

Bundesamt für Landestopografie
Office fédéral de topographie
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Absolute Antenna Phase Center Model

E. Brockmann

Decisions

- IGS will change to absolute antenna phase center values with the change to ITRF2005
- Main reason: Consistency with VLBI/SLR for coordinates and troposphere improved
- Geo++ delivers group values from the data base to the IGS05_www.atx file, as soon as an IGS station is concerned
- No deal with EURF yet -> antennas in IGS file with rel. ->abs. conversion, even if robot values exists
- Proposal Geo++: User licence for EUREF ACs: 125€ / 3 years; no public exchange allowed – not acceptable for EUREF

Geo++ Data base

- Data at April 2006
 - 125 antenna types
 - 3745 individually callibrations (957 antennas)
- <http://gnpcvdb.geopp.de>
- Glonass PCV's frequency-dependent determined (linear drift as first guess) – to be implemented in ANTEX



Impact of antenna phase center model

- IGS-rel compared to IGS-abs:

GPSWEEK 1369			Difference [mm]			standard deviation [mm]			
			# ant.	dn	de	du	sdn	sde	sdu
TRM29659.00	NONE		14	0.5	1.7	1.1	0.2	0.2	1.0
LEIAT504	LEIS		5	-1.2	-0.7	3.3	0.3	0.3	1.1
TRM33429.20+GP	NONE		21	1.9	0.4	-17.9	0.2	0.4	0.4
ASHTECH (differnet models)			16	-0.5	-1.1	3.3	0.5	0.6	5.9

- „Extreme“ cases horizontally

	dn	de	du	antenna type
LINZ 11033S001	-4.2	-5.4	11.2	TRM29659.00 UNAV
RENN 10047M001	-6	4.8	-5.8	LEIAT503 NONE
MANS 10091M001	-5.9	4	-0.4	LEIAT303 NONE

IGS Antex File: Status April 2006:

R. Schmid

Latest model igs05_1365.atx

59 **satellite** antennas:

- 44 GPS
- 15 GLONASS (latest GLONASS-M missing: R714)

154 **receiver** antennas:

- 42 **robot** calibrations from Geo++ (az.+el.)
 - 32 without radome
 - 10 with radome
- **112** converted **field** calibrations from NGS (el. only)
 - 74 without radome
 - 38 with radome

IGS Antex File: status April 2006

R. Schmid (2)

Antennas in the IGS network

Data source: <ftp://igscb.jpl.nasa.gov/igscb/station/general/loghist.txt>

37 different antenna types (cf. igs05.atx: 106):

- 22 → robot calibration (60%)
- 15 → converted field calibration

81 antenna + radome combinations:

- 10 → robot calibration
 - 15 → converted field calibration
 - 42 → no calibration available
 - 14 → not calibratable (DOME)
- } 70%

EUREF Status

EUREF (status May 15,2006)

