

Relation of high-temperature acid hot-springs to volcanoes

*Munetake Sasaki¹, Noriyoshi Tsuchiya²

1.National Institute of Advanced Industrial Science and Technology, 2.Gradual School of Environmental Studies, Tohoku University

Volcanic-hydrothermal systems can effectively transport heat and mass from deep to shallow environments, providing us a lot of benefits such as resort, thermal energy and mineral resources. Acid hot-springs generally locate in central parts of the systems, and are not still utilized for thermal energy resources. Then, this study investigated geochemical features of acid hot-springs in order to form a basic framework of genesis of acid hot-springs for future development of thermal energy resources.

Acid hot-spring waters exhibit contribution of low-temperature meteoric water to high-temperature magmatic fluids more than 80% based on isotopic compositions, the value which is necessary to form liquid-dominated discharges. Acid hot springs seem to interact fully with rocks, situating at a transitional point in progress from dissolution to neutralization stages. Acid SO₄-Cl type waters are classified into HCl-dominated and SO₄-dominated waters, probably indicating reduced and oxidized conditions of waters at deep depths, respectively. Geothermometers applied to acid hot-spring waters might suggest acid water reservoirs where mixing between magmatic fluid and meteoric water promote water-rock interaction through dissolution and dissociation of gaseous components.

Referring these lines of consideration, potential resources and tasks to be solved in future for thermal energy exploitation will be discussed.

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