and/or ash plumes through the water surface such as the 2003 and 2004 eruptions (Miyabuchi et al., BVSJ, 2005). In order to clarify this hypothesis, we should carefully monitor the seismic signal relating to the fluid movement as well as the temporal change of the temperature and the water level of the crater lake, and compare them to the results of the cross-correlation analysis. In the presentation, the author also would like to discuss time relation between migration processes of volcanic tremors based on the amplitude ratio analysis of seismic signals (Taisne et al., GRL, 2011) and the fluid injections interpreted from patterns of CCFs.