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swisstopo Report for EGVAP 2010/2011

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Content

- “Routine” GNSS operation:
 - Processing remarks
 - Additional networks
- New parameter type in Bernese Software: ISTPs (Intersystem Translation Parameters; S. Schaer)
- Tomography (D. Perler, ETH Zurich)
- Swisstopo planning 2012



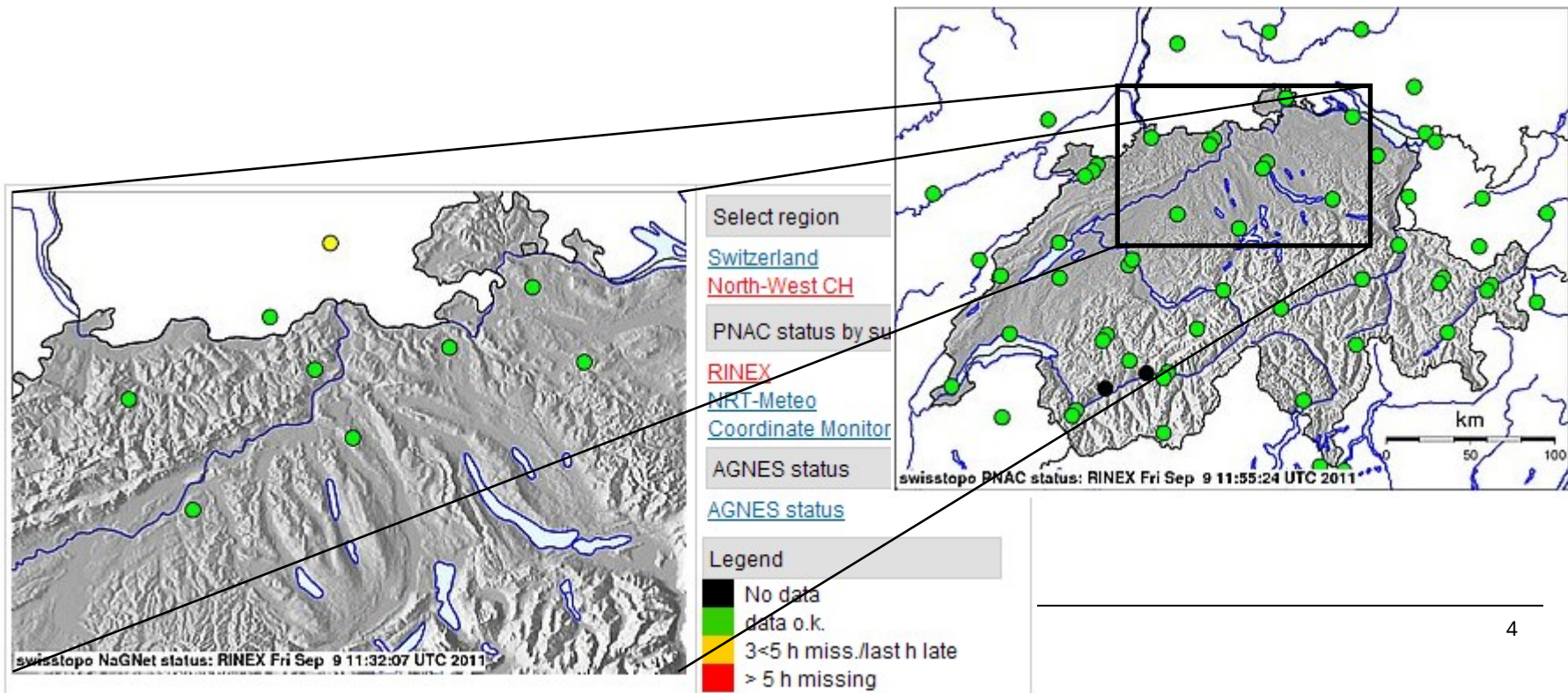
Processing remarks

- Processing as usual...
- availability 2010: hourly 97.28%, real-time 96.98%
(availability problems for real-time products (LPTR) in 2011
~ 60-80% -> notification mails from Gemma)
- Model changes GPS week 1632 (April 19, Session 109, hour "m")
 - Antenna model change from IGS05.ATX -> IGS08.ATX
 - Reference frame ITRF2005 -> ITRF2008
 - Influence much smaller than from I01 -> I05



