



Consideration of Station-Specific Intersystem Translation Parameters at CODE

S. Schaer¹, M. Meindl²

¹Swiss Federal Office of Topography (swisstopo)

²Astronomical Institute of the University of Berne (AIUB)

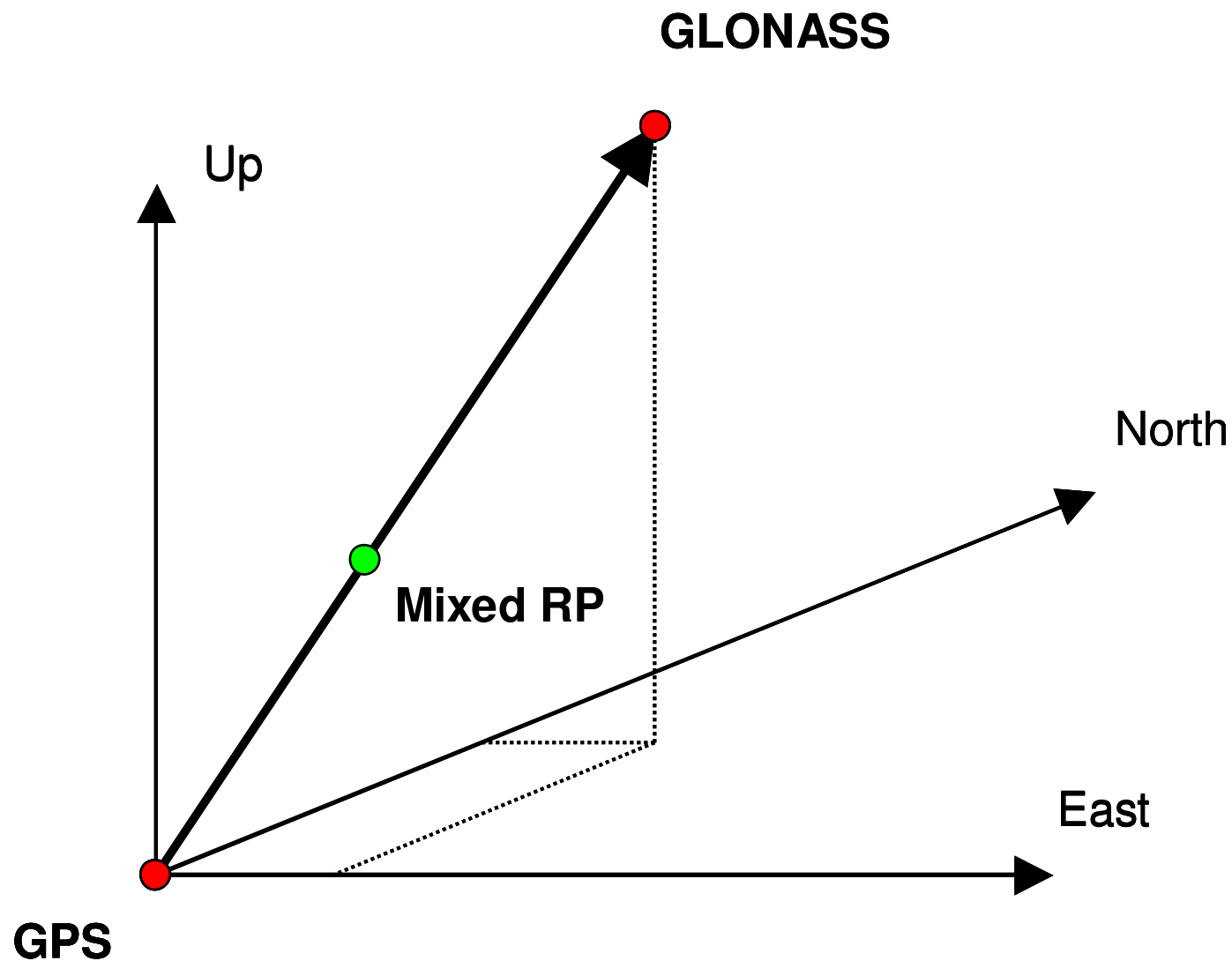


Introduction

- At CODE, we recently started considering an extra set of (3+1) parameters for each GLONASS observing station to characterize
 - a GLONASS-GPS receiver antenna offset vector and
 - a GLONASS-GPS ZPD troposphere bias.
- We will describe how these GLONASS-GPS bias parameters are treated.
- First results (with a main focus on the GNSS PCV model switch from IGS05 to IGS08) will be presented.

