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Ground deformation on active volcanoes. What do we measure?

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Ground deformation measurement is one of the major methods of monitoring of active volcanoes. Processes in magma chamber-conduit and geothermal systems heated by the magma are the main sources of ground deformation. Influence of magma chambers and volcanic conduits on ground deformation is well studied theoretically but there are no studies of ground deformation caused by short-lived changes in hydrothermal system during a volcanic eruption.
Two patterns of ground deformation caused by changes in pressure in a volcanic conduit and by a heated hydrothermal system are compared in the paper. It is shown that vertical displacement caused by a hydrothermal system can be several times larger than those caused by conduit processes. Patterns of ground deformations are also very different for these sources. In the case of hydrothermal system induced deformation maximum of the vertical displacement is located above the conduit. There is a local subsidence above the conduit in the case of deformations induced by conduit processes. The maximum uplift is located at a distance approximately twice the depth of the upper part of the conduit. The influence of hydrothermal system must be considered during interpretation of monitoring data of active volcanoes.