Processing remarks (2)

- # stations: ~110-120 – increased by analysis of a private network consisting of 9 sites in Switzerland
- Monitored separately, but with ZTD submission (hourly only)
- Naming was coordinated beforehand to avoid confusions with other sites: **cross-check with THORN: gvwstn_ALL.dat; gvwstn_NONE.dat; Reserved site names gvwstn_RSRV.dat**

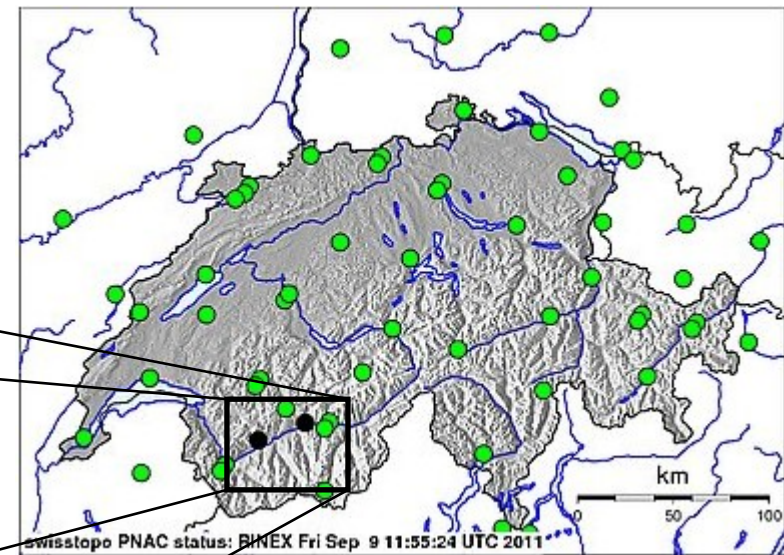
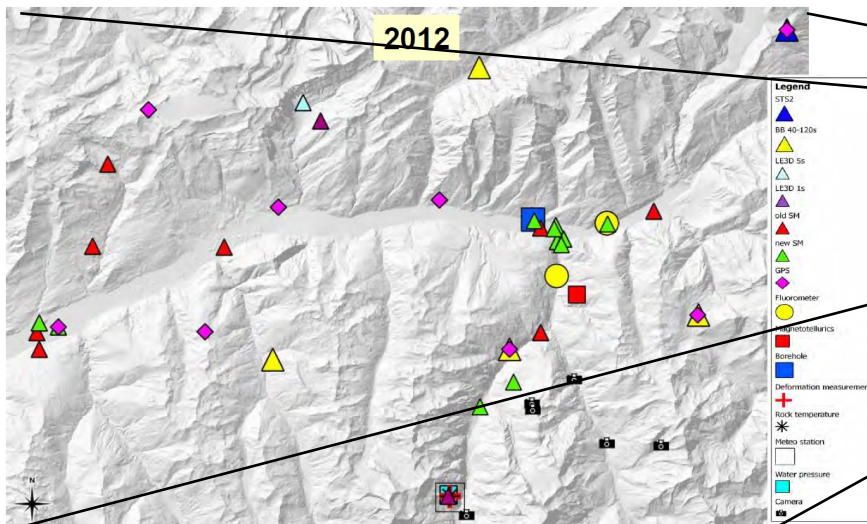




Processing remarks (3)

- COGEAR network (dense GPS, Seismic, multi-sensor network) for geophysical applications (ETH Zurich)
- 5-6 new GNSS sites (500 – 2500 meters above sea level)
- Used also for APUNCH GNSS tomography project

Instrumentation 2008-2012 (COGEAR, SSMNet, SwissTopo, SNF, SED, etc.)