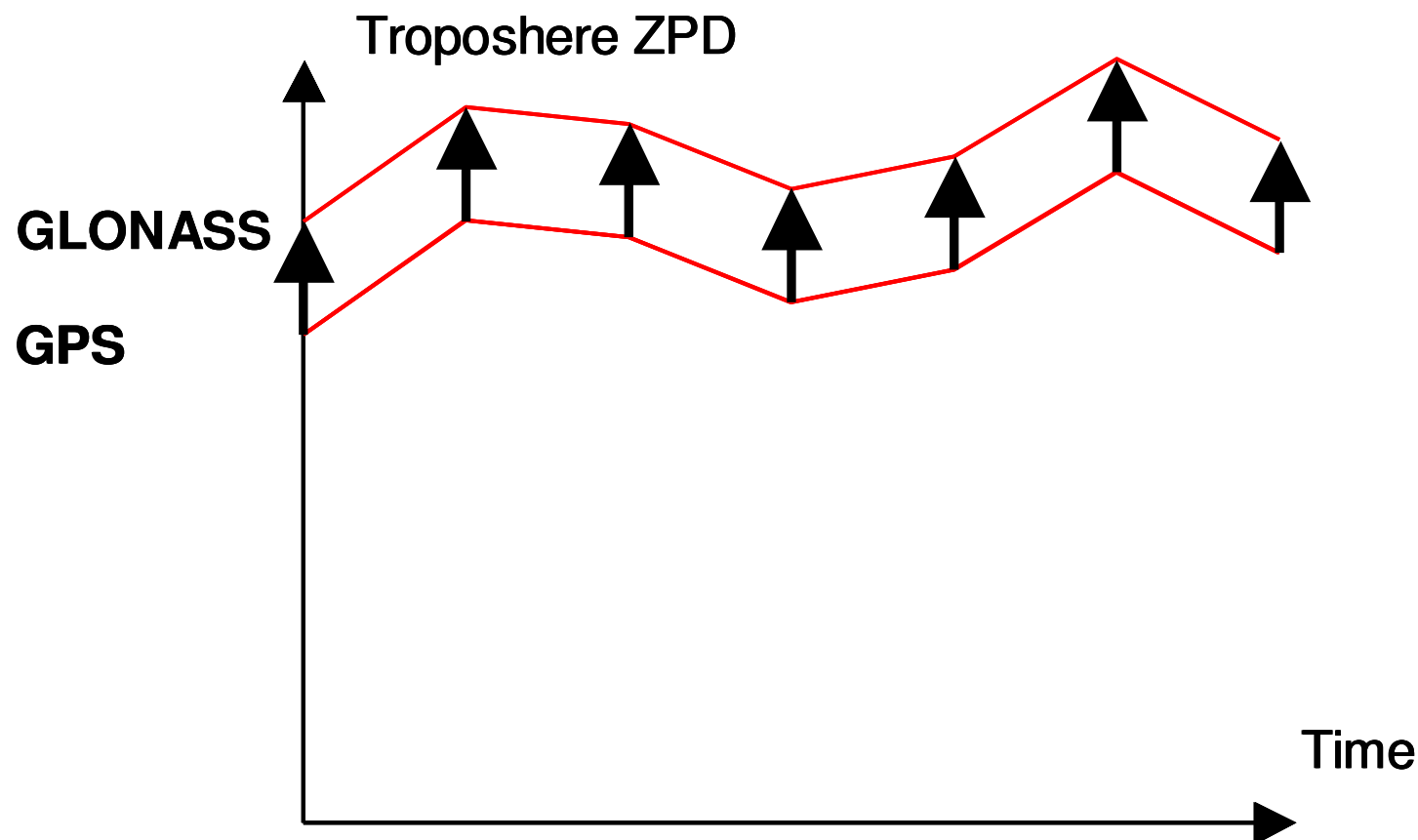


GLONASS-GPS Intersystem Translation Parameters With Respect to Station Coordinates





