Activities at the Institute of Geodesy and Geoinformatics

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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;

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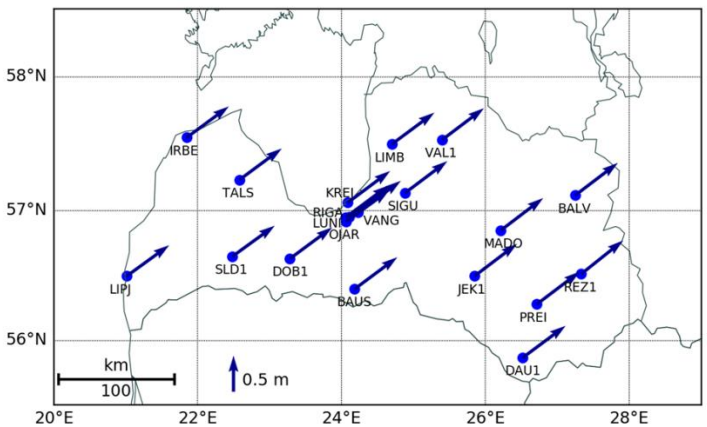
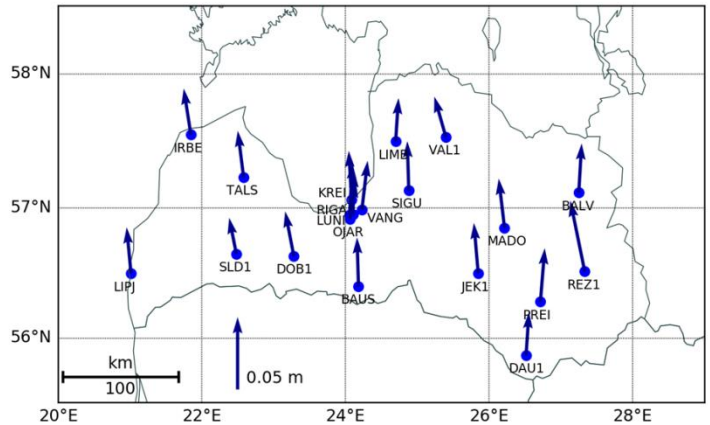


Latvian CORS differences regarding to GNSS observations in ITRF14 system epoch 1989.0 and 2018.5



Latvian CORS differences regarding to GNSS observations in ETRF89 system epoch 1989.0 and 2018.5

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Coordinate analysis of Latvian CORS stations

	ITRF14			ETRF89		
	Distance	Azimuth	Height	Distance	Azimuth	Height
Average	0,573	53,2°	0,003	0,033	-2,7°	0,003
STDV	0,008	0,6°	0,014	0,005	6,8°	0,013
Min	0,561	51,3°	-0,045	0,025	-15,9°	-0,035
Max	0,592	54,0°	0,014	0,050	8,7°	0,022

Comparison of the coordinate differences (m) expressed in ITRF14 and ETRF89 systems (1989.0-2018.5)

