Activities at the Institute of Geodesy and Geoinformatics
Coordinate analysis of Latvian CORS stations

• Networks analyzed:
  - LatPos
  - EUPOS® Riga

• Station Count: approx. 30 (11 unmoved since 2006);
• Timespan: from 2006;
• Weekly SINEX solutions transferred to EPN DAC;
Coordinate analysis of Latvian CORS stations

Latvian CORS differences regarding to GNSS observations in ITRF14 system epoch 1989.0 and 2018.5

Latvian CORS differences regarding to GNSS observations in ETRF89 system epoch 1989.0 and 2018.5
## Coordinate analysis of Latvian CORS stations

<table>
<thead>
<tr>
<th></th>
<th>ITRF14</th>
<th>ETRF89</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distance</td>
<td>Azimuth</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>0,573</td>
<td>53,2°</td>
</tr>
<tr>
<td><strong>STDV</strong></td>
<td>0,008</td>
<td>0,6°</td>
</tr>
<tr>
<td><strong>Min</strong></td>
<td>0,561</td>
<td>51,3°</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>0,592</td>
<td>54,0°</td>
</tr>
</tbody>
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Comparison of the coordinate differences (m) expressed in ITRF14 and ETRF89 systems (1989.0-2018.5)
Coordinate analysis of Latvian CORS stations

Up differences (year 2018 - year 2011) in ETRF89, ETRF2000 and ITRF14 coordinate system

Up differences (year 2018 - year 2007) in ETRF89 and ITRF coordinate system
Coordinate analysis of Latvian CORS stations

Ellipsoidal height changes (year 2018 - year 2011) according to ETRF89 solution (red vectors) and ITRF14 solution (blue vectors)
Vertical Deflection observations

At the moment Institute of Geodesy and Geoinformatics (GGI) is dealing with new kind of measurement – vertical deflection (VD) observations – which are possible to use in DFHRS v4.3.

DFHRS v.4.3. allows to use GNSS/levelling data together with geopotential models and field vertical deflections measurements and/or vertical deflections derivatives from geopotential models.

Vertical deflection measurements allow to check independently the places that have inconsistencies and improve quasi-geoid model.
The scheme of GNSS/levelling and VD observations

Digital-Zenith camera and processing software was developed by GGI and these observations are actively done in Latvia now. The current amount of VD observations is more than 370 and precision of these measurement are evaluated as 0.10 arcsec mostly for all observations.
The research is funded by ESF Project: 1.1.1.1/16/A/160

Digital Zenith Camera observations: differences from global geoid GGM+

- 370+ sites (2017-2019)
- 1 – 1.5 hours per site
- max 6 sites per night
- accuracy ~ 0.1”
- differences from GGM+:
  - average 0.02”
  - rms 0.4”
  - amplitude up to ~1”
- applications:
  - regional geoid models,
  - local geological features,
  - alternative to levelling
Zenith camera consists of a rotating platform, on which is mounted a small telescope, equipped with imaging device, tiltmeter, leveling mechanism, rotation gear and control equipment.

Similar platform bellow is used as base of levelling and rotation, it is mounted on field tripod.

The CCD camera is attached in direct focus, below the telescope.

A 203 mm catadioptric telescope equipped with CCD camera is used for image acquisition.

The camera has 8 Mpix sensor with 4.5 μm pixels; at 2 m focus distance resulting field of view is 0.5x0.39 deg with resolution close to 0.5 ”/pix
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Thank You