GLONASS-GPS Intersystem Translation Parameters With Respect to Troposphere ZPD



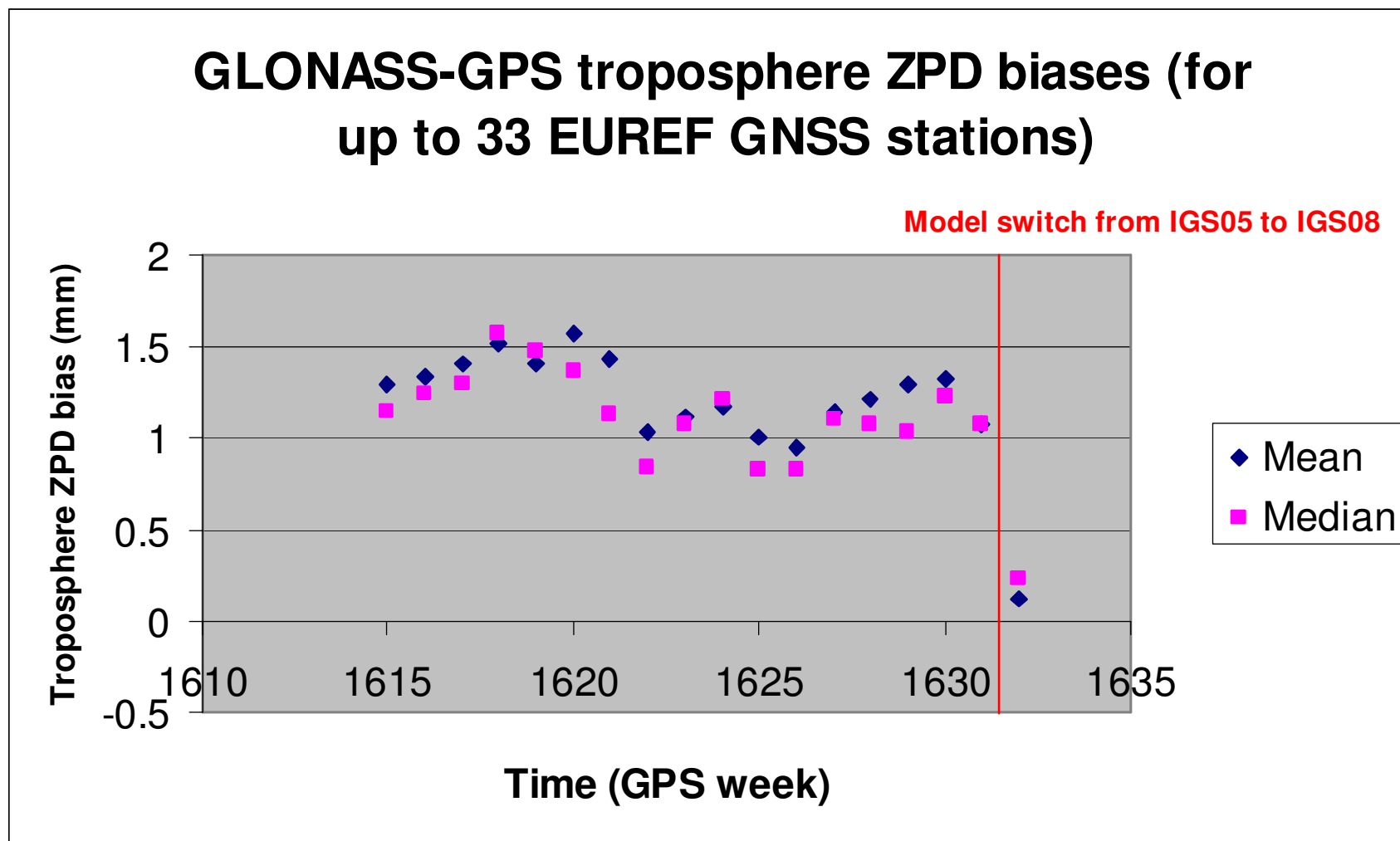


GNSS Analysis Updates and Treatment of These Intersystem Translation Parameters at CODE

- Since GPS week 1619 (EUREF: 1615), an extra set of (3+1) parameters is set up for each GLONASS observing station to characterize
 - a GLONASS-GPS receiver antenna offset vector and
 - a GLONASS-GPS ZPD troposphere bias.
- Starting with GPS week 1625, these GLONASS-GPS bias parameters (4 for each GNSS station) are determined on a weekly basis and subsequently used for generation of our daily IGS analysis results.
- Note 1: The datum definition used for the GLONASS-GPS receiver antenna offset vectors is similar to that used for station coordinates: no-net translation and no-net rotation conditions with respect to all GLONASS observing stations are imposed.
- Note 2: GLONASS-GPS ZPD troposphere biases are generally treated unconstrained.
- Note 3: Our weekly SINEX contribution implicitly includes these GLONASS-GPS bias parameters (4 for each GNSS station).

