National geodetic networks of the Republic of Belarus

The State Unitary Enterprise of aerial and space methods in geodesy "Belaerocosmogeodesia"

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Decree Nº200 of the President

Since January, 01, 2010 National Reference Frame – State Geodetic Reference System of 1995 of the Republic of Belarus (SGRS95 RB) has been in use

Specific Features

- 1. Preservation of the common coordinate space with Russian Federation and keeping to the portability to cartographic survey performed earlier as well as cadastral maintenance in the previous coordinate system
- 2. Transitions of topographic and geodetic production to GNSS-methods



Conceptual scheme





The structure of the National Geodetic Network

Fiducial Astro-Geodetic Network (FAGN station in Minsk)

Precise Geodetic Network (Zero order reference network)

1st class Satellite Geodetic Network (First order reference network)

National Detail Geodetic Network



Referencing with ITRS (ITRF 2005)



Some details of the campaign:

- > Observation time: 14x24 hours
- Processing software: Bernese software
- Accuracy (RMS) of the coordinates:±0.8 mm,±0.3 mm,±2.0mm in North, East and Up component

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Zero order reference network



- Number of stations: 9
- > Observation time: 4x24 hours
- Processing software: Bernese software
- Accuracy (RMS) of the coordinates:±1.0 mm,±0.7 mm,±3.0mm in North, East and Up component

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First order reference network



- Processing software: Pinnacle, GeoLab
- Accuracy (RMS) of the coordinates:±2.2 mm,±1.6 mm,±4.2mm in North, East and Up component

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National positioning service



> **Post-processing Service** accuracy - 15 mm horizontal and 20 mm vertical

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Network-RTK service accuracy - 20 mm horizontal and 30 mm vertical

The precise levelling 1993-2004

First order network:

□ 3 700 km
□ 1 930 bench marks
□ Foot levelling along railways and roads
□ Standard deviation after adjustment: 1.7 mm/√ km
□ normal heights
□ previous height system-Baltic Height System 1977 (tide gauge Kronstadt)
□ new height system-? First order lines - Second order lines

Absolute gravity measurements



Absolute gravimeter – FG5
 Indoor measurements
 Concrete pillar (1mx1mx1m)

Some details of the campaign :

- Number of stations: 4
- > Observation time: 2x24 sets, number of drops/set-50
- Processing software: g software
- ➢ Accuracy (RMS) of the measurements :±6.0 µGal



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Nowadays tasks

- Densification of the Permanent Stations
- Reconstruction of local geodetic networks.
 Determination of transformation models from SGRS95 RB to local coordinate systems in the administrative divisions
- Make next order of densification gravity network
- Modelling gravity-field and Quasigeoid computations with accuracy 2-3 cm data-based on EGM 2008

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Cooperation with the EPN and IGS

Many thanks for your attention

