Hydrogeochemistry of hydrothermal circulation occurred in Aira Caldera occupied the innermost part of Kagoshima Bay, Kyushu, Japan

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Marine shallow-water hydrothermal activity was discovered at a submarine crator at 200 meters water depth in Kagoshima Bay (Ishibashi et al., 2008). The Wakamiko crator is considered as a volcanic vent of a giant eruption at 25ka representing the last stage of formation of the Aira caldera. At present, most part of the Aira caldera of 30 km x 20 km in size is submerged to be a part of Kagoshima Bay, which shorelines are bordered by the rim of the caldera.

We collected hydrothermal fluids (T = 200 degC) venting from chimney-like structures on the crator floor, during NT07-09 and NT07-16 dive missions conducted using ROV Hyper Dolphine (Japan Agency for Marine Science and Technology). The fluid showed chemical composition explained by hydrothermal interactions between seawater and felsic volcanic material, although the Cl concentration was only half of seawater. The isotopic composition characterized by significantly negative delta-D value suggests involvement of meteoric water as the origin rather than subseafloor boiling process.

To confirm recharge of meteoric water into the fluid circulation sytem, we collected 8 hot spring waters (T = 40 - 80 degC) close to the shore line, which are pumped up from reservoirs situated at 650 - 1100 m deep from the surface. Relationship between Cl concentration and delta-D value of the spring waters was well accordance with a mixing trend between the seawater and local ground water, which covers the data of the submarine vent fluid.

The reservoirs of these hot springs are considered to developed in the upper Pleistocene pyroclastic deposits, which filled in the paleo-Kagoshima bay (Kagoshima Graben) prior to the formation of the Aira caldera and is found widely even outside of the caldera. It is reasonable to expect that the submarine discharge of hydrothermal fluid originated from a reservoir in the same sedimentary layer. A magma chamber is expected to exist about 10 km beneath the center part of Aira caldera based on geophysical studies, which would act as a heat source that drives fluid circulation of 30 km in a diameter. Heat flux from the Aira caldera floor is reported by Fujino at the same session.