

Gravity measurements

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Gravity data is primarily used in bedrock mapping. The data can also be used for locating major aquifers. Other areas where gravity data is useful are in conjunction with exploration for ores, in various geodetic applications, for navigation and positioning purposes, deployment of strain gauges, and for calibrating precision balances.

The Geological Survey of Sweden (SGU) initiated systematical gravity measurements in the late 1950s in conjunction with the documentation of iron ores in northern Sweden. The regional, nationwide measurements were started in the middle of the 1960s, serving primarily as support for SGU's bedrock mapping activities. Nowadays gravity measurements are mainly carried out along roads by car and, in areas with sparse road coverage, by snowmobiles or helicopter.

The gravity measurements in the Gulf of Bothnia and the Bothnian Sea were carried out on the ice, mainly in the 1970s and parts of the 1980s. In the late 1990s, parts of the Bothnian Sea and a few sections of the Baltic Sea, Kattegat and Skagerrak were measured from ships. In 1999, the Baltic Sea, the Gulf of Finland, and the lakes Vänern and Vättern were measured from aircrafts. The measurements on the ice were carried out in collaboration with the Swedish National Land Survey and the Finnish Geodetic Institute. During the measurements from ships and aircrafts, SGU collaborated with the Swedish National Land Survey, the Finnish Geodetic Institute, Danish National Survey and Cadastre, the Norwegian Mapping Authority, the University of Bergen, and the geodetic institutions in Estonia, Latvia and Lithuania.

When performing regional measurements, SGU aims at keeping a distance of 1–1.5 km between the measurement points. The measurements made by the Swedish National Land Survey, most of which are present in the SGU database, have a distance of 5 km between the measurement points. The accuracy of the gravity deviations,

or Bouguer anomalies, is very much associated with the quality of leveling. SGU is currently using network-RTK GNSS and altimeters to determine the elevation of each gravity measurement.



Gravity measuring in a beech forest on Hallandsås. The elevation determinations were made using a precision GNSS, but the dense forest made elevation determinations difficult. Photo: Anders Gustafsson.