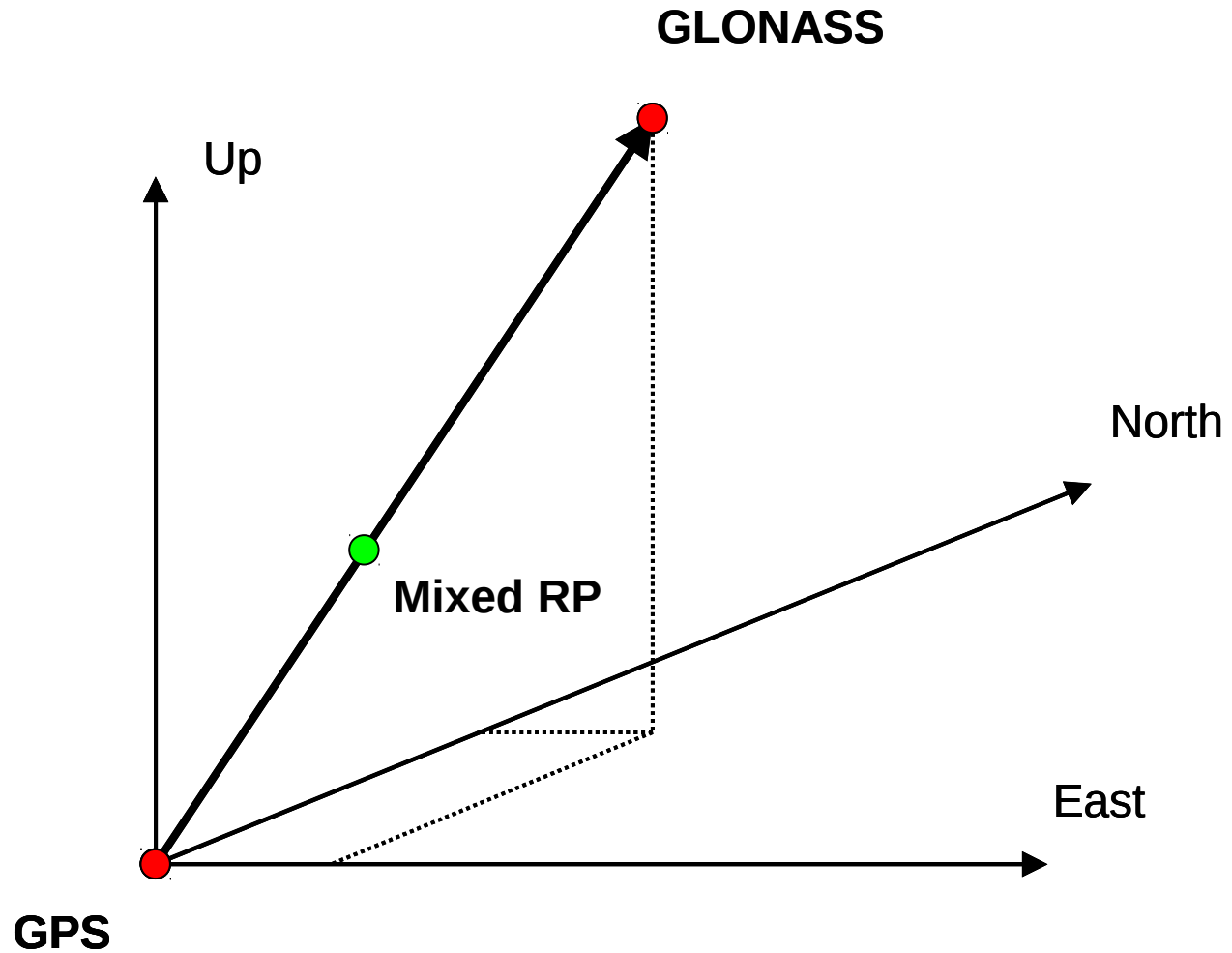


Station-Specific Intersystem Translation Parameters

- New parameter type in the new version of the Bernese Software: extra set of (3+1) parameters for each GLONASS observing station to characterize (-> Authors S. Schaer, M. Meindl)
 - a GLONASS-GPS receiver antenna offset vector and
 - a GLONASS-GPS ZPD troposphere bias.

