

Hypocenter determination of volcanic earthquakes at Azuma volcano: analyses of seismic array data of fiber optics and DAS system

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We determine volcanic earthquakes at Azuma volcano by using seismic array data obtained by fiber optics and DAS system. We use the fiber optics cable deployed by the Ministry of Land and Transportation along the Bandai-Azuma sky road. The cables are set about 14 km long in a tube at a depth of about 50 m. The data are stored with a sampling frequency of 1000 Hz and the observation point interval of 10 m. We first apply amplitude source location method. We measure p-p amplitude of volcanic earthquakes on July 4, correcting site amplification factors estimated from coda waves of regional earthquakes. Assuming attenuation factor of 50 and phase velocity of 2 km/s, we determine the hypocenter of the volcanic earthquake by using a grid search. We further apply a method using phase information of the seismogram. We measure arrival time differences of the seismic waves observed at two observation points that are separated with 10, 20, and 30 m by using cross-spectrum method. Minimizing the residual between the observed arrival time differences and the calculated ones for the two methods, we determine the source locations. Small residuals are recognized at 0-1 km depth around Ohana-crater where many volcanic earthquakes are located. This indicates that even when a fiber optics cable does not surround a hypocenter and/or elongate in a limited region, we are able to determine the hypocenters of volcanic earthquakes.

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