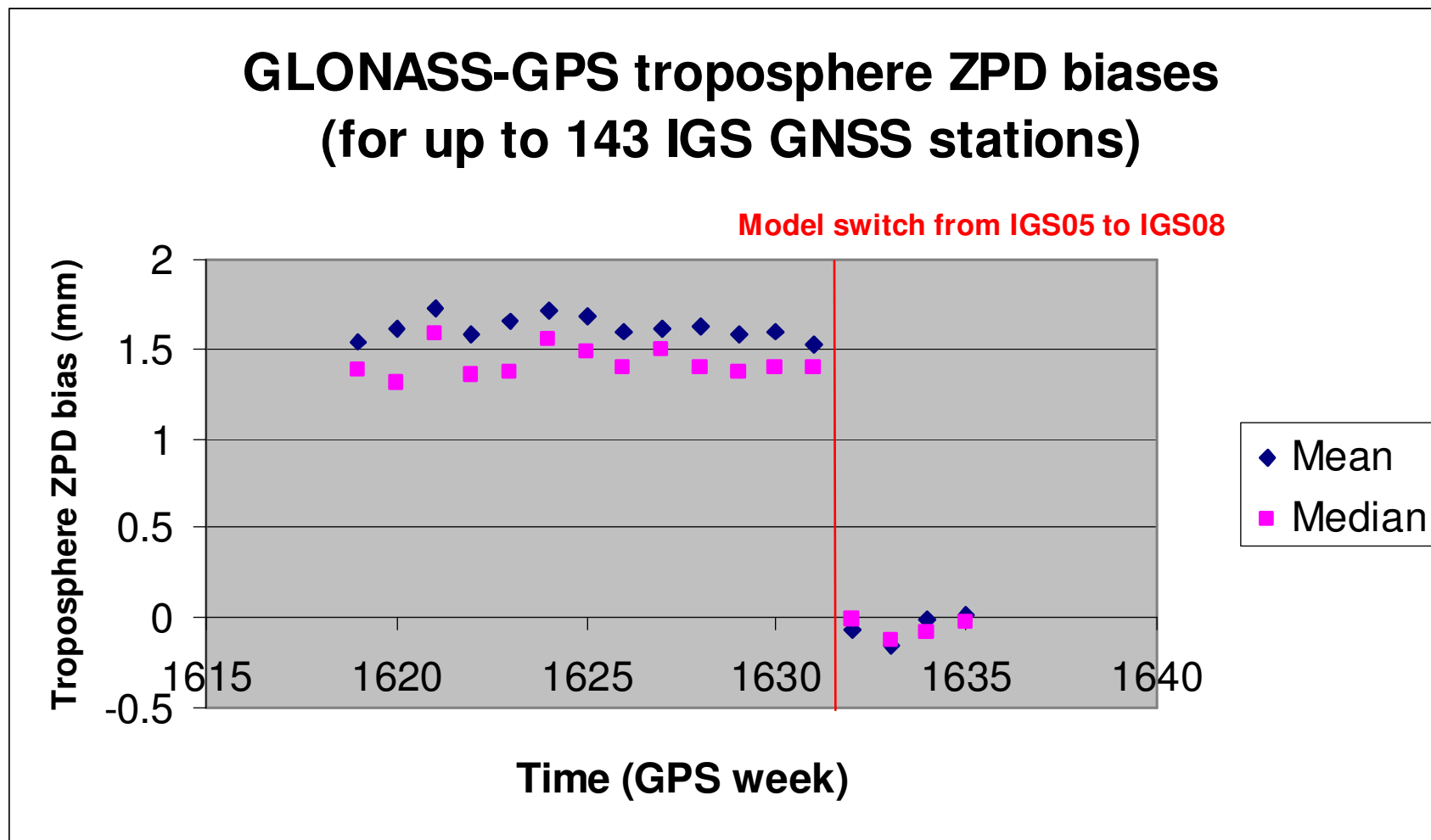


Mean GLONASS-GPS Troposphere ZPD Biases: CODE EUREF (Regional) Weekly Results



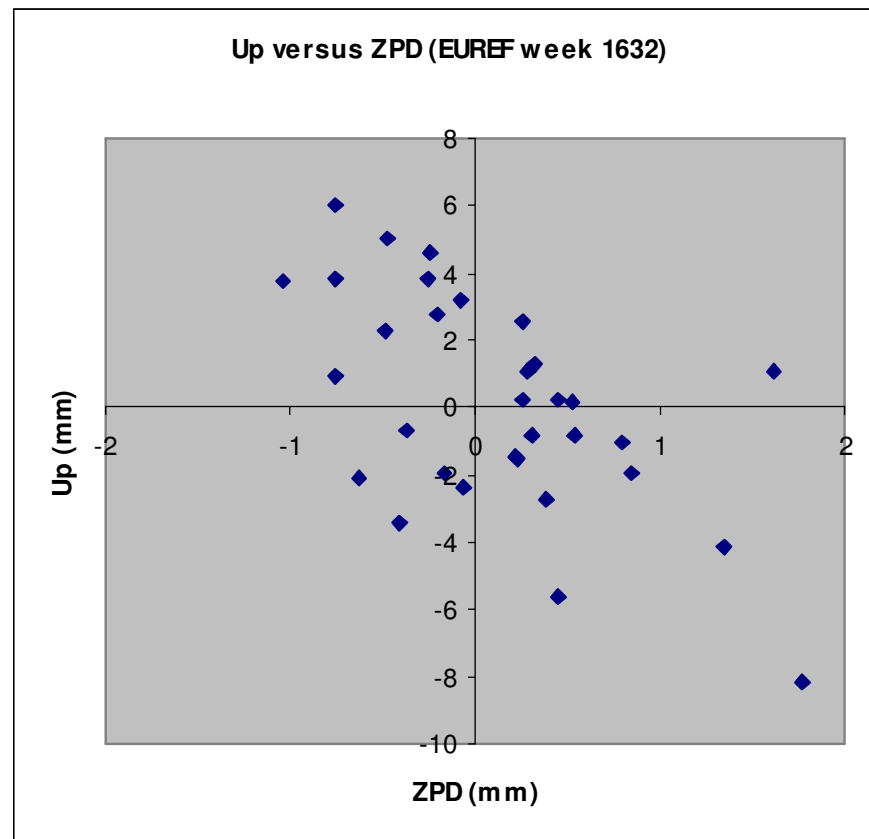
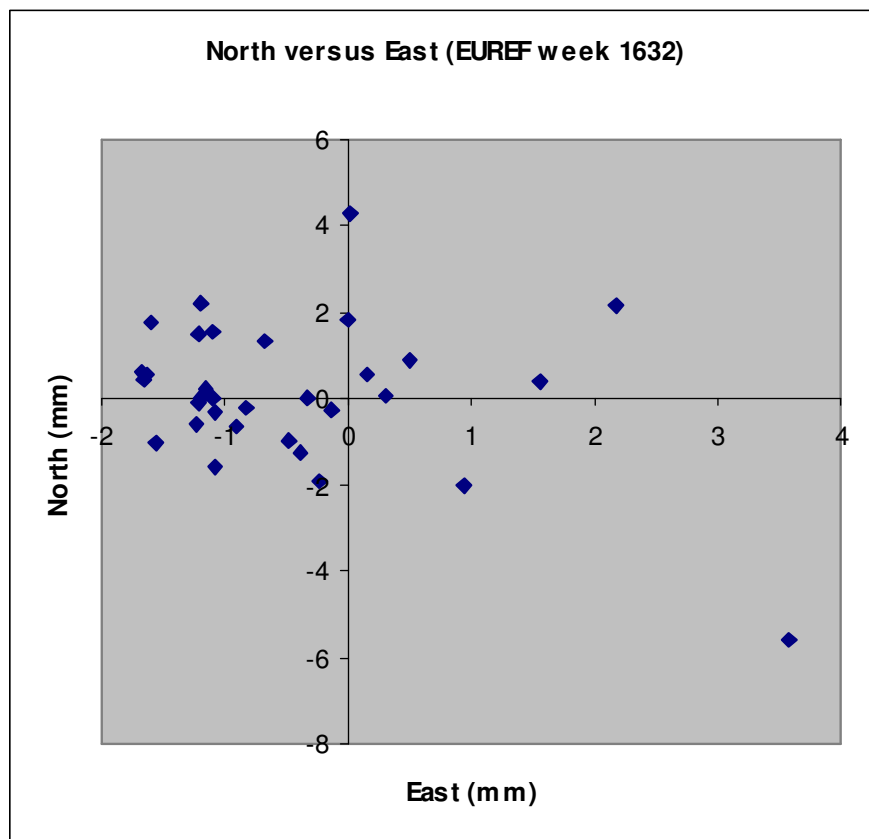