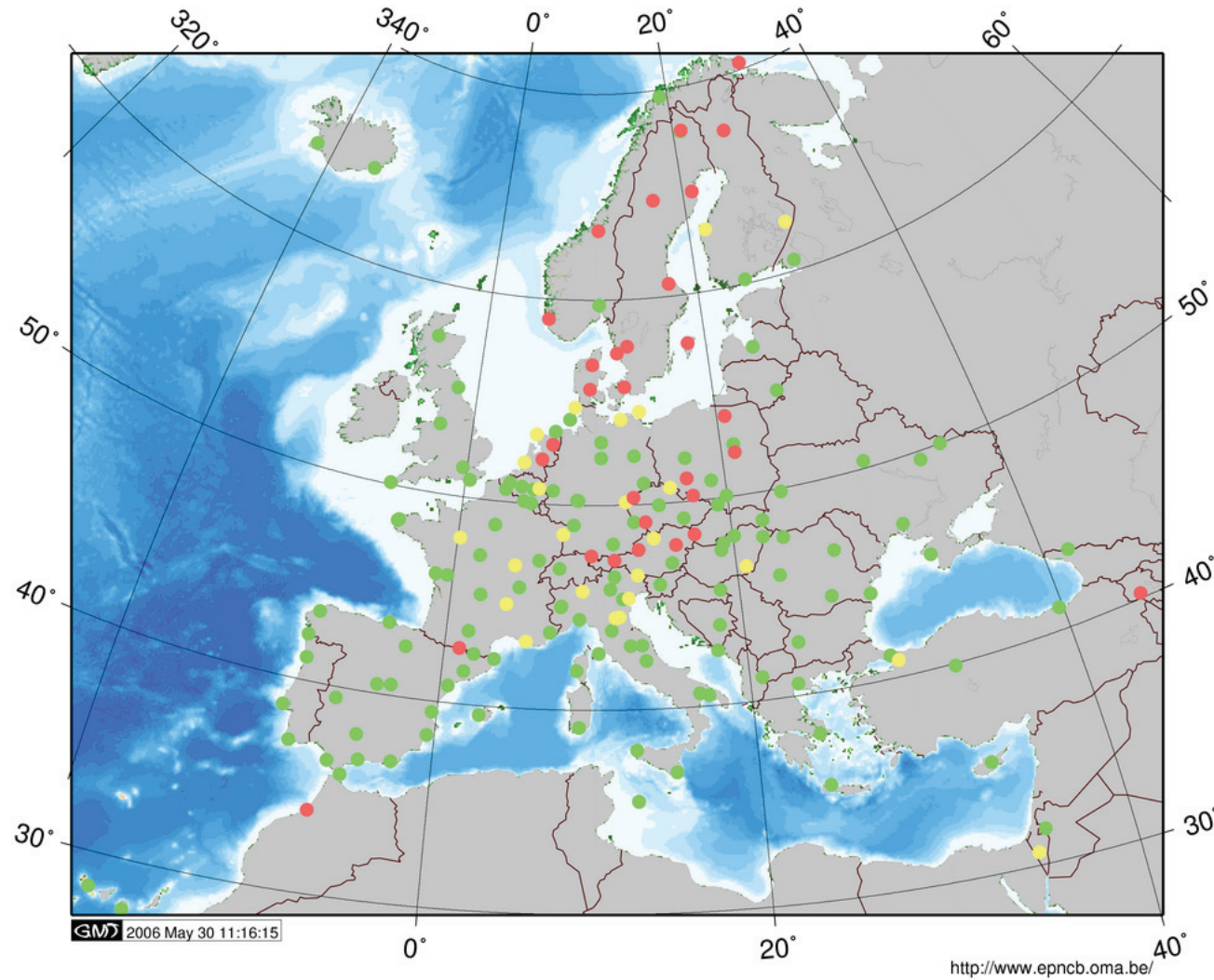
183	Antennas				
52	Antenna types				
32	Antenna types with abs. from rel. NGS	62%	59	Antennas	32%
20	Antenna types with abs. from robot	38%	121	Antennas	66%
4	Antenna types with abs. from rel. NGS (but robot available)	8%	10	Antennas	5%

national (AGNES)

84	Antennas				
28	Antenna types				
14	Antenna types with abs. from rel. NGS	50%	24	Antennas	29%
14	Antenna types with abs. from robot	50%	60	Antennas	71%
3	Antenna types with abs. from rel. NGS (but robot available)	11%	7	Antennas	8%

EUREF Status (2)

EUREF Permanent Tracking Network



● antenna/radome
without absolute
calibration

● absolute values
coming from
relative

● robot values

Implementation Specialities

- Antenna Model realization in Bernese 5.0:
 - Satellite.rel -> Satellite.abs
 - Antenna phase center file contains ground antenna patterns + GNSS satellites antenna patterns -> automatic updates necessary (hourly processing)
 - Method was tested in Bernese 5.0 and implemented at swisstopo – several „bugs“ identified + file (re)naming + GLONASS receiver antenna calibrations. Bernese update in preparation since 2 months. SORRY for the delay!!!
- EPN AC's must implement the procedures (and version 5.0 update) soon – together with other model changes (Radome Codes, ITRF2005, Gradients, Ocean Loading)

Variants of ATX handling

1. IGS-conform: IGS.ATX
2. Best-possible EUREF: IGS.ATX + EUREF.ATX
3. Best-possible National: IGS.ATX + national.ATX
4. Best-possible: IGS.ATX + EUREF.ATX + national.ATX

- Attention:
 - automated update procedures necessary because of satellite antenna patterns
 - possible confusions if too many files involved (partly with different information for the same antenna)
 - in EUREF not regarded: absolute individual calibrations and special radoms (GRAZ radoms, SWEPOS radoms...)

Conclusion

- Coordinates – antenna phase center models are 1:1 correlated!
- Proposal: EPN uses antenna phase center model „IGS-conform“ (coordinate consistency more important than best possible (ECGN))
 - Rely on IGS files (updated by new satellites by AIUB group)
Optionally: special deal with Geo++ to add 4 missing group values to the IGS file + payment of some AC's of 125€/3years
 - Change EPN processing at same time together with IGS
- EPN improvements necessary (independent of phase center model change):
 - No EPN site, if antenna not available in IGS05.ATX file (station manager responsible – in future might be responsible to organize and pay the antenna calibration)
 - No inclusion in combined product, if AC use different antenna values
- Development IGS/EUREF update procedures (new antennas in IGS/EUREF, new values available - semi-annual updates of Geo++ data base, individual calibrations / special radome handling)
- If change in IGS phase file (with updated antenna patterns, etc.) IGS05 -> IGS06: time series discontinuity -> reprocessing necessary!
- Antenna phase center model will change coordinates (1-2 cm) – transition to national reference frames must be realized!