[JJ] Evening Poster | S (Solid Earth Sciences) | S-VC Volcanology

[S-VC43]Volcanic and igneous activities, and these long-term forecasting

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Sun. May 20, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

This session focuses on generation and accumulation processes of magmas, magma-crust interaction and degassing, and modes of eruption, long-term forecast of eruption, dispersal and emplacement of the volcanic products. The discussion spans petrological, geochemical, geophysical, and geological processes related with volcanic activity and products in the past, the present and the future.

[SVC43-P12]Eruption history and temporal change of magmatic compositions of Kumanodake-sancho lava &pyroclastics, Zao Volcano

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1. Introduction

Zao volcano is an active stratovolcano in NE Japan arc. The volcanic activity started at about 1Ma and has continued to present. Kumanodake-sancho lava &pyroclastics, composed of many pyroclastic layers and surface lavas, which were formed at about 80ka. We conducted geologic and petrologic studies on these products and revealed temporal change of eruption styles and magmatic compositions.

2. Stratigraphy of Kumanodake-sancho lava &pyroclastics

The surface lavas flowed down to north and southward from the summit of Kumanodake. The maximum length is about 2.75km. The pyroclastic layers, which pile up successively, are well exposed near the summit of Kumanodake (total thickness is ca. 12m), These layers can be grouped to the products of four phases, based on the change of the lithofacies. Products of phases 1, 3 are characterized by phreatic eruption deposits, those of phases 2, 4 are mainly magmatic eruption deposits. Total thicknesses of the products of phase 1 to 4 are 2m, 2.1m, 1.4m, 6.8m, respectively.

・ Phase 1 (seven layers, L1-7) : L1-3, 5 and 7 are phreatic eruption deposits, composed of altered whitish or brown rock fragments in hydrothermally altered whitish or brown matrix. Size of the fragments is relatively larger in L2 (<3cm) than in L1, 3, 5, 7 (<2cm). Altered scoria (10-20cm) are observed in L2. L4 and 6 are vulcanian fall deposits, composed of blocks and bombs of 10-20cm (L4) and 5-20cm (L6) in reddish-brown volcanic ash matrix.

・ Phase 2 (five layers, L1-5) : L1 and 4 are strombolian scoria fall deposits, composed of reddish-brown scoria. Size of scoria is <15 cm in L1 and <2 cm in L4. L2 and 5 are vulcanian fall deposits, L2 is composed of reddish - gray volcanic blocks and bombs (5-20cm) in reddish-brown volcanic ash matrix. The matrix of L5 is reddish-brown volcanic ash, including many gray volcanic blocks and bombs (2-15cm). L3 is phreatic eruption deposit. The matrix is altered whitish clay, including altered ocher rock fragments (<1cm).

・ Phase 3 (three layers, L1-3) : L1 and 3 are poorly sorted phreatic eruption deposits, composed of many altered ocher rock fragments (<20cm) and a little altered scoria (<10cm) in hydrothermally altered whitish matrix. L2 is strombolian scoria fall deposit, composed of dark-gray scoria (ca. 2cm). Relatively large scoria

(10-50cm) are sometimes observed.

・ Phase 4 (five layers, L1-5 and surface lavas) : L1-3 are vulcanian fall deposits. The matrix is reddish - dark-gray volcanic ash, including many reddish - gray volcanic blocks and bombs. Size of volcanic blocks and bombs is <20 cm in L1 and 2, L1 is richer in matrix than L2. Large sized volcanic bombs (<200cm) are observed in L3. L4 and 5 are agglutinates. Dark gray spatters (<60 cm) are elongated horizontally in L4 and they are strongly welded in L5. The lavas flowed down to north and south direction. The eruption volume ($0.021km^3$) is the largest among phase 1 to 4. The raft composed of agglutinates of L4, 5 is observed above the lava at 1 km northward from the summit.

3. Petrological features

All rocks are olv-cpx-opx basaltic andesites to andesites, having many disequilibrium features. These belong to the medium-K, calc-alkaline series. The rocks are plotted on same linear trends in SiO_2 variation diagrams. These are mixed rocks of the two-end member magmas. MgO and Ni contents of the magmatic products increase from L4 to 6 in phase 1. In phase 2, these increase from L1 to 3, then decrease to L4 and 5. These contents reach maximum in L2 in phase 3. In phase 4, these contents decrease from L1 to 3, then gradually increase to L4, 5.

4. Change in magma compositions and mode of eruption

In phase 1, the activity began with phreatic eruption and changed to alternation of vulcanian and phreatic eruptions. Magmatic compositions changed to mafic from L4 to 6. In phase 2, activity began with vulcanian and strombolian eruptions, followed by phreatic eruptions, and thereafter by vulcanian and strombolian eruptions. The magmatic compositions changed toward mafic before the phreatic eruption and afterwards toward felsic. In phase 3, strombolian eruption occurred in between phreatic eruptions. Magmatic compositions at this time reached most mafic among entire activities. In early half of phase 4, vulcanian eruptions occurred repeatedly and the size of the volcanic bombs increased with time. No systematic change in magmatic compositions can be observed. In the later half, the strombolian eruptions occurred repeatedly. The activity ceased by the effusion of lavas. The magmatic compositions became slightly mafic with time.