



The use of the A10-020 absolute gravimeter for the establishment and modernization of national gravity controls in Europe

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The Institute of Geodesy and Cartography operates the A10-020 absolute gravimeter since October 2008, and since that time the gravimeter had been used for gravity control establishment and modernization in several European countries, i.e. Finland, Sweden, Norway, Denmark and Poland. In all countries gravimetric surveys were performed on outdoor stations.

While surveys in Norway and Denmark covered up to 15 stations, work done in Finland, Sweden and Poland included more than 300 field stations in total and for each country lasted for at least a few years. It was vital for the A10-020 gravimeter to remain reliable during the whole period of gravity control establishment.

In order to assure long term reliability of the instrument specific procedures were implemented including laser, clock and barometer calibration as well as participation in local and international AG comparison campaigns. Long term A10-020 offset from AG campaigns will be presented as well as long term stability of metrological components. Their impact on the realization of gravity reference will be discussed.

Consistently throughout the whole period of the A10-020 operation at IGiK monthly gravity surveys were performed at Borowa Gora Observatory at three separate stations, providing valuable material to evaluate long term gravity variations and allowing to assess the A10-020 performance throughout its operation.

As of May 2016 the Borowa Gora Geodetic-Geophysical Observatory is equipped with an iGrav-027 superconducting gravimeter. Therefore the current reference function will be realized by a combination of the A10-020 and iGrav-027 records and at the same time serve as a continuous verification of the A10-020 gravimeter performance for all sort of gravimetric surveys in Poland and Europe. Results of first 18 months of simultaneous gravity residual signal of the A10-020 and iGrav-027 will be presented.

The impact of annual hydrological variation in the realization of the reference level will be discussed as the sensitivity of the A10-020 gravimeter along the years proved to be much lower than the observed and modelled hydrological effect in Poland reaching annual peak to peak variations up to 200 nm/s².