V054-018 Room: C310 Time: May 30 14:45-15:00

Scientific Target of Unzen Conduit Drilling

Setsuya Nakada[1], Kozo Uto[2], Hiroshi Shimizu[3]

[1] ERI, Univ. Tokyo, [2] GSJ, AIST, [3] Inst. Seismol. & Volcanol., Kyushu Univ.

Conduit drilling planned in the Unzen Scientific Drilling Project of MEXT (K. Uto as project leader) starts in 2002. This aims at penetration into the magmatic path of the 1990-1995 eruption at Unzen. Effusive eruption had continued for about 4 years at Unzen. Though relatively explosive eruptions occurred in the initial stage of eruption, Plinian explosion did not follow the events. The initial water content of magma was estimated as high as 6 wt.% so that the magma had the potential of explosive eruption. Effective degassing during its ascent may have made the magma of the latest eruption to erupt effusively. On the other hand, the activity of 500 ka at Unzen is characterized by explosive eruptions such that pumice-flow deposits are distributed extensively. These facts suggest that effective degassing had not always occurred at this volcano. Though degassing efficiency is thought strongly related to the magma ascent speed, the factor controlling the latter is not clear. A sudden release of overpressure in the upper part of the conduit is followed by either Plinian explosion (Pinatubo and MSH) or effusive eruption (Unzen and Soufriere Hills). The difference of physical process between the two modes still remains unsolved. In this conduit drilling, the most important goal is to understand the manner of degassing in the upper parts of the conduit.

This drilling is hoped to clarify (1) formation process of conduit, (2) degassing process of magma in the conduit, (3) mechanism of geophysical phenomena associated with volcanic eruption, and so on. Though the initial conduit is thought to be platy in form, the effective portion during 4-years eruption may have become a pipe. It is important, therefore, to monitor small earthquakes associated during drilling operation and to re-determine the location of penetration target analyzing the data. The penetration target is the conduit of around sea level (1,300 m depth from the crater), where low-frequency earthquakes and tremors had occurred in the eruption. EDM data during eruption suggests a steady growth of the conduit width; that is, chilled lava may have been accreted successively onto the conduit wall, keeping effective flowing diameter. In this case, continuous core samples from the conduit margin are useful to analyze the time-and-space distribution of degassing fossil in the conduit. Core sampling is scheduled continuously in and around the conduit and as spot coring in other drilling sections, while logging of temperature, density and images is in most sections.

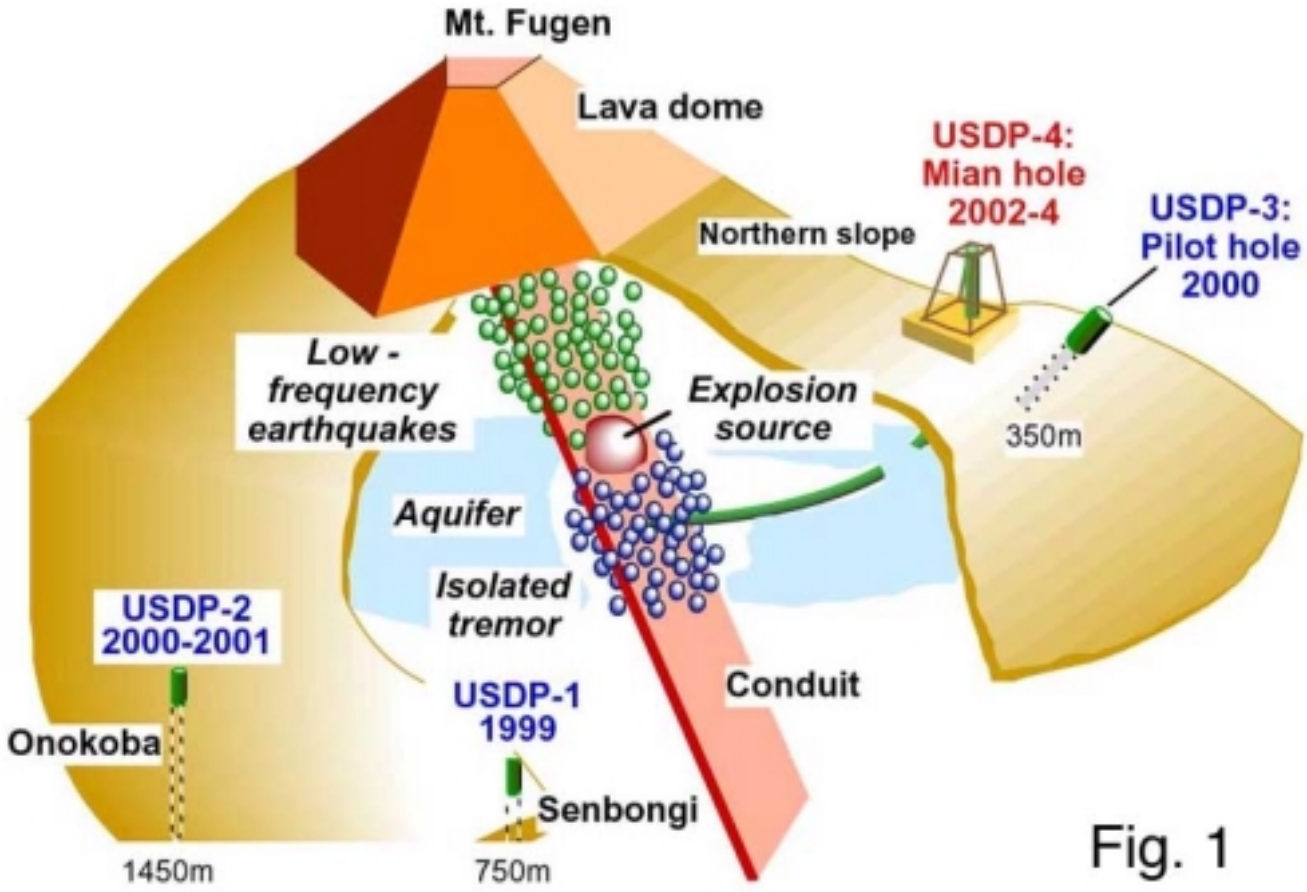
Mt. Fugen
Lava dome
USDP-4:
Mian hole
2002-4
USDP-3:
Pilot hole
2000
Northern slope
Low -
frequency
earthquakes
Explosion
source
350m
Aquifer
Isolated
tremor
USDP-2
2000-2001
Conduit
USDP-1
1999
Onokoba
Senbongi
1450m
750m

