

Numerical model of the hydrothermal system at the Akakura Caldera in Kurikoma Area

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The Akakura Caldera is located at the southern part of Kurikoma Area, and is one of the old calderas in Tohoku District. It was formed by the huge pyroclastic flow about 3 million years ago. This study conducts numerical simulations of the hydrothermal system development that is modeled after the Akakura Caldera. In the numerical modeling, the structures such as a magma chamber that was associated with the formation of the caldera structure (Magma 1), high permeable fracture zone associated with a reverse fault and a circular fracture, impermeable layers filled with quartz and fracture clouds were considered and emplacement of a magma chamber that generated the post-caldera volcanic activity of 0.8 to 1.4 Ma (Magma 2) was also included. The calculation period was 3 million years from the emplacement of Magma 1 to the present and Magma 2 was emplaced 2.2 million years after the emplacement of Magma 1. The initial temperature of Magmas 1 and 2 was set as 1000 deg C. For the size of Magma 2, two kinds of diameter (2.5 km and 3.5 km) were adopted for the modeling. As a result, it was indicated that a supercritical geothermal fluid region still remains at the depth of 5 km until about 100 thousands years after the emplacement of Magma 2. It is inferred that a high enthalpy hydrothermal system can exist at a piston-cylinder type caldera with a post-caldera volcanic activity like the Akakura Caldera until about 10 thousands years after the commencement of the post-caldera volcanic activity.

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