Mean GLONASS-GPS Troposphere ZPD Biases: CODE IGS (Global) Weekly Results



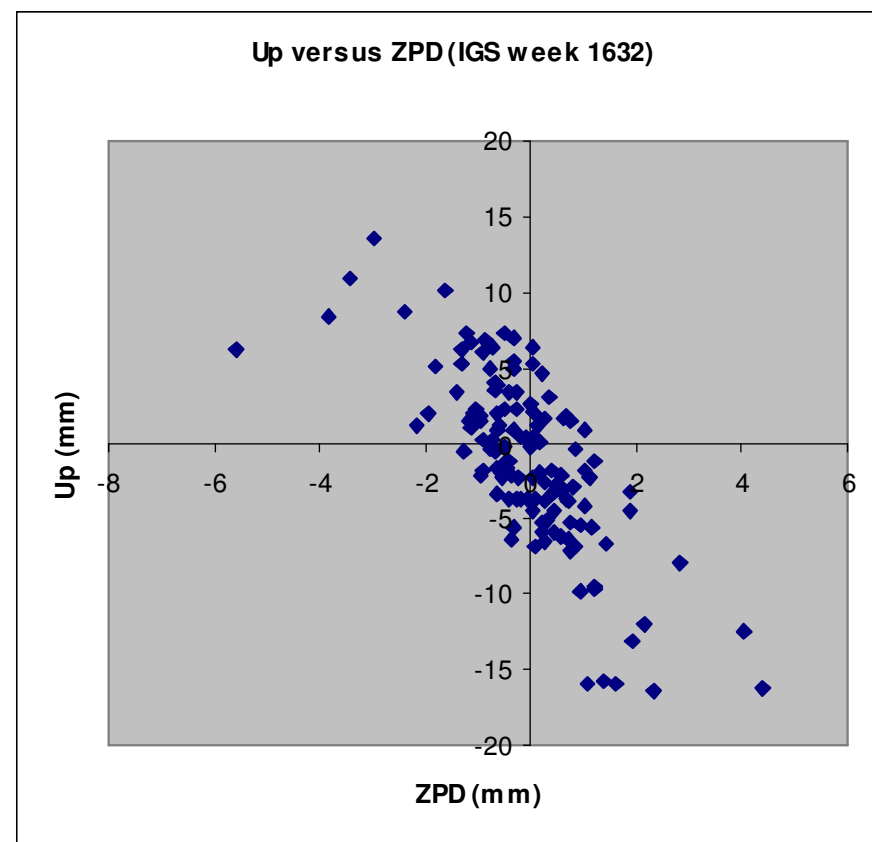
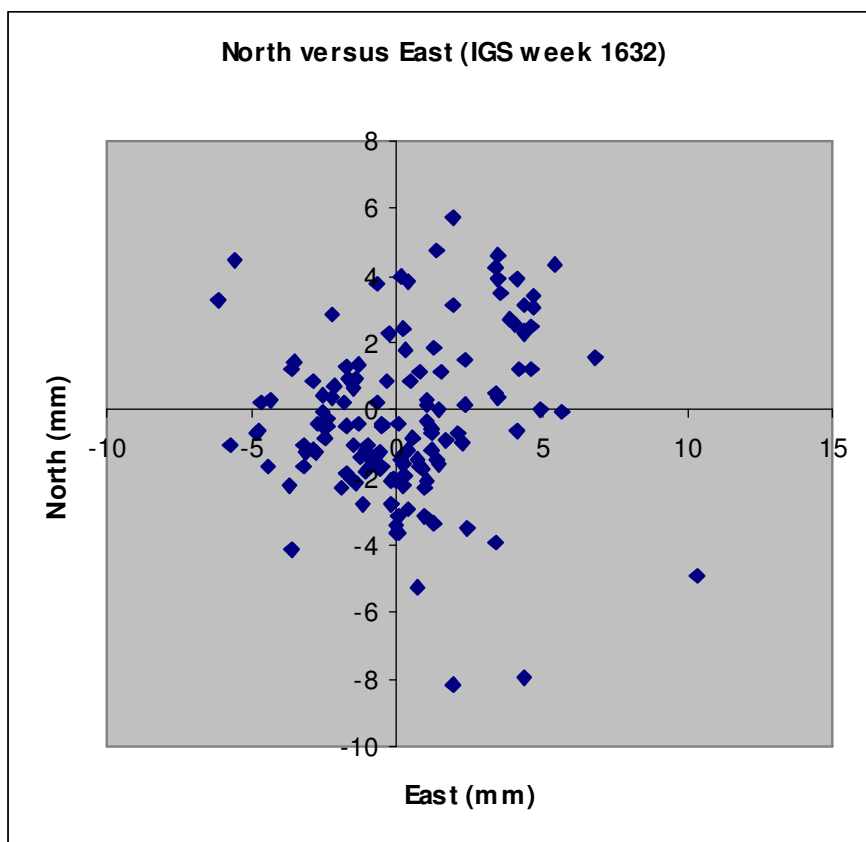


GLONASS-GPS Translation Parameter Results Concerning N/E and U/ZPD: EUREF Week 1632



