

## Helium and CO<sub>2</sub> fluxes in Wakamiko caldera

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Wakamiko caldera is part of the active volcanic arc system situated in Kagoshima Bay. It is closely being monitored because it has the potential for a destructive eruption. In this study, we collected seawater and sediment pore water samples within Wakamiko caldera and nearby sites around Kagoshima Bay in 2015. Helium isotopes, which are good geochemical tracers for sources of fluids, were measured to know the composition and origin of the hydrothermal effluents. Gas composition, including carbon and nitrogen isotopes, was also analyzed to understand the provenance of the dissolved gases in the pore water. This is the first report on the dissolved gases in sediment pore water in Wakamiko caldera.

Helium isotopic ratios in both seawater and sediment pore water show a mixture of air saturated seawater (~1Ra) and magma source with ~7Ra. This means the origin of excess helium-3 in bottom water is same as that in sediment. This trend is similar to previous studies in 2010 and 2014, which indicate that hydrothermal activity is stable in this period. The <sup>3</sup>He and <sup>4</sup>He fluxes derived from this study are 13.7 - 18.4 atoms/cm<sup>2</sup>s and 1.51 - 1.54 x10<sup>6</sup> atoms/cm<sup>2</sup>s, respectively. These estimates reflect background diffusion of helium in the Wakamiko caldera. Measurement of gas composition showed that the pore waters are CO<sub>2</sub> rich and stable carbon isotope analysis revealed that the CO<sub>2</sub> in the system is a mixture of biogenic sources and magmatic volatiles similar to that of Mt. Sakurajima. Finally, the estimated average magmatic CO<sub>2</sub> flux from the submerged caldera is 1.41 x 10<sup>5</sup> mol/yr.

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