Oral | Symbol S (Solid Earth Sciences) | S-VC Volcanology

[S-VC51_29PM1]Hydrothermal systems beneath volcanoes

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Hydrothermal systems occur beneath volcanoes depending on different environments. Uderstanding of hydrothermal systems contributes not only to the study of the earth system but also to utilization of geothermal energy and prediction of volcanic eruptions. In this session, the structure and the flow of heat and mass beneath volcanoes are discussed from earth sciences and reservoir engineering.

3:45 PM - 4:00 PM

[SVC51-P02_PG]Hydrothermal system beneath Shirahone hot spring, Nagano, Central Japan, revealed by resistivity survey

3-min talk in an oral session

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Shirahone hot spring is one of the most active geothermal area, located in the western part of Nagano prefecture, Japan. A source of hot water has not been clarified, because there are few geophysical exploration and borehole logging. We performed an electrical resistivity exploration employing the magnetotelluric (MT) method in order to identify a hot-water reservoir and whole hydrothermal system providing the Shirahone hot spring. The MT data were measured at six stations along the NNE-SSW line crossing the Shirahone area. The apparent resistivity and impedance phase were inverted to a two-dimensional resistivity section down to 3 km deep with the aid of the code developed by Ogawa and Uchida (1996). The estimated resistivity section generally indicates a range of resistivity 1-3000 Ω m, including two considerable conductors below 3 Ω m. These conductors are found at a depth 400-1000 m and deeper than 2000 m beneath the Shirahone hot spring. The upper conductor is interpreted as a hot-water reservoir which acts as a source of the Shirahone hot spring. The hot water would ascend from this reservoir to the discharge area through a fracture zone. The deeper conductor can be a heat source consisting of high temperature intrusive complex. This source might sustainably supply heat to the upper reservoir, which can keep itself a long time. A high resistivity zone is found beneath the Sakaigawa active fault zone. In general, an active fault is identified as a conductive zone due to saturated water into a fractured zone. Conversely, our resistivity section indicates a relatively resistive zone beneath the fault. This implies a locked part of the fracture zone where groundwater had declined after the last active phase of the fault.