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Results of 4th repeated levelling survey in Estonia

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Estonian precise levelling network consists of about 2000 km levelling lines and 1300 benchmarks. Three precise repeated levellings were carried out: in 1933-1943, 1948-1969 and 1970-1996. Three height systems have been realized: Tallinn Height System (unofficial system), Baltic Height System of 1951 and Baltic Height System of 1977 (BK77).

Campaign of 4th repeated levelling was started at 2004 with goal to reconstruct the destroyed and damaged benchmarks, to realize the new height system and concept of integrated geodetic network. Reconstructed levelling network will consist of approximately 3000 km levelling lines and 2300 benchmarks. Digital level DiNi and NEDO invar code rod is used for levelling. Levellings carried out so far is characterized by high precision: levelling error calculated using levelling loops closing error is 0.23 mm/km. In the end of 2010 is planned to complete the levelling field work. After that the processing of the levelling data and the realization of the new height system will be implemented.

Goal of the present study was to adjust the height differences of the latest repeated levelling and compare obtained benchmarks heights with previous ones. Method of the least squares and software SBG GEO 2005 was used for adjustment. Minimally constrained adjustment with one fixed benchmarks was used. Location of the benchmark was chosen in the area of minimal postglacial land uplift.

Obtained benchmark heights are preliminary because no rod calibration, refraction etc. corrections were added yet to field height differences. Therefore obtained heights are not realization of the new height system. Still obtained heights can be used for example for improving of Estonian geoid model.

In comparison between new and old benchmark heights, SE-NW directional pattern of postglacial land uplift appeared as expected.