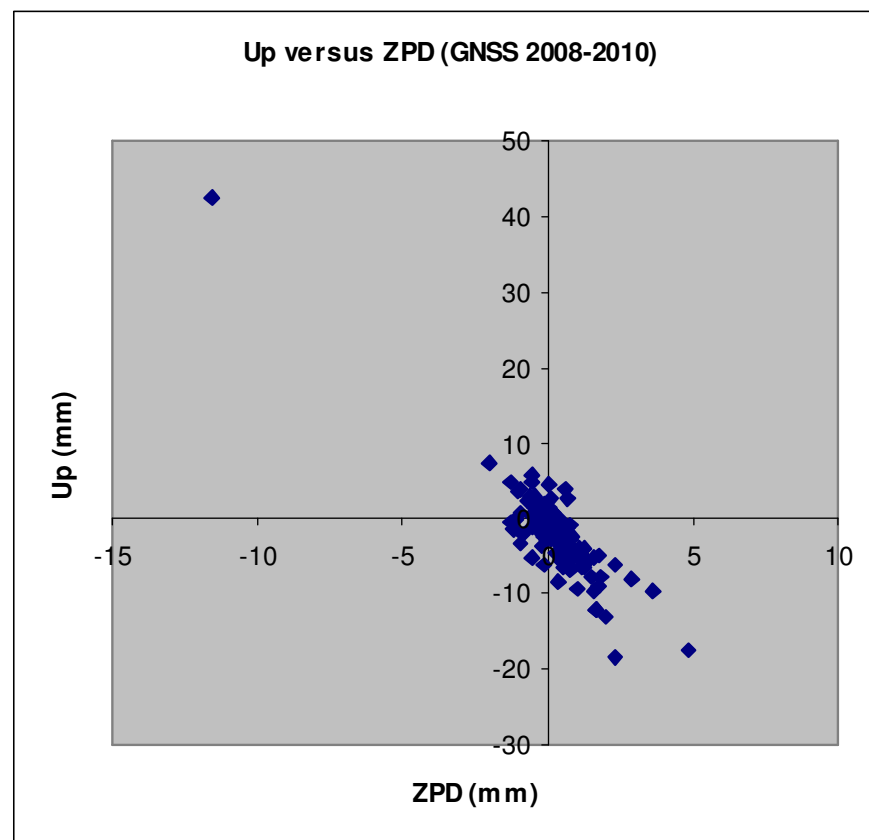
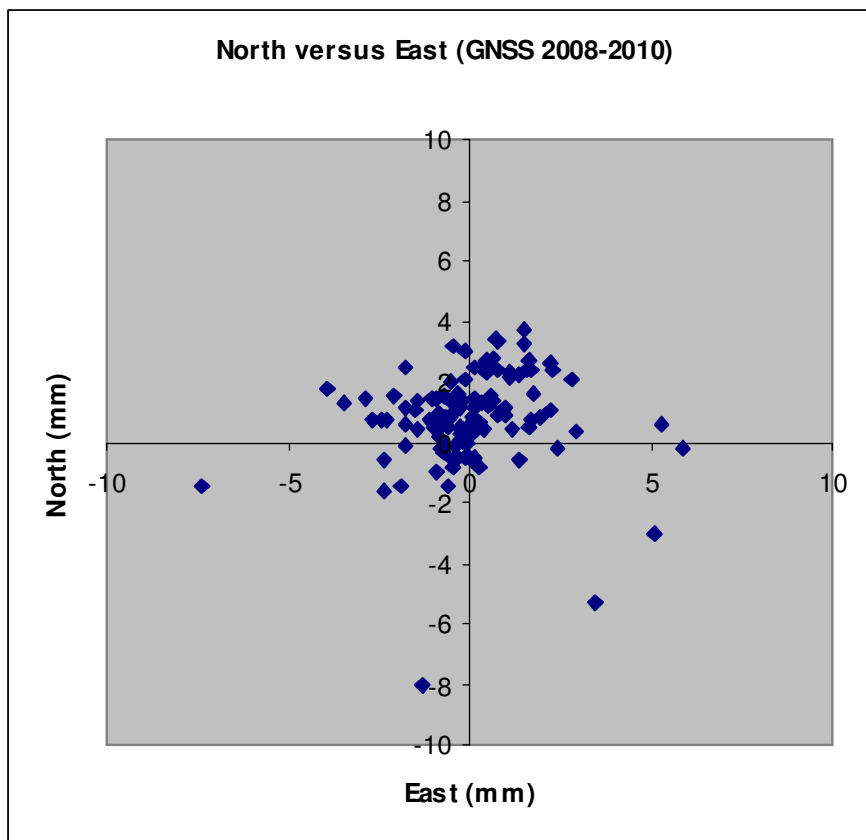


GLONASS-GPS Translation Parameter Results Concerning N/E and U/ZPD: IGS Week 1632





GLONASS-GPS Translation Parameter Results Concerning N/E and U/ZPD: “GNSS-Only” Test Analysis Covering 3 Years (2008–2010)