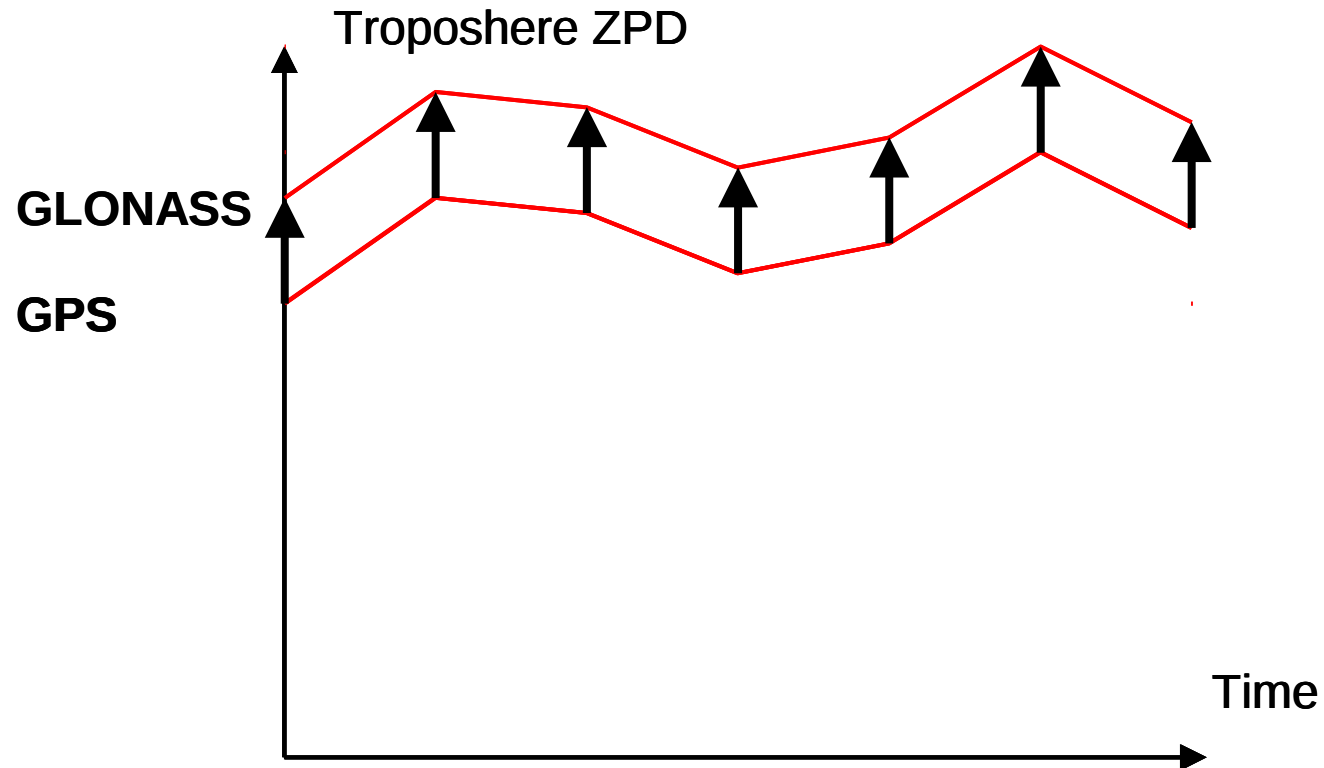


GLONASS-GPS Intersystem Translation Parameters With Respect to Station Coordinates





