

## Volcanology and scientific drilling

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Drilling in volcanic fields is important to obtain an understanding of subsurface three-dimensional geological and thermal structures for not only volcanological interests but also geothermal development and disposal of radioactive waste. In addition, monitoring using drilled hole is an advantage for understanding of movement and circulation of fluids including magma to forecast volcanic eruptions and to evaluate geothermal potential.

Volcano and magma development histories were revealed by deep drilling at Mauna Kea volcano (Hawaii), Unzen volcano, Fuji volcano, etc. Challenging drilling was carried out into a hot basalt lava lake and a volcanic conduit of a recently erupted Kilauea volcano (Hawaii) and Unzen volcano, respectively. During geothermal drilling at Kakkonda and in Iceland, a solidifying magma chamber and rhyolite magma, respectively, were accidentally drilled. Three-D subsurface structures under caldera volcanoes have been understood by carrying out geothermal drillings at Long Valley, Aso, and Nigorikawa calderas. Many of new volcanological knowledge came from drilling projects in volcanic fields including those for geothermal development.

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