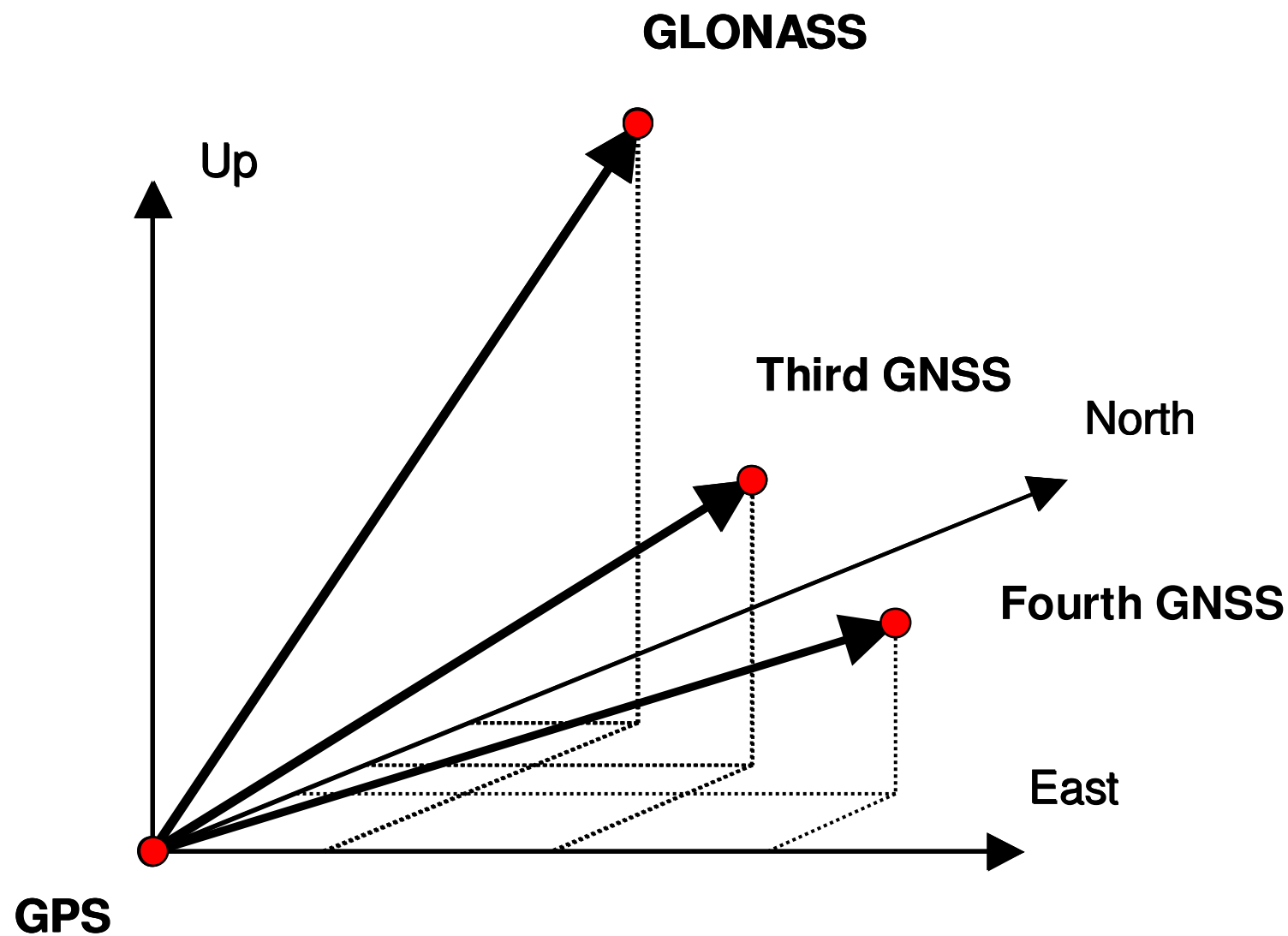


Summary and Conclusions

- Consideration of **intersystem translation parameters** specific to each GPS/GLONASS (as introduced by CODE) is a further step towards consistent multi-GNSS analysis.
- These GLONASS-GPS bias parameters (4 for each GNSS station) are kept in our NEQ results (for later manipulation).
- To consider station coordinates with respect to each GNSS is equivalent. Consequently, datum definition of **ISTPs** is essential.
- Intersystem receiver antenna calibration (concerning LC).
- **ISTPs** are “multi-GNSS monitoring parameters” relevant to the realization of ITRF (when relying on multiple GNSS).
 - Example: Mean GLONASS-GPS troposphere ZPD bias vanishes after the switch to the IGS08 GNSS PCV model.
- **ISTPs** (and in particular their formal errors) are very sensitive to tracking problems of GNSS stations.
- A set of **ISTPs** is desired with respect to each observed GNSS ...



More and More GNSS ...





Remark: GPS-Only Individual PCV Calibrations (EPNC) in Case of GPS/GLONASS-Combined Receiver Antennas

```
grep -B 1 group $X/GEN/PCV_COD.E08:
```

LEIAT504GG	LEIS	219	G	2	1	0	5	5	90	EPNC	ROBOT	2007-05-18
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
LEIAT504GG	LEIS	435	G	2	1	0	5	5	90	EPNC	ROBOT	2008-04-17
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
LEIAT504GG	LEIS	446	G	2	1	0	5	5	90	EPNC	ROBOT	2008-07-18
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
LEIAT504GG	LEIS	456	G	2	1	0	5	5	90	EPNC	ROBOT	2008-04-15
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
LEIAT504GG	LEIS	460	G	2	1	0	5	5	90	EPNC	ROBOT	2008-04-15
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
LEIAT504GG	LEIS	627	G	2	1	0	5	5	90	EPNC	ROBOT	2008-04-16
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
TPSCR3_GGD	CONE	70155	G	2	1	0	5	5	90	EPNC	ROBOT	2003-09-26
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
TPSCR3_GGD	CONE	70159	G	2	1	0	5	5	90	EPNC	ROBOT	2003-09-25
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
TPSCR3_GGD	CONE	70182	G	2	1	0	5	5	90	EPNC	ROBOT	2004-12-20
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
TPSCR3_GGD	CONE	70218	G	2	1	0	5	5	90	EPNC	ROBOT	2004-02-28
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
TPSCR3_GGD	CONE	70243	G	2	1	0	5	5	90	EPNC	ROBOT	2004-02-16
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
TPSCR3_GGD	CONE	70298	G	2	1	0	5	5	90	EPNC	ROBOT	2004-11-29
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
TRM29659.00	NONE	81795	G	2	1	0	5	5	90	EPNC	ROBOT	2002-06-10
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11
TRM29659.00	NONE	81799	G	2	1	0	5	5	90	EPNC	ROBOT	2000-10-30
			R	2	1	0	5	5	90	IGS08_1636	ADOPTED from group	25-MAR-11

