

## K-Ar Age Determinations of USDP Cores in Unzen Scientific Drilling Project and Products on the Surface of Unzen Volcano

# Akikazu Matsumoto[1], Hideo Hoshizumi[1], Kozo Uto[1]

[1] GSJ, AIST

Systematic K-Ar age determinations have been made on the three USDP cores from the eastern and northern flanks and the products on the surface of Unzen Volcano, SW Japan. In the USDP-1 core, the thirty-one samples were collected from lavas or pyroclastic flow deposits, and debris flow or debris avalanche deposits. In the USDP-2 and -3 cores, the eight and five samples were collected from lavas, pyroclastic flow and debris flow deposits. The fifty lava and pyroclastic flow samples were collected on the surface of Unzen Volcano.

In the USDP-1 core, the bottom of Unzen volcanic products appears at 684 m below the surface. The five pyroxene andesites between 694 and 751 m below the surface gave the ages of about 500 ka. These ages are consistent with those of similar Pre-Unzen products on the surface around southern flank. The ages of six hornblende andesites between 626 and 681 m below the surface were within the range 400-500 ka. These mean that the activity of Unzen Volcano would start at about 500 ka without an evident time interval after the last eruption of Pre-Unzen products. The ages of sixteen samples between 104 and 557 m below the surface were accumulated relatively short periods between about 170 and 230 ka. They represent the latest stage of Older Unzen Volcano. In contrast, between 230 and 400 ka, very small amount of products reached the drill site. The formation of regional tectonic Unzen Graben would become accelerated after about 250 ka with intensive volcanism. A juvenile material from pyroclastic flow deposit at 20 m below the surface gave the age of  $11 \pm 9$  ka suggesting the age of Myoken- or Fugen-dake stage of the Younger Unzen Volcano.

In the USDP-2 core, the bottom of Unzen volcanic products appears at 1,182 m below the surface. The five samples between 245 and 287 m below the surface gave the ages of about 120 ka, and the three samples between 1,236 and 1,263 m below the surface gave the ages of about 500 ka. The former ages are consistent with those of Nodake volcanic products on the surface of Younger Unzen Volcano, and the latter ones consistent with those of the Pre-Unzen products.

The five samples from the USDP-3 core gave significant ages in the range 100-200 ka. However, the ages of two samples at 298 and 349 m below the surface ( $198 \pm 7$  and  $156 \pm 6$  ka) are stratigraphically inconsistent with each other. Because the USDP-3 hole was drilled obliquely, it would cross a concealed fault between the sampling depths, and the deeper one would have younger age than the shallower one. The ages of about 150 ka, which were given by the three samples at 74, 99 and 349 m below the surface, have been never found in the products on the surface of Unzen Volcano. This result suggests that the dormancy between Older and Younger Unzen Volcanoes would be at most less than 30,000 years or not exist between the active periods.

K-Ar ages of Younger Unzen volcanic products are stratigraphically consistent with the  $^{14}\text{C}$  ages, except for the case of two pyroclastic flow deposits. The eruptive ages of Younger products on the surface are in the range 0-120 ka.

Although the Older and Pre-Unzen volcanic products were collected from the outcrops, for which the previous workers classified into the Older or Pre-Unzen products, some of them gave the ages of Younger products. The distribution of Younger and Older Unzen Volcano should be revised on the ages obtained in the present study. Among the Older products, the oldest age ( $449 \pm 14$  ka) was found on the southern flank where the Pre-Unzen products are also distributed. On the southern-southwestern and northwestern flanks, which are located around the outside of regional tectonic graben, the Older products have the ages in the range 300-450 ka. In contrast, on the western flank, which are located on the inside of graben, and in the central-eastern parts of Shimabara Peninsula, the Older products have younger ages in the range 170-300 ka.