GLONASS-GPS Intersystem Translation Parameters With Respect to Troposphere ZPD



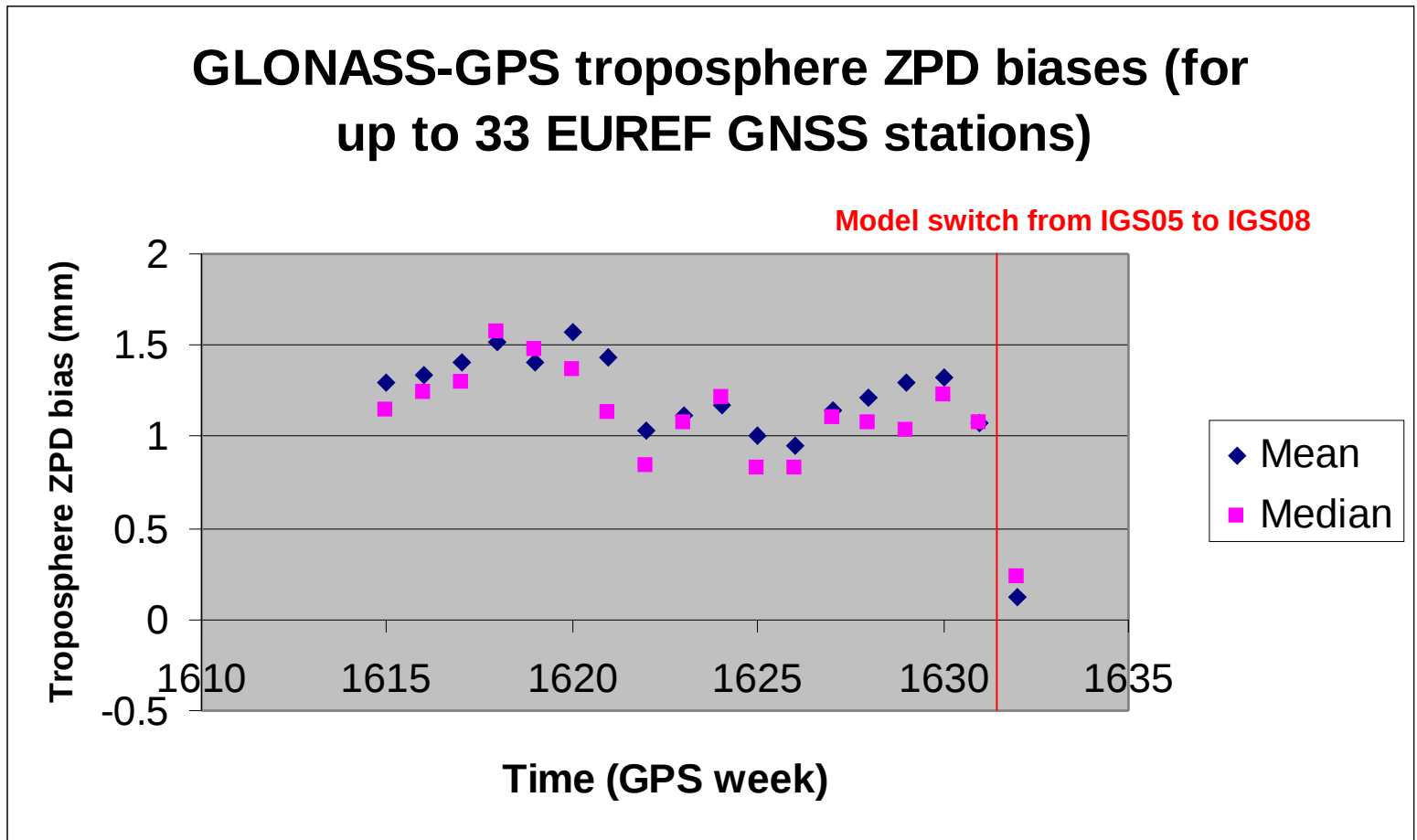


GNSS Analysis Updates and Treatment of Intersystem Translation Parameters at CODE

- Postprocessing (daily solutions): **EUREF** processing (starting GPS week 1615) and **Global IGS** processing (starting GPS week 1619)
 - estimation of **additionally 4 GLONASS-GPS bias parameters**
 - Datum definition: no-net translation and no-net rotation conditions with respect to all GLONASS observing stations
 - GLONASS-GPS ZPD troposphere biases are generally treated unconstrained.