Involved GNSS antennas:

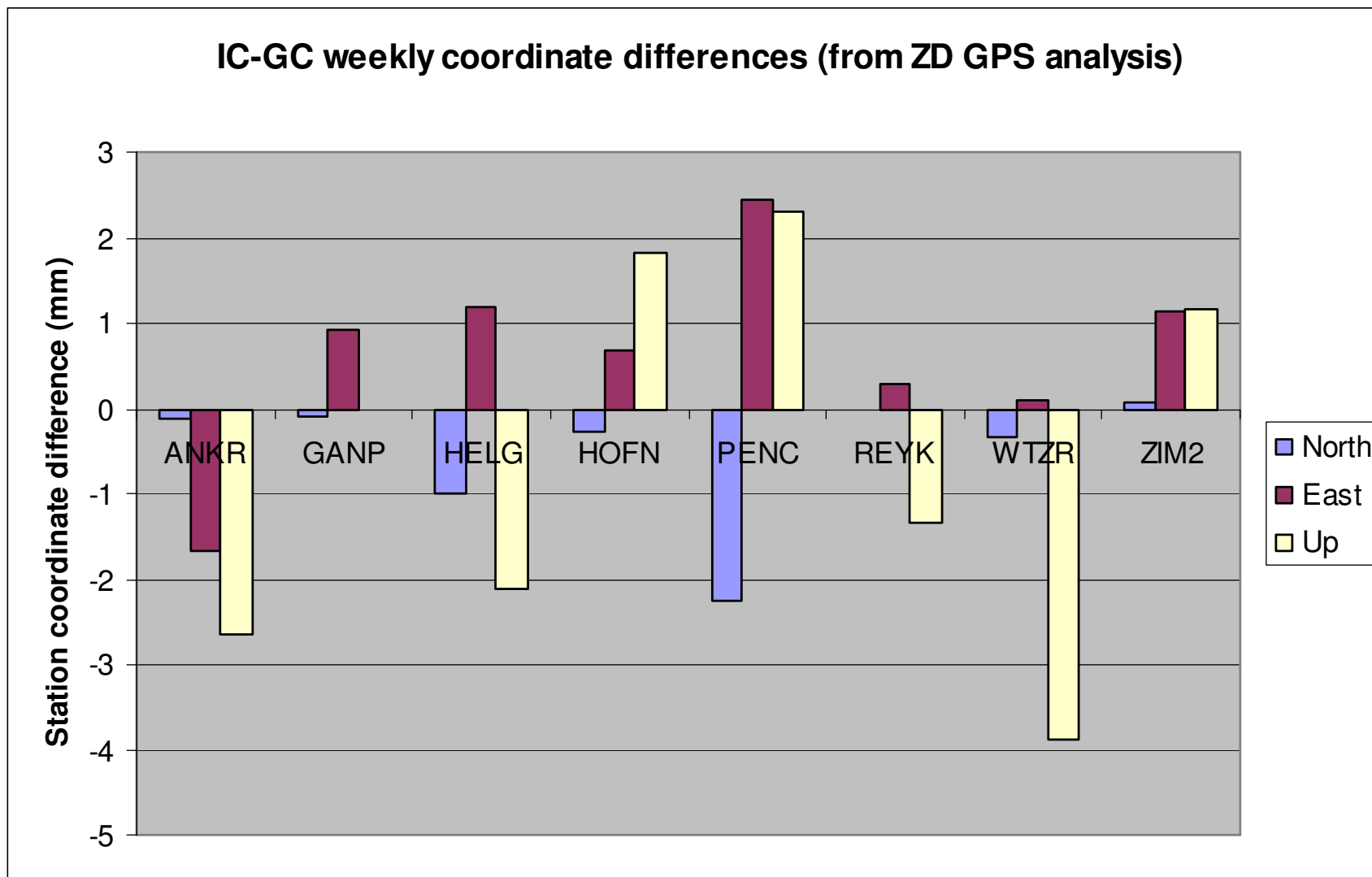
LEIAT504GG **LEIS:** **HOB**U, PENC, NICO, HELG, BUCU, ORID, EUSK
TPSCR3_GGD **CONE:** HOE2, SASS, WARN, BORJ, **DRES**, HOFN, ANKR
TRM29659.00 **NONE:** KLOP, DRES

Possible options for computation of GLONASS PCV values (using ATX2PCV V5.2):

1. **GPS_VALUES:** GLONASS values adopted from GPS IC
2. **GROUP_VALUES:** GLONASS values adopted from GLONASS GC
3. **GROUP_DIFF:** GLONASS values computed as: GPS IC plus difference of GLONASS-GPS GC



Constant Differences Between Individual and Group PCV Calibrations (1)





Constant Differences Between Individual and Group PCV Calibrations (2)

