

Temporal change of resistivity and self potential at Onikobe geyser

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We deployed 23 potential electrodes around the Onikobe geyser and 5 current electrodes to inject DC current (200-300mA). We could monitor the resistivity and self potentials at 23 potential electrodes at every 2 seconds. We have observed the decrease (up to 5 percent) of apparent resistivity starting from 20-30 seconds prior to the effusion. The spatial pattern of the decrease does not have a simple radial symmetry, but in general closer sites to the pit had larger amount of decrease. On the other hand, if we injected current in another location 5m away from the vent, then we observed increase of apparent resistivity at the time of the effusion. The larger increase was centered at the opposite side of the current injection location. This puzzle was solved using the three-dimensional resistivity model utilizing FEM. The final model showed that at the effusion the vacant space beneath the vent is filled with hot water.

Self potential source was investigated for typical phases of the effusion cycle. The most significant SP increase was observed just after the effusion and modeled point current source was sought at 4m below surface at 4m away from the pipe, which means that the fluid was supplied to the reservoir through pipe with porous media which caused electro-kinetic effect. The SP decreased as the reservoir was filled. Just before effusion, as part of the fluid entered into a shallow minor plumbing system, another small current source appeared. During effusion, the vapor-fluid interface was responsible for the divergence of the drag current and it was located near the casing pipe.