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'Understanding volcanoes and society: the key for risk mitigation'



Detectability and observations of eruption clouds by the JMA's C-band weather radar network

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To evaluate as soon as possible the total amount of tephra produced from volcanic eruption is very important for the estimation of damage on human life, traffic, building, agriculture, etc. It is also important for the reconstruction from the disaster. Furthermore, the eruption column height is the most important parameter for the ash fall forecast. Weather radar is useful tool for these estimations. Japan Meteorological Agency (JMA) operates a network of 20 C-band Doppler weather radars across Japan and generates the radar-echo composite maps every five minutes by merging all radar data and estimates the echo-top heights and other parameters. The network can detect the volcanic eruptions in Japan except the volcanoes in the Bonin Island. The eruption cloud of the volcanoes except in Hokkaido, the southern part of the Izu Islands, and south Kyushu can be observed using five or more radars. We inspected the echo-data of Tanegashima radar (ca. 108 km SSE of the volcano) on 548 explosions of Sakurajima volcano in 2009, and investigated the detectability of eruption and the structure of eruption cloud echo. The cases detected eruption cloud are 20 % of the number of the explosion with a plume height of 500 m above the vent, and it is increase with height to 100% at the height of more than 2400 m. The relation between the detectability and plume height is able to evaluate from the scanning time table of the radar and an ascending process of volcanic plume. We estimated the total mass of tephra on the recent eruptions (Feb. 2, 2009 Asama, Jan. 26-27, 2011 Shinmoedake, Kirishima, 2014 Ontakesan, and 2015 Kuchinoerabujima) from the time series of echo-top height of eruption cloud detected by the radar network. And the estimates are compared with the total volumes of tephra evaluated by field surveys.