Location of tremor Sources at Aso Volcano Using Short period Seismic Array

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The sources of short period volcanic tremors at Aso Volcano are located using seismic array data.There are two types of short period volcanic tremor at Aso Volcano: continuous tremor and isolated tremor. Continuous tremor is ground vibration with approximately constant amplitudes without any clear beginning and end.An isolated tremor is, on the other hand, an episodic event which starts suddenly and continues about ten seconds. Short period seismometer arrays were deployed for three days near the crater of Aso in 1999 and 2001, and the short period volcanic tremors were recorded. In order to locate these volcanic tremors we developed two semblance-based seismic array analysis methods: one method which stacks semblance coefficients for many individual time windows, and another which stacks seismogram-s of the individual seismic stations over different time windows and computes semblance coefficients for the stacked seismograms. A technique is also developed to utilize three-dimensional particle motions and to extract episodic events with the same pattern of ground motions.

Based on the result from the array analyses we conclude that the continuous tremor in 1999 consists of surface waves which are emitted from the vicinity of the western rim of the active crater at very shallow depth. On the other hand, the isolated tremor is S wave (body wave) and its source can not be restricted satisfactorily,but the semblance coefficient takes maximum at the direction of the south of the crater. Its focal depth is difficult to determine, but it is almost certainly be deeper than that of the continuous tremor. The estimate of the depth is 500 (+-500) meters from the surface of the crater lake. There seems changes in the locations of the tremors

during a year and half between the two observations, in November 1999 and July 2001, although there are no significant change in the surface activity of the volcano. The isolated tremor appears to become shallower with the epicenter shifted toward north, while the source of the continuous tremor also appears to

shift to the norther rim of the crater. We also find that each isolated tremor event consists of two sub-events separated nearly 1.3 seconds in time, with the latter sub-event always having lager amplitudes. Our location techniques cannot discriminate the foci of the

two sub-events. Such a concomitant occurrence of two events should provide an important clue in understanding the mechanism of the excitation of the isolated tremor.