

5.1. Status of the ASG-EUPOS network

Since the use of the PL-KRON86-NH vertical reference frame in Poland has been extended by the end of 2023, for next four years this frame will still officially be applied parallel to PL-EVRF2007-NH. The new reference surface for heights was developed using the current pl-geoid2011 model based on EGM2008, fitted to PL-KRON86-NH, and then corrected for differences between PL-KRON86-NH and PL-EVRF2007-NH heights. Those corrections are determined by means of Helmert's seven parameter transformation on the basis of over 35 000 benchmarks of the basic levelling network, common for both frames realization. The complicated procedure of calculation of geoid heights from the model as well as the level of errors induced into vertical networks encouraged the team of the Warsaw University of Technology to implement the reference surface for heights in Poland by using the European Gravimetric Geoid models. Gravimetric height anomalies determined on the basis of EGG2008 and EGG2015 models were compared with the respective ones from satellite/levelling data from the stations of the ASG-EUPOS network (Marjanska et al., 2019). Estimated fit of geoid undulations calculated from the EGG2015 model to satellite/levelling data is at the level of 2 cm. Fitting Using trigonometric polynomials that fit is reduced to 1.3 cm. The results of the next realizations of the EGG models might be better through sharing new gravimetric and satellite/levelling data from parts of the Polish territory to the National Geodetic Survey and the University of Leibnitz in Hannover. Trojanowicz (2019) investigated the local quasigeoid modelling based on the geophysical gravity data inversion (GGI) method. The model includes information on density distribution, thus it can be considered as a local integrated model of both: the external gravity field and the density distribution of the Earth's crust. The performed calculations indicated a very high accuracy of the determined quasigeoid model which is developed when the modelling process includes the use of a GGM. Standard deviations of differences between height anomalies obtained from the model determined and from GNSS-levelling data are at the level of 1.5 cm.

Trojanowicz et al (2020a) focused on the modelling of local quasigeoid in South-Western Poland using precisely defined GNSS/levelling height anomalies, EGM2008, terrestrial gravity data and topography data. Four approaches: Least Squares Collocation (LSC) approach.