

Report of the WUT LAC

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This report contains the following topics:

- 1 Routine analysis:
 - Products
 - Strategy description
 - Network characteristics
- 2 Analysis of Poland's national GPS reference network
- 3 GNSS analysis with GLONASS-specific PCVs
- 4 Outlook



Currently WUT contributes to EPN with the following products:

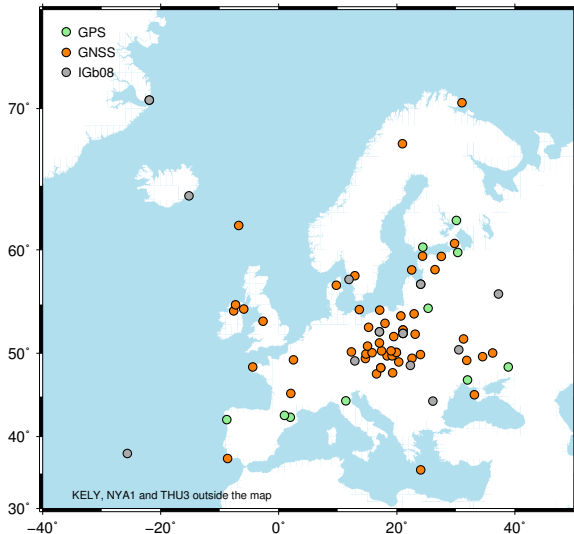
- Final (operational)
 - weekly coordinate estimates (`wutWWW7.snx`)
 - daily coordinate estimates (`wutWWWWD.snx`)
 - daily tropospheric delays (`wutWWWWD.tro`)
- Rapid (since week 1565, January 2010)
 - daily coordinate estimates (`wutWWWWDr.snx`)
 - rapid multi-day time series (since February 2011); dedicated web page created and maintained by EPN CB
- Reprocessed results from a period 1996–2006



Summary of current strategy:

- Software: Bernese GPS Software version 5.0
- processing performed according to EPN LAC Guidelines
- GPS and GLONASS (since week 1609) observations analyzed
- CODE orbits and ERPs
- antenna calibration tables: `epr08_www.atx`
- Ambiguity resolution for GPS satellites: L1&L2, L5/L3, QIF depending on baseline length
- Reference Frame: IGS08
- Sites used for NNT minimum constraints: usable IGB08 stations (currently 16)





Network status:

- 79 stations:
 - 61 GNSS (77%)
 - 16 IGb08
 - 5 proposed

Since 2011:

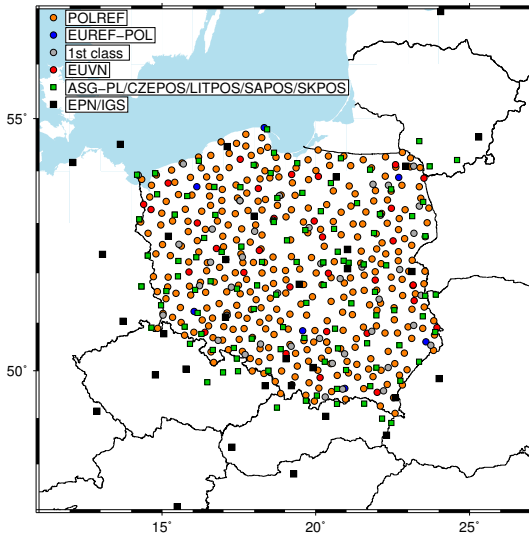
- 4 new
- 4 former



In the end of 2011, for the Polish NMA – Head Office for Geodesy and Cartography (GUGiK), we processed Poland's national GNSS reference network and created a new national realization of ETRS89 for Poland.



Poland's national GNSS reference network



- Two campaigns:
 - 1 2008
 - 2 2010/2011
- 66 days
- ~700 sites processed



National network: Data analysis and results

- Software: Bernese GPS Software version 5.0
- Data processed with two elevation masks: 5° and 10°
- EPN cumulative solution (C1600) as reference (35 stations)

Statistics of combined solutions:

Solution type	Repeatability (mm)			RMS (mm)	# observations
	N	E	U		
WUT ASG-PL 5°	1.20	1.23	3.11	1.29	38 617 779
WUT ASG-PL 10°	1.38	1.30	3.47	1.32	33 532 898

Final coordinates (solution WUT ASG-PL 5°) expressed in:

- ITRF2005 at epoch 2011.0
- ETRF2000(R05) at epoch 2011.0

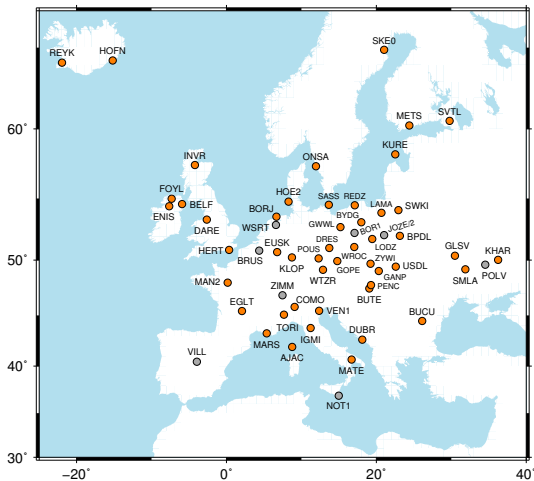


Since igs08.atx, IGS supports the receiver GLONASS specific PCC.
Tests performed to check the effect on coordinates:

