# National Report of Estonia 2011

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Abstract. National Report of Estonia covers overview of geodetic works in 2010-2011. Shortly are described geodetic works in field of permanent stations, high-precision levelling, gravity and in municipalities. As well maintenance aspects of geodetic marks are dealt with. The legislation issues have now great importance, because in February the Spatial Data Act was adopted, which implements the INSPIRE directive in Estonia.

#### **1** Permanent Reference Stations

Currently the national GNSS permanent stations network (ESTREF) consists of 10 stations of which 4 belong to the EPN network.

The cooperation continued with EUPOS Combination Centre in FÖMI Satellite Geodetic Observatory. The Land Board started with the analysis of older observation data and removal of gross errors. The exchange of GNSS data on border areas has been initiated between Estonia and Latvia.



Fig. 1. Estonian GNSS permanent stations.

# 2 High-precision Levelling Network

Measurements were performed in two periods: 5 May – 9 June 2010 and 31 August – 28 November 2010. Eight lines were levelled (Fig.2) including a connective line to Latvia in the segment of Vastse-Roosa – Ape. The total length of the levelled lines was 379 km and the accuracy of measurements 0.18 mm  $\sqrt{\text{km}}$  for random errors and = 0.03 mm km for systematic errors.

The preliminary data processing of sea level measurements performed in the Estonian University of Life Sciences (Liibusk, 2011) indicated a 17 mm error of closure in the archipelago polygon (253 km). The period of observations between Hiiumaa, Saaremaa and mainland was 271 days, between Saaremaa and Hiiumaa 202 days. During the subsequent data processing gross errors of various origin were filtered out; for analysis there remained 250 days between mainland-Hiiumaa and 183 days between Saaremaa-Hiiumaa. It is necessary to extend the period of observations in order to ensure the reliability subsequent calculations.



Fig. 2. The I order levelling network.

### **3 Gravity networks**

In 2010, densification of the gravity network was continued in South-West Estonia and Central Estonia (ca 300 points). The scheduled measurement on the ice of the Gulf of Finland in the winter of 2011 could not be performed due to difficult traffic conditions.

#### 4 Local networks

In 2010 only those local geodetic networks were reestablished that had been destroyed as the result of building activities. Particularly many geodetic marks are destroyed in the course of reconstruction of roads and water supply systems of towns. In 2010, 255 cases of geodetic point destruction were registered.

# 5 Maintenance

The Land Board continued the inspection of geodetic points in East Estonia. In 2010, 500 points were inspected. During the inspection the distance of the mark from the surface was measured and it was photographed from near and far.

# **6 Legislation**

On 17 February 2011, Spatial Data Act was adopted, which creates basis for the implementation of INSPIRE directive in Estonia. Proceeding from this act it is necessary to draft also implementing legislation regulating the maintenance of the geodetic database, the Estonian geodetic system, protection of geodetic marks and performance of geodetic works.

# References

Liibusk A., Ellmann A., Kõuts T. (2011) Use of high resolution sea level measurements for height transfer in the West-Estonian Archipelago (Manuscript)