

Growth history Of Unzen Volcano, Kyushu, Japan - Results of two flank drillings of Unzen Scientific Drilling Project

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Unzen volcano is an active volcano composed of lava domes, thick lava flows and pyroclastic deposits of hornblende andesite to dacite. Tectonically active Unzen graben dissects volcanic edifices of the volcano. During the phase I of the Unzen Scientific Drilling Project (USDP), two drillings were conducted at the northeastern (USDP-1: 752 m depth) and eastern (USDP-2: 1463 m depth) flanks of the volcano, respectively, to fully recover accumulated deposits of the volcano hidden beneath the younger eruptives. Extensive K-Ar and $^{40}\text{Ar}/^{39}\text{Ar}$ age determinations have also been conducted on both surface rocks and drilling cores.

Unzen volcano starts to grow at 0.5 Ma above the Pre-Unzen pyroxene andesite (0.5-0.8 Ma). Unzen volcano has been divided into three volcanic stages, Early and Late stages of the Older Unzen and the Younger Unzen.

The Early stage of the Older Unzen (0.3-0.5 Ma) products consist of pumice-rich pyroclastic flows, block and ash flows, associated volcanoclastic debris flows and thick lava flows. The north- and south-dipping fans spreading outside the graben are sharply cut by the faults. This suggests that Unzen volcano grew rapidly in the first 200,000 years of its history and formed a conical volcanic edifice.

The Late stage of the Older Unzen (0.15-0.3 Ma) products mainly fill in the graben. In the western half of the deposits of this stage, thick lava flows cover widely inside the Unzen graben. On the other hand, thick alternated piles of pyroclastic deposits were recovered both from USDP-1 and -2 cores. In the USDP-2 core, phreatomagmatic deposits about 250 m thick with essentially abundant glass materials of ca. 0.3 Ma. These findings suggest that rapid subsidence of the Unzen graben at around 0.3-0.2 Ma led strong interaction between the magma and groundwater.

Younger Unzen volcano (0-0.15Ma) is composed of four edifices, Nodake, Myokendake, Fugen-dake and Mayuyama volcanoes, all locate in the eastern half of Unzen volcano. Block-and-ash flow deposits or related debris flow deposits were continuously supplied to the eastern flank of the volcano.