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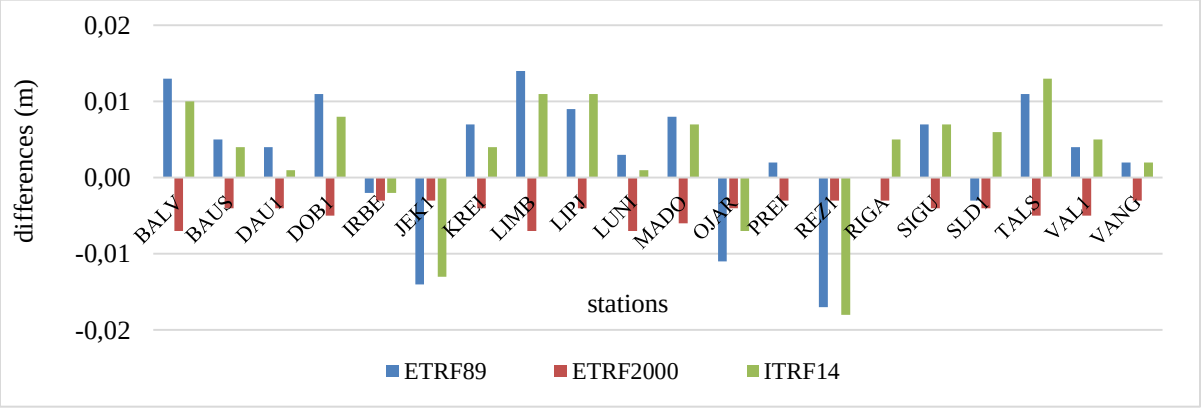
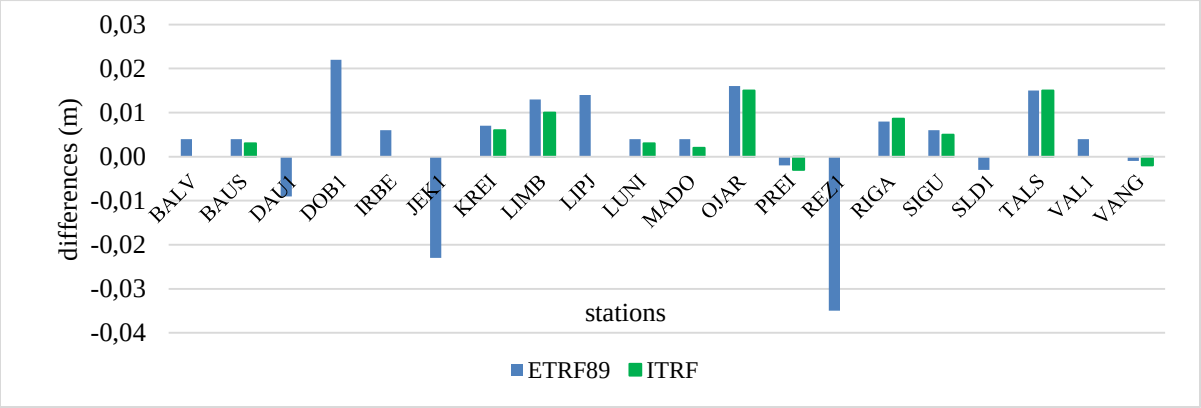


Up differences (year 2018 - year 2011) in ETRF89, ETRF2000 and ITRF14 coordinate system



Up differences (year 2018 - year 2007) in ETRF89 and ITRF coordinate system

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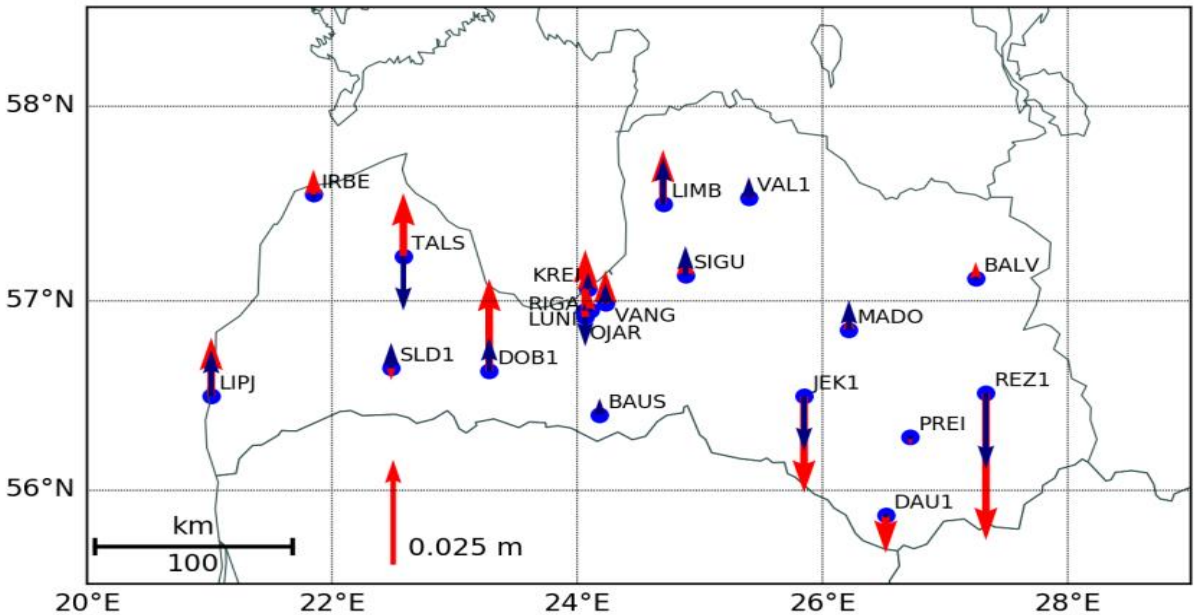
Coordinate analysis of Latvian CORS stations



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

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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.

