

Surface displacement around Hachobaru geothermal field inferred from persistent scatterer SAR interferometry

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Fluid migration around geothermal field can cause surface displacement. Leveling campaign and GPS measurement has been used to estimate surface displacement and shown the usefulness for reservoir monitoring at geothermal field. Recently, persistent scatterer SAR interferometry (PS-InSAR) analysis has been developed as a practical tool for surface displacement monitoring. By making use of the advantage of wide data coverage of satellite image, the analysis enables us to estimate surface displacement at the whole geothermal field with high spatial density. In this study, we applied PS-InSAR analysis on areas around Hachobaru geothermal field, the largest geothermal field in Japan, located Kyushu Island. For the analysis, we used 18 ALOS/PALSAR images acquired from July 2007 to December 2010 from an ascending orbit.

As a result of the analysis, we estimated secular surface displacement with the maximum rate of 15 mm/year opposite to satellite direction, which can be inferred as ground subsidence. We also found temporally irregular displacement along with the secular displacement. This irregular displacement has occurred all of Mt. Kuju, suggesting that displacement at Mt. Kuju has influenced displacement at the geothermal field. Moreover, we found that the secular displacement has decayed over time and has clear boundaries which possibly correspond to fault locations.

Keywords: surface displacement, persistent scatterer SAR interferometry, Hachobaru geothermal area