



## Advancement of volcano disaster prevention based on studies of thermal activity on volcanoes

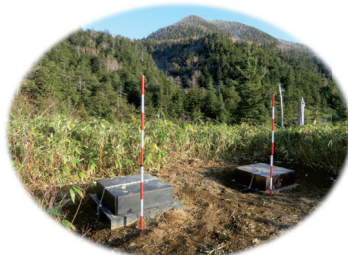
<http://www.ksvo.titech.ac.jp/~terada/index.htm>

- Modeling of shallow hydrothermal system based on multi-parametric observations at Kusatsu-Shirane volcano
- Risk assessment of lateral eruptions using soil gas
- Development of aerial multi-parametric observation methods using drones

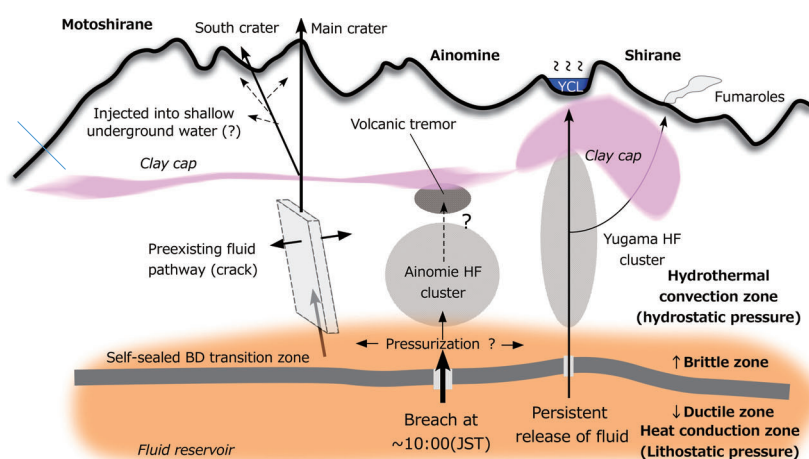
We design and operate a dense volcano observation network of the Kusatsu-Shirane Volcano Observatory to model shallow subsurface structures that cause phreatic eruptions. In addition, we develop methods for monitoring the hydrothermal system (see the schematic diagram below). We discuss how people who benefit from volcanoes but face threats from volcanoes can deal with volcanoes, in other words, how to increase their resilience.



Borehole-type tiltmeter and seismometer station



Temporary seismic and geodetic station



Schematic diagram of the hydrothermal system associated with the 2018 eruption at Kusatsu-Shirane volcano (Terada et al., 2021). <https://doi.org/10.1186/s40623-021-01475-4>



Kusatsu-Shirane volcano



Fumaroles

### New Initiatives



#### An experiment of multi-parametric measurements using drones.

Perform gas analysis, sample collection, and remote temperature measurement. Continue safe and reliable volcano observations even during eruptions.

- Developing observation techniques
- Devising analytical methods



Application to actual volcanoes including Kusatsu-Shirane volcano



#### Soil gas sampling at a new vent formed during the 2018 eruption

Sample small amounts of volcanic gas to assess magmatic activity at depth and model a hydrothermal system of volcanoes.