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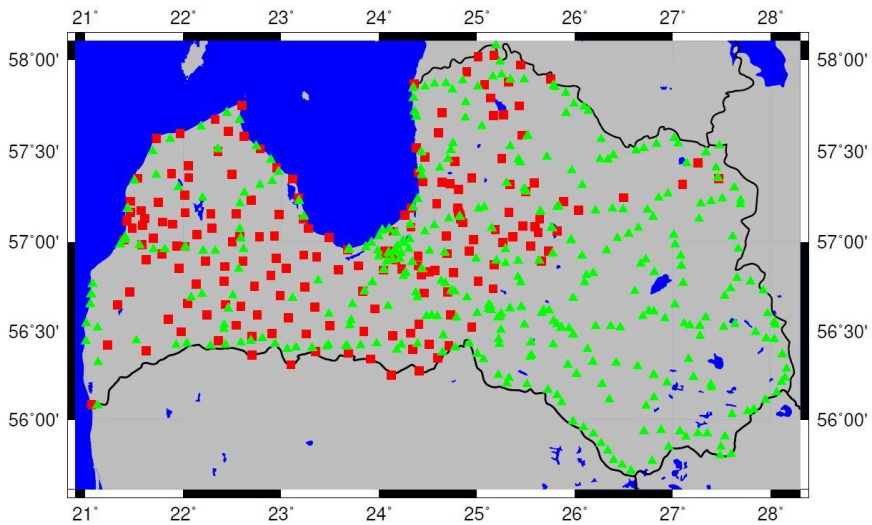
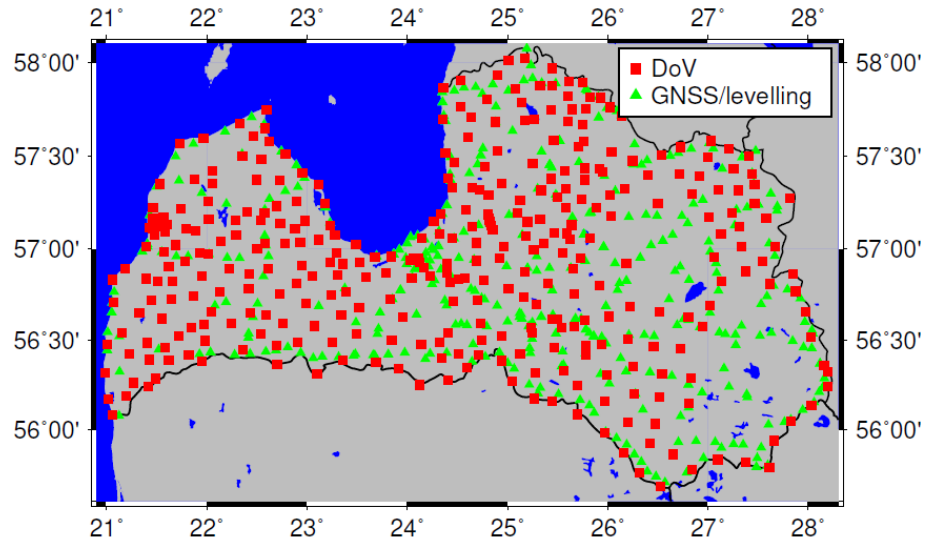
The scheme of GNSS/levelling and VD observations



Data points as of 2018



Data points as of 2019

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.