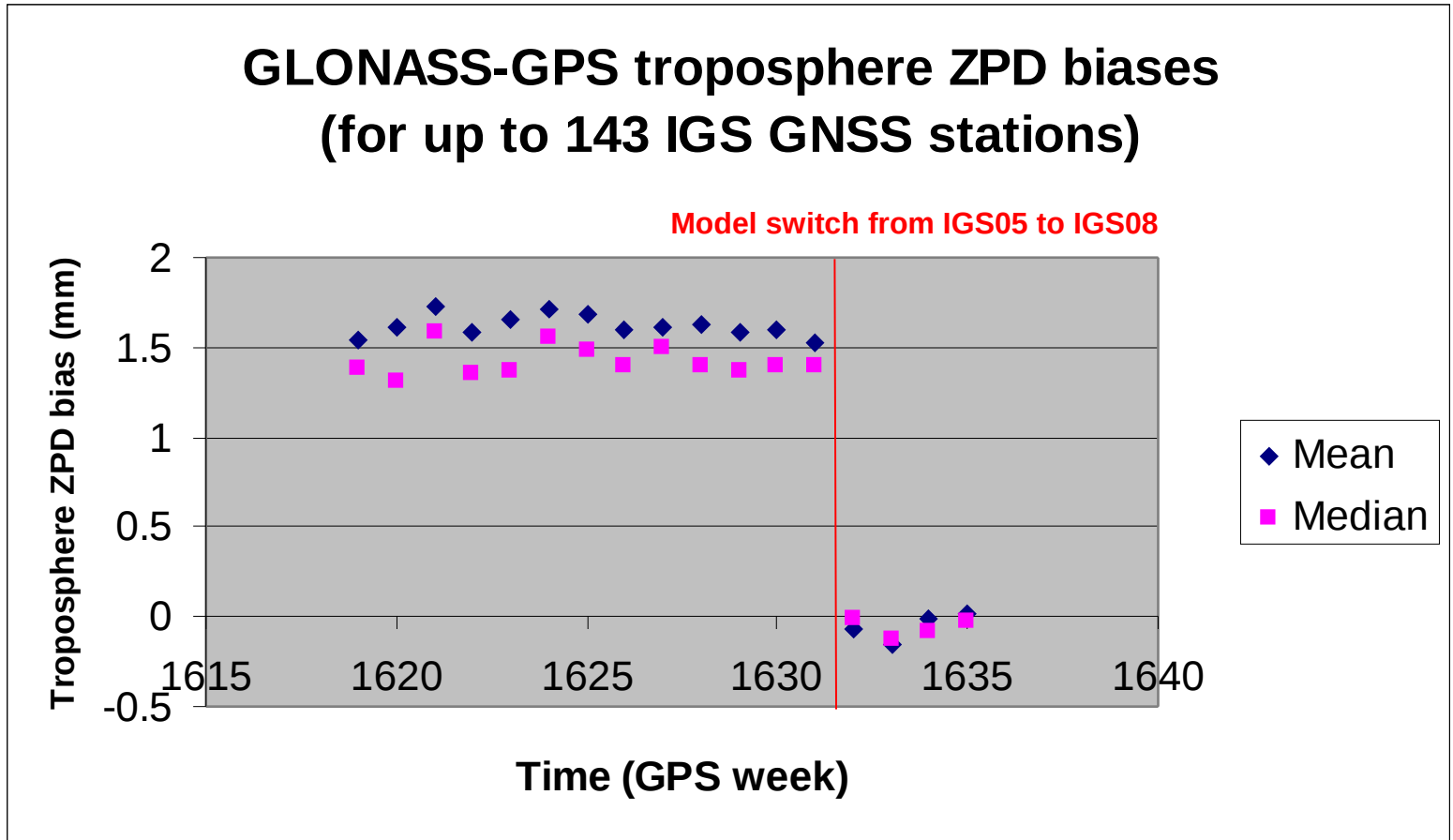


Mean GLONASS-GPS Troposphere ZPD Biases: CODE EUREF (Regional) Weekly Results



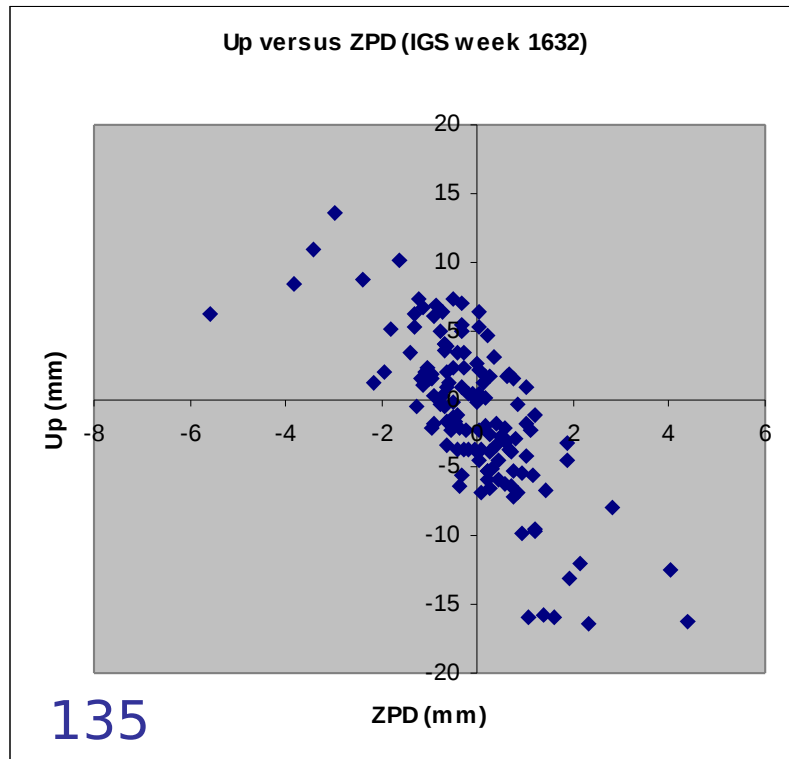


Mean GLONASS-GPS Troposphere ZPD Biases: CODE IGS (Global) Weekly Results





GLONASS-GPS Translation Parameter Results Concerning Up/ZPD: IGS Week 1632

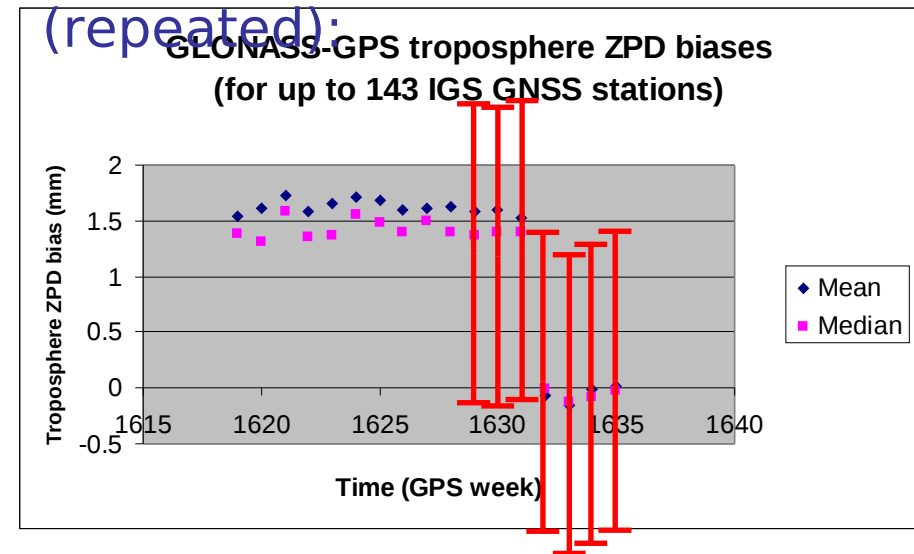


135
stations

-> correlation Up / ZPD: ratio 4 / 1

-> mean ZPD bias zero, standard deviation 1.3
mm

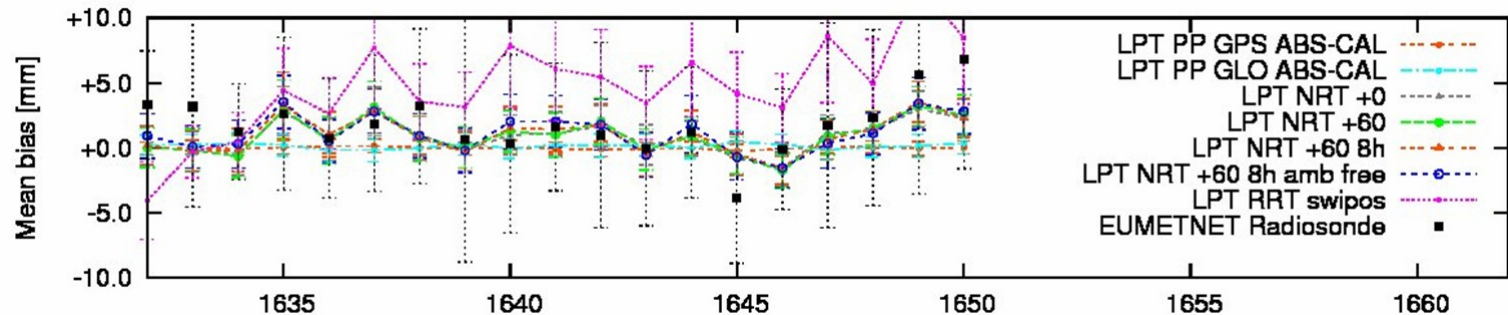
CODE global results (repeated):





Comparison with NRT processing various types

- NRT results and comparisons usually show bigger ZPD biases than 1.5 mm ZTD





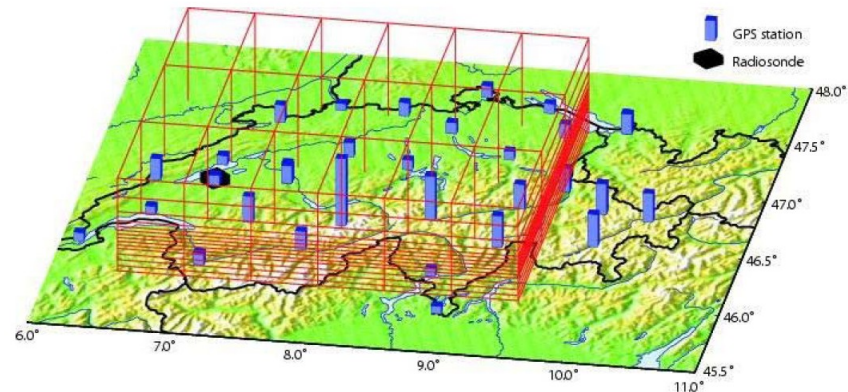
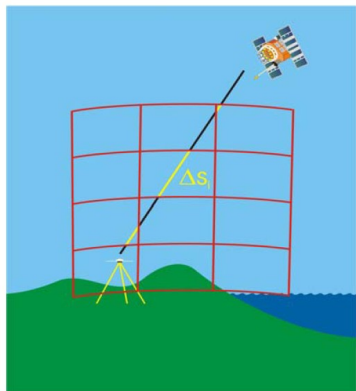
Summary ISTPs

