# Temporal variations of self-potential at the summit area of Izu-Oshima volcano

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We observe Self-potentials(SP) continuously at Izu-Oshima volcano, in order to detect signals associated with the changes in volcanic activities. The system was installed at Mt. Mihara and its surroundings in March 2006, and 11 sites are currently operating. The recorded electric differences among sites show seasonal variations up to 50 mV, although, the linear trends excluding the annual variation has not notable changes.

Downward meteoric water flow generates substantial negative self-potential (SP) via electrokinetic coupling. The groundwater level of the Izu-Oshima volcano is about 500m depth from the caldera floor. Above the groundwater level, a thick unsaturated zone develops, where the pore is filled with air and water. The numerical simulation calculating the hydrothermal flow and associated electric potential, shows that the observed seasonal SP change is induced by the change of liquid saturation in pore due to the meteoric water infiltration. From the comparison between the observation and calculation, we obtained the suitable hydrothermal condition such as porosity, permeability and infiltration rate of rainwater at each sites.

Using the suitable model, we calculated the SP change associated with the volcanic gas inflow to the unsaturated zone which is located above the groundwater level. The simulation shows the SP increase with the inflow of high temperature volcanic gas and rapid decreases with the outflow of the gas. The total amount of SP change depends on the gas flow rate and the period of it. When we take the inflow rate similar with the rainwater infiltration rate, the model indicates that the sufficient change of the hydrothermal condition such as temperature and pressure occurs at the depth deeper than 300m from the surface, which result in the SP change up to 100mV at the surface. We conclude that SP is effective tool to catch the sign of the volcanic gas uprising before it reaches to the surface.