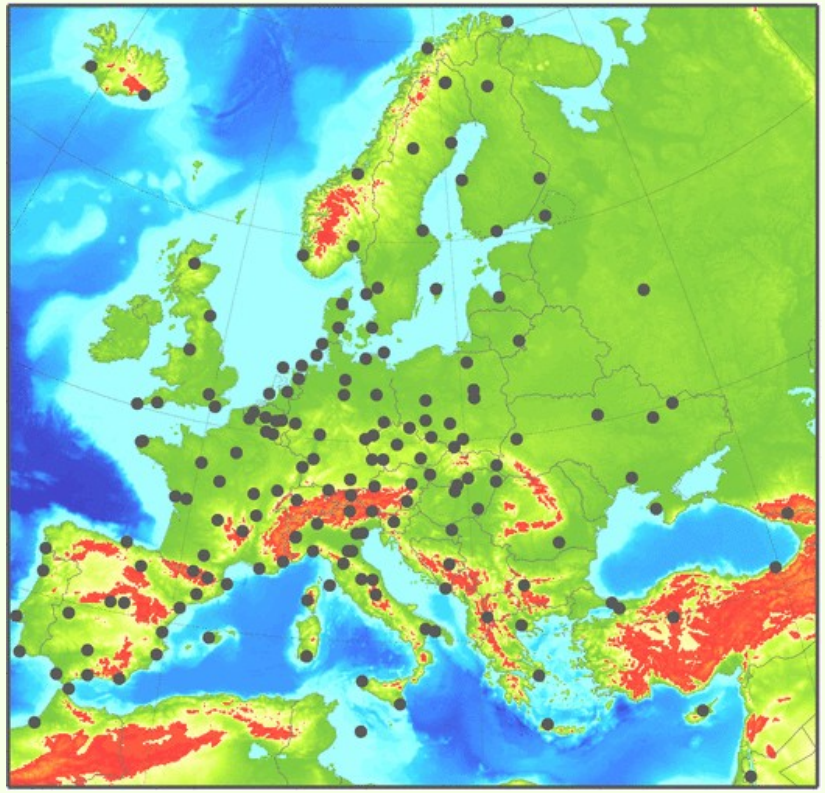
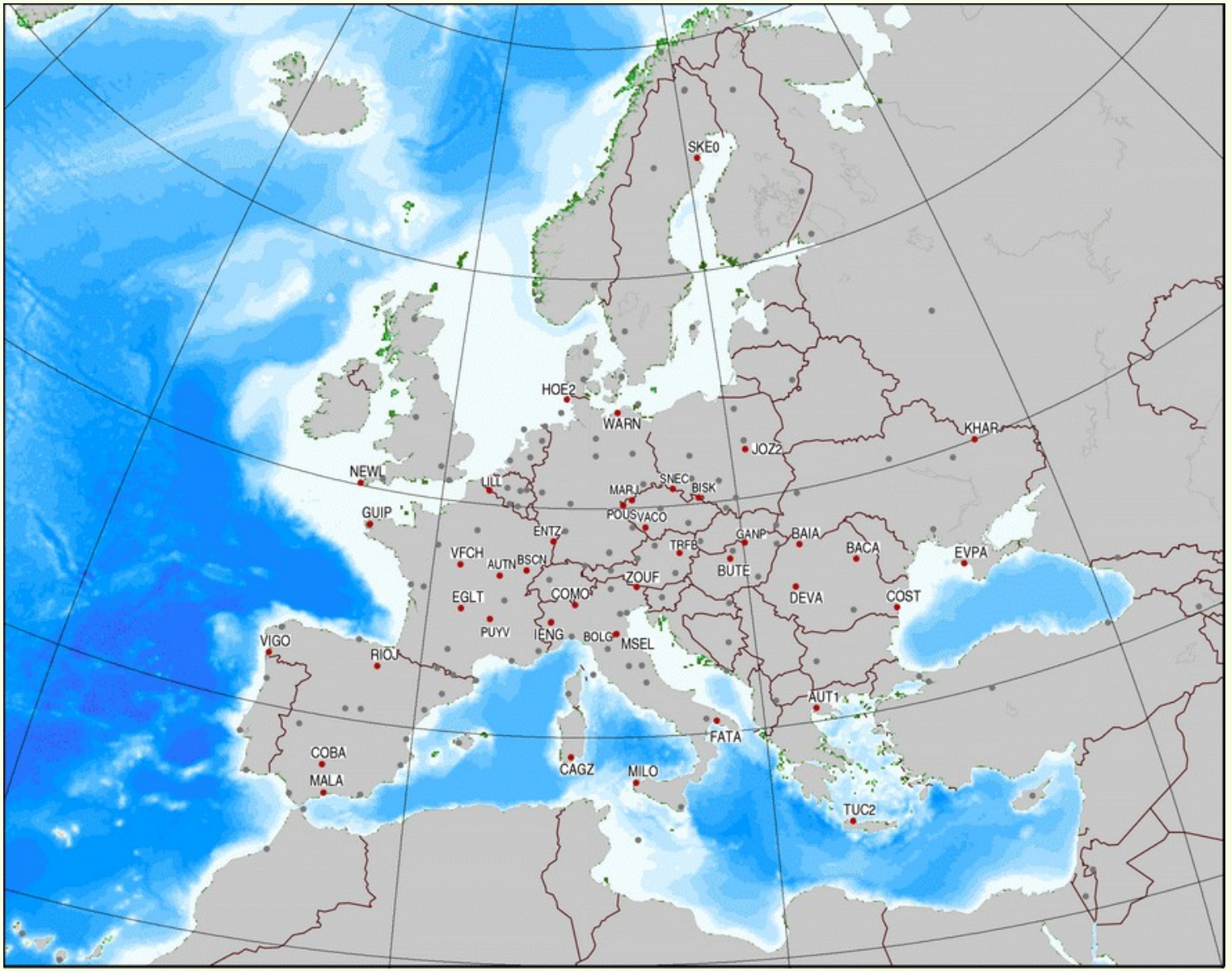
EPN Status and Reliability