- Consideration of **intersystem translation parameters** specific to each GPS/GLONASS (as introduced by CODE; not yet in standard BSW software) is a further step towards consistent multi-GNSS analysis.
- **ISTPs** are “multi-GNSS monitoring parameters”
- Mean GLONASS-GPS troposphere **ZPD bias of ~1.5 mm vanishes** after the switch from IGS05 to the IGS08 GNSS PCV model, **but acknowledging**
 - Results received in postprocessing of daily solutions (global + European), average of many stations and 7 days (**std ~1.3 mm**)
 - Variations expected in near-realtime are bigger and the introduction of these parameters to the routine NRT processing not urgent.



GPS Tomography (ETH Zurich)

- GANUWE Project
 - Swiss project funded by the Swiss Federal Office of the Environment FOEN
 - Partners: ETH Zurich + MeteoSwiss
 - External partner: swisstopo
- Goal: Development of new tomographic algorithms for assimilation in numerical weather models





GPS Tomography: results

- Parts of the results presented in previous annual EGVAP reports
 - Simulations: Improvement due to Galileo and number of stations
 - Comparisons with MeteoSwiss COSMO model based
- Phd of D. Perler finished October 2011
(-> systematic analysis of the data available in 2006)



Swisstopo planning 2012

- Scientific processing (beginning 2012):
Update Bernese 5.0+ -> Bernese 5.2
- Real-time infrastructure (started already): new station concept, new data streams, new data flow and format conversions to RINEX, new data hub, **new network software generating the real-realtime ZPDs**, new policy model for streaming data