Fig. 1

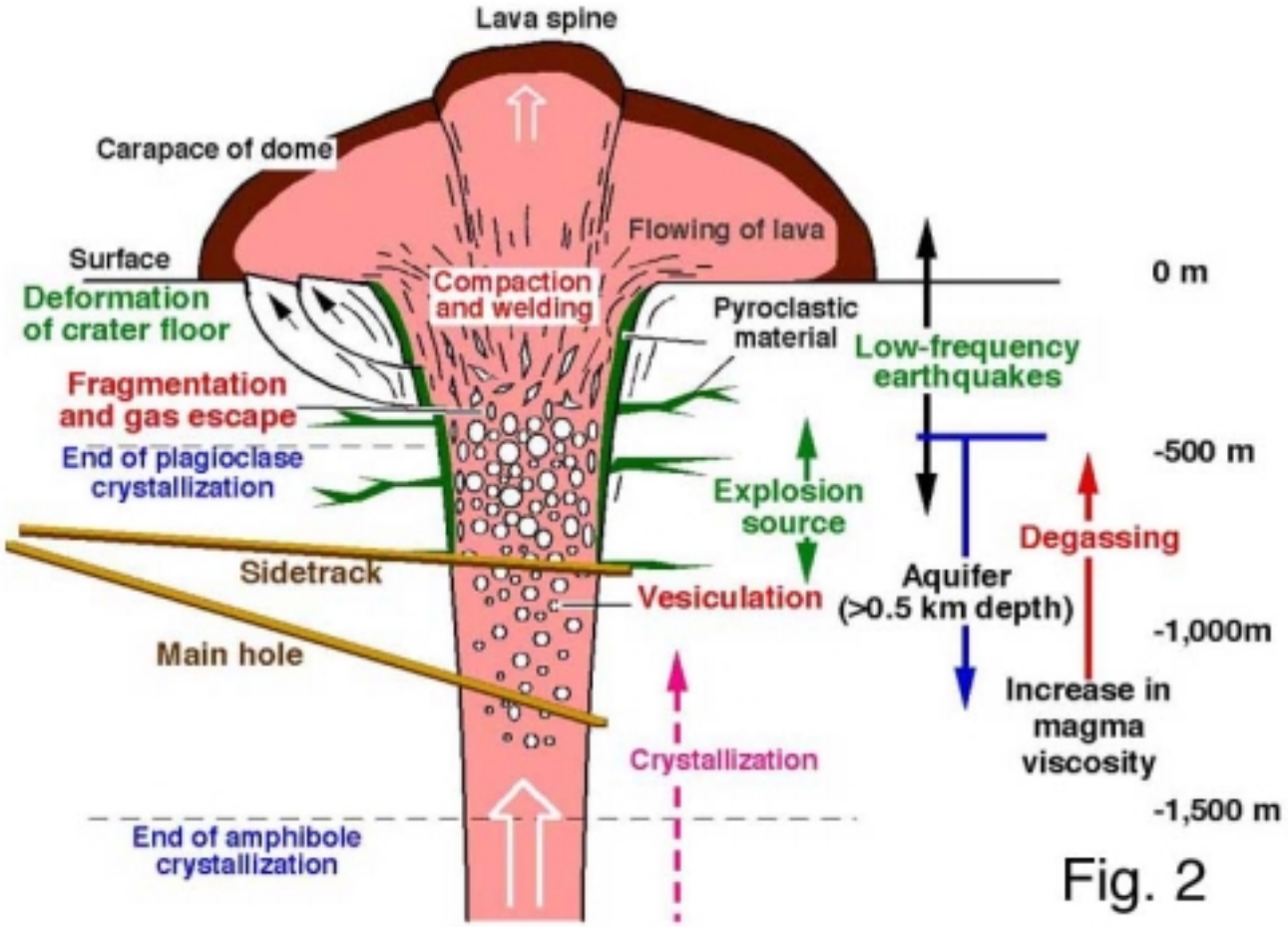
Lava spine
Carapace of dome
Flowing of lava
Surface
Deformation
of crater floor
Compaction
and welding
Pyroclastic
material
Low-frequency
earthquakes
0 m
Fragmentation
and gas escape
End of plagioclase
crystallization
-500 m
Explosion
source
Degassing
Sidetrack
Vesiculation
Aquifer
(>0.5 km depth)
-1,000m
Main hole
Increase in
magma
viscosity
Crystallization
-1,500 m
End of amphibole
crystallization

Fig. 2