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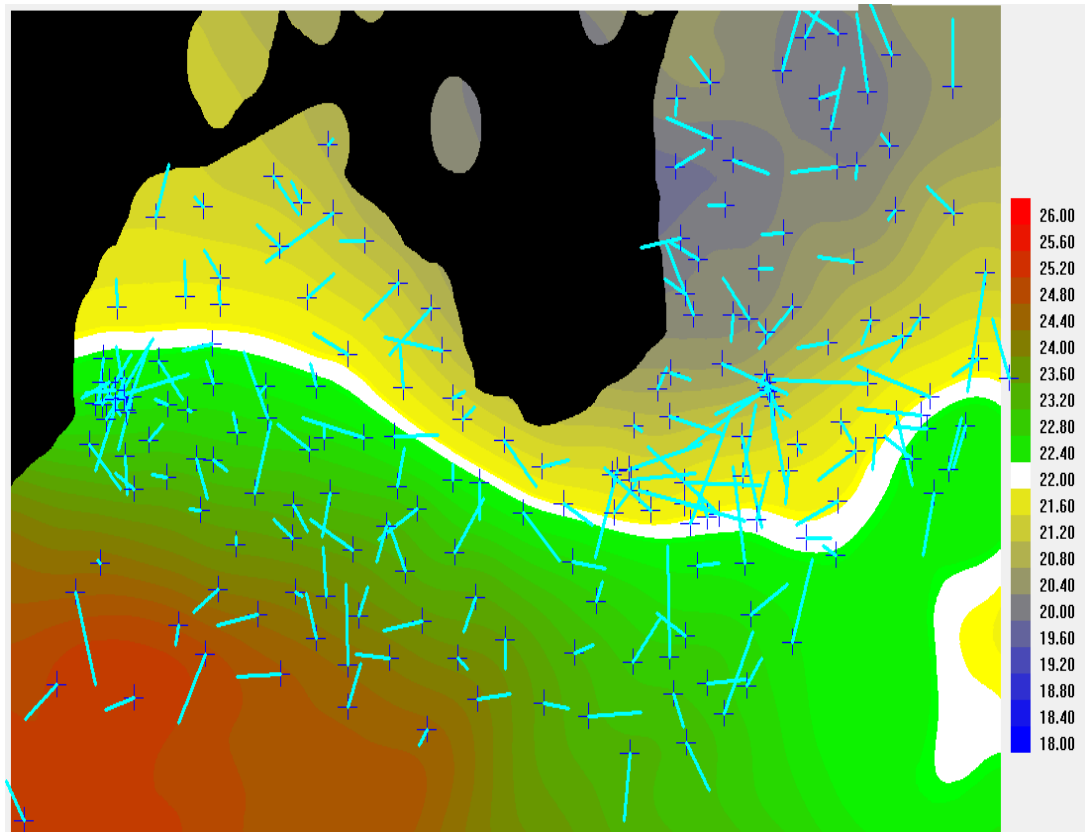
Digital Zenith Camera observations: differences from global geoid GGM+



- 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

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Digital Zenith Camera

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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Digital Zenith Camera

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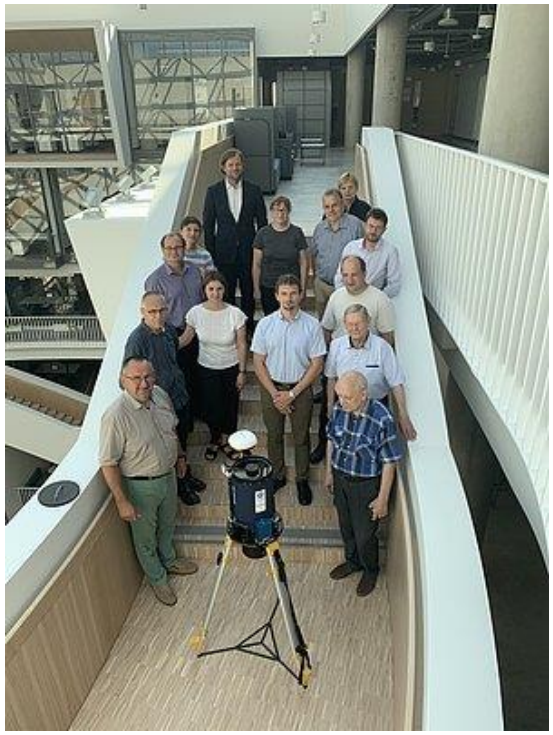
Digital Zenith Camera



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Thank You

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