

The October 7-8, 2016 eruptions of Nakadake crater, Aso Volcano, Japan and their deposits

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The Nakadake first crater of Aso Volcano (SW Japan) erupted at 21:52 on October 7, 2016, and the first eruption was followed by an explosive activity at 01:46 on October 8. The October 8 explosive eruption produced ash plumes rising to altitude of 11000 m asl that drifted E-ESE. The ash-fall deposit was dispersed over an area extending 350 km northeast of the volcano. We performed fieldwork for observing and sampling of the related deposits in the proximal and distal areas immediately after the eruption. The October 7-8 eruptions emplaced a large amount of poorly-sorted deposits containing abundant block-size clasts around the Nakadake first crater. Although the total thickness of deposits associated with the October 7-8 eruptions at the southwestern crater rim was about 1 m, the maximum thickness was likely to reach 1.5-2 m because some shelters (2-2.5 m high) were almost buried by the deposits. A large number of ballistic clasts of a few ten centimeter across was scattered around the crater, and the largest clast with a size of 3×2.2×1.5 m existed at the southwestern crater rim. Since several lobate deposits of 0.5-1 m high and a few meter wide occurred along gullies in the proximal area, most of proximal deposits were interpreted to be derived from pyroclastic density currents (PDCs). Based on a helicopter inspection immediately after the eruption, the mass of the PDC deposits was roughly estimated at 4.5×10^5 tons. The October 8 ash-fall deposit was clearly distributed about 70 km to the northeast of the source crater. Lapilli-size clasts were dispersed to areas up to about 30 km east-northeast of the crater. The dispersal axis of the maximum size of clasts was slightly more easterly than that of thickness. The mass of the ash-fall deposit (including lapilli-size clasts) was calculated at about 1.8×10^5 tons. Adding the mass of the PDC deposits, the total eruptive mass of the October 7-8, 2016 event was $6-6.5 \times 10^5$ tons. The polarizing microscope observations revealed that a sample of the October 8 ash-fall deposit consisted of glass shards (20 %), crystal (20 %) and lithic (60 %) grains. Most glass shards were unaltered poorly crystallized pale brown glasses and highly-crystallized black glasses, which probably represented juvenile magma. Results of EPMA analysis indicate that chemical composition of glass shards included in the October 8 ash-fall deposit was similar to those of glasses in the 1979, 1989-1990 and November 2014-September 2015 ash. The October 7-8, 2016 eruptions of Nakadake first crater were characterized by explosive phenomena including ballistic projectiles and pyroclastic density currents, and were similar in deposit volume to eruptions on September 6, 1979 and April 20, 1990.

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