



Continuous high resolution gravity measurements at a geothermal field in Northern Iceland

Florian Schäfer (1), Philippe Jousset (1), Jacques Hinderer (2), Maren Brehme (1), Kemal Erbas (1), Michal Mikolaj (1), Nolwenn Portier (2), Marvin Reich (1), Séverine Rosat (2), Stephan Schröder (1), Richard Warburton (3), and Andreas Güntner (1)

(1) GFZ German Research Centre for Geosciences, Potsdam, Germany, (2) EOST, Université of Strasbourg, France, (3) GWR Instruments Inc., San Diego, USA

In December 2017, three superconducting gravity meters (iGrav006, iGrav015 and iGrav032) were installed in the Theistareykir geothermal field in Northeast Iceland. Together with two gPhone relative gravity meters (gPhone061 and gPhone128), subsurface mass changes from production and injection of fluids in the course of the operation of the new power plant that started operation in October 2017 will be monitored for at least one year.

Prior to the Iceland installation, all gravity meters were co-located for simultaneous measurements at the gravimetric observatory J9 in Strasbourg, France. The obtained data were used for instrumental calibration, comparison of noise levels and tidal analysis. During transport from Strasbourg to the geothermal site in Iceland, the superconducting gravity meters were kept at their 4K operating temperature. This way, the time-consuming cool-down process of the iGravs as well as the generation of high initial drift rates could be avoided.

The measuring sites in Theistareykir were set up close to the geothermal production and injection wells. Additionally, one site is located outside the geothermal field, for reference measurements that are unaffected by the activities of the power plant. At each site, a set of physical parameters which influence the local gravity signal are measured. This includes the monitoring of soil moisture, groundwater level, and snow height. Moreover, snow weight and snow water equivalent are measured at the production site.

Here, we present the results of the unique intercomparison of three superconducting gravity meters and two gPhones at Strasbourg and the first time series obtained at the geothermal site in Iceland. An initial interpretation of the gravity variations with regard to the geothermal activities and the hydro-metrological dynamics is given.