National Report of Estonia
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High-precision levelling

• Inspection and reconstruction of levelling lines
  – Year 2007: 331 km
  – Altogether: 2928 km

• Statistics
  – 44% of elevation marks were damaged or unfound
  – 928 new marks were placed

• High-precision levelling
  – Year 2007: 631 km
  – Year 2008: 571 km
  – Year 2009: 573 km
Fig. 1. Estonian Levelling Network
Levelling lines (red), reconstructed in 2007 (right); levelling lines (red), measured in 2007 (left)
Gravity networks

• Activities in 2007
  - 4 new 1 order points were established
  - In two points – Suurupi and Tõravere – the absolute measurements were performed (with cooperation of the Institute of Geodesy of University of Hannover)

• Activities in 2008
  - Absolute measurements on 1 order network points (altogether 7) in cooperation with FGI
  - New absolute points will be tied to the rest of network by relative gravity measurements
  - On all 1 order points the vertical gradient of gravity and its non-linearity will be determined
Estonian gravity network with relative gravimetric ties

EUREF Symposium 18-21 June 2008, Brussels, Belgium
Re-measurements of Estonian geodetic network

- Measurements of the Estonian geodetic network in 1997
- Re-measurements were planned for 2007
  - Postponed (the establishment of permanent stations network took longer than expected)
- The re-measurements will take place between July 28 and August 1, 2008 in total on 12 points
  - Length of session is planned 72 hours
  - All operational permanent GNSS stations will be included
  - Measurement methods are similar to those used in 1997
- We expect to get preliminary results by the end of September 2008
Fig. 3. 1 order Estonian National Geodetic Network
Geodetic networks in municipalities

• Activities before 2007
  – Geodetic networks completed in approx. 50 settlements

• Activities in 2007-2008
  – Reconstruction of geodetic networks in 12 settlements

• Activities in 2009
  – Reconstruction of geodetic networks for three major settlements in the Rae Municipality and in the city districts of Kohtla-Järve

• GPS-measurements by the staff of the Land Board
  – Check the accuracy of local networks
  – Specify the transformation parameters
Fig. 4. Reconstruction of Geodetic Networks in municipalities (2007-2009)

EUREF Symposium 18-21 June 2008, Brussels, Belgium
Permanent GNSS networks

• Activities in 2007
  – 4 new permanent stations were established – Tõravere, Toila, Kuressaare and Audru.
  – Leica GRX1200GG PRO receivers and Leica AT504GG antennas together with LEIS dome are used

• Activities in 2008:
  – In April three new permanent stations – Tõravere, Toila, Kuressaare were included in EPN.
  – Three new reference stations will be set up – Kärdla, Võru and Mustvee
  – In these locations Leica SR520 receiver and AT504 antenna will be set up
Fig. 5. Estonian GNSS Permanent Station Network
Photogrammetry

• Since 2008 in addition to the aerial camera Leica ADS40 also the laser scanner Leica ALS50II has been used
• The both equipment have been mounted on the aircraft Cessna Grand Caravan 208B

Photo 1. Leica ALS50-II Airborne Laser Scanner

Fig.6. Elevation model of the Pärnu city