

## Theme B : Development of new Volcano Observation Technology

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Japan, with its many volcanoes, has suffered many volcanic disasters in the past, and thus the promotion of research leading to volcanic disaster mitigation is one of the most important missions of volcanology. It is essential to promote research that leads to the assessment of the imminence of volcanic eruptions by utilizing existing knowledge and technology.

In order to properly assess the urgency of a volcano's eruption, it is most important to understand the internal conditions of the volcano using observational data, both in eruptive and non-eruptive periods. Internal structure of volcanoes is also important as it can greatly influence the eruption style. In addition to the acquisition of observation data, it is also necessary to simultaneously advance the sophistication of methods for the appropriate and rapid analysis and evaluation of the data.

Theme B: Development of advanced volcano observation techniques (hereafter, Theme B), which is a part of the Integrated Program for Next Generation Volcano Research and Human Resource Development (hereafter, Volcano-PJ), aims to respond to the need to assess the imminence of volcanic eruptions and consists of the following four subthemes.

Subtheme 1: Using New Techniques to Enhance the Sophistication of Volcano Observation. This subtheme aims to improve the temporal resolution of volcanic fluoroscopic techniques using cosmic ray muons, a new method for understanding the density structure of volcanoes.

Subtheme 2: Development of Remote Sensing Techniques for Volcano Observation, is further divided into two subthemes. In Subtheme 2-1: Development of precise observation technology of crustal deformation using portable radar interferometers and satellite SAR, a portable radar interferometer for observing ground deformation is developed and linked to the results of current satellite SAR analysis. In Subtheme 2-2: Development of remote observation technology for volcanic surface phenomena, a compact thermal gas visualization camera is developed to remotely observe volcanic gases, plumes and lava flows during eruptions at various wavelengths.

Subtheme 3: Development of Geochemical Monitoring Techniques. In this subtheme, equipment is developed that enables field measurement of isotope ratios to quantify the magmatic origin of volcanic gases emitted from fumaroles and dissolved gases in hot spring water, which can rapidly indicate subsurface changes.

Subtheme 4: Development of Techniques for Revealing Internal Structure and Conditions. In this subtheme, we conduct mobile observations at about 10 active volcanoes that are likely to erupt in the near future or cause major disasters when they erupt, in order to acquire information to assess volcanic activity and clarify detailed underground structures. Several tools are also developed to support the immediate understanding of the internal conditions of volcanoes.

The observation data and analysis results obtained in Theme B are registered in the database JVDN, which is being developed and maintained by another theme of Volcano-PJ, and utilized by the community. Theme B also collaborates with other themes of Volcano-PJ to promote volcanic research, such as the development of useful technologies for volcanic hazard mitigation, and to deepen the individual results of the research. Furthermore, in collaboration with the Consortium for Volcano Research and Human Resource Development, we are also cooperating in the training of the research leaders of the next generation volcano research.

In this presentation, we will give an overview of the overall picture of Theme B and introduce the main results obtained so far in the four subthemes.

Keywords: Volcano observation, New observation techniques, Eruption imminence