- three solutions with same baseline definition:
 - 1 **GNSS**: GNSS obs. with GPS PCVs for both systems
 - 2 **GNSSPCV**: GNSS obs.; GPS and GLONASS specific PCVs for GPS and GLONASS obs. respectively
 - our own implementation into Bernese GPS Software ver. 5.0
 - constant values, for $k = 0$, used for all other channels k
 - GLONASS freqs. used for GLONASS L3 PCV
 - 3 **GPS**: only GPS observations used
- igs08_1682.atx model (with spikes)
- GPS-only IGS08 sites as reference
- data span: April 17, 2011 – December 17, 2011 (245 days)



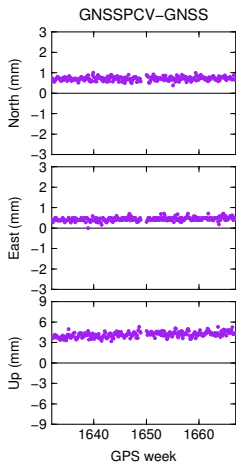
GNSS Analysis – test network



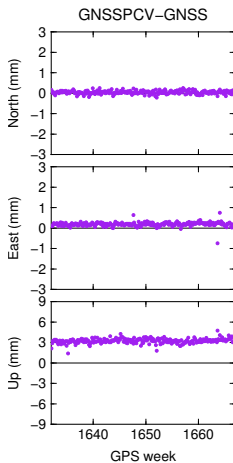
Orange: GNSS site; Grey: GPS-only reference site



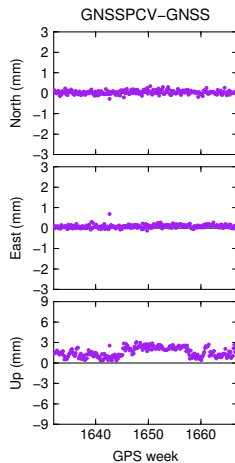
GNSS Analysis – examples of coordinate differences



DARE



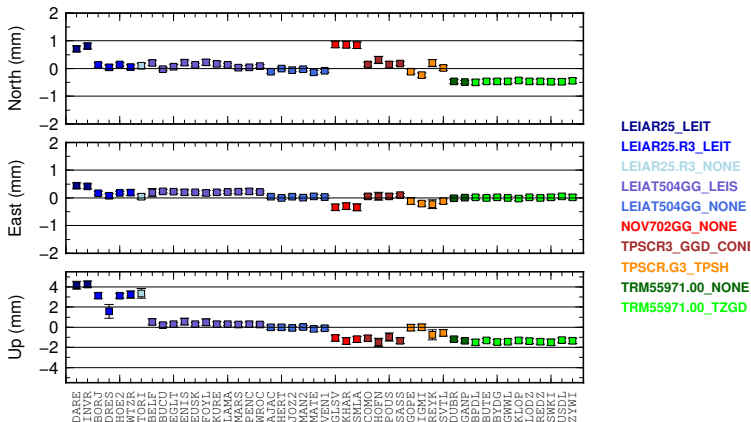
WTZR



DRES

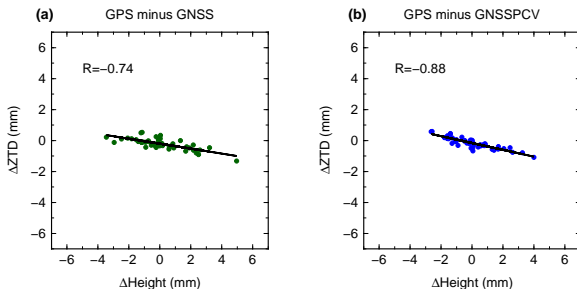


Mean differences over 245 days between GNSS solution and GNSSPCV solution and their standard deviations.



After introducing receiver GLONASS-specific PCVs in our GNSS analysis:

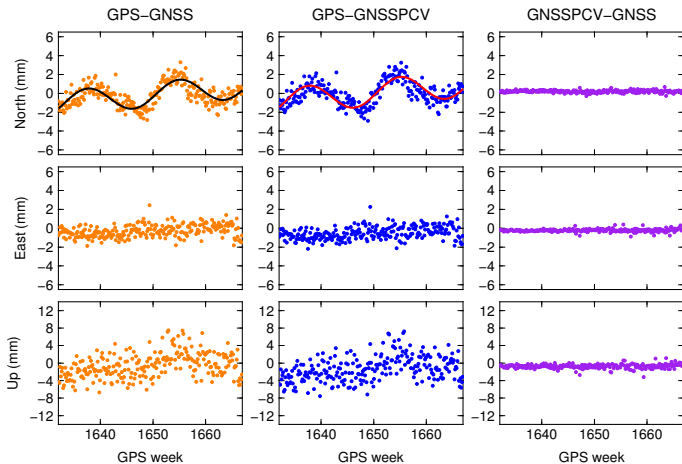
- no repeatability change of station positions
- in general solutions did not get closer to GPS-only solutions
- better correlation between height change and ZTD change wrt. GPS-only solution:



Difference of correlation coefficients (R) significant ($p < 0.05$)



GNSS Analysis – difference of coordinates: REYK



- Currently WUT contributes to the EPN with final and rapid products:
 - plans to prepare and submit NRT results
- WUT can participate in repro2
- We could possibly generate solutions with global sites (initial analysis already done)
- we would use the new version of Bernese GNSS Software (5.2) for GNSS data analysis for EUREF
 - software available at WUT (~2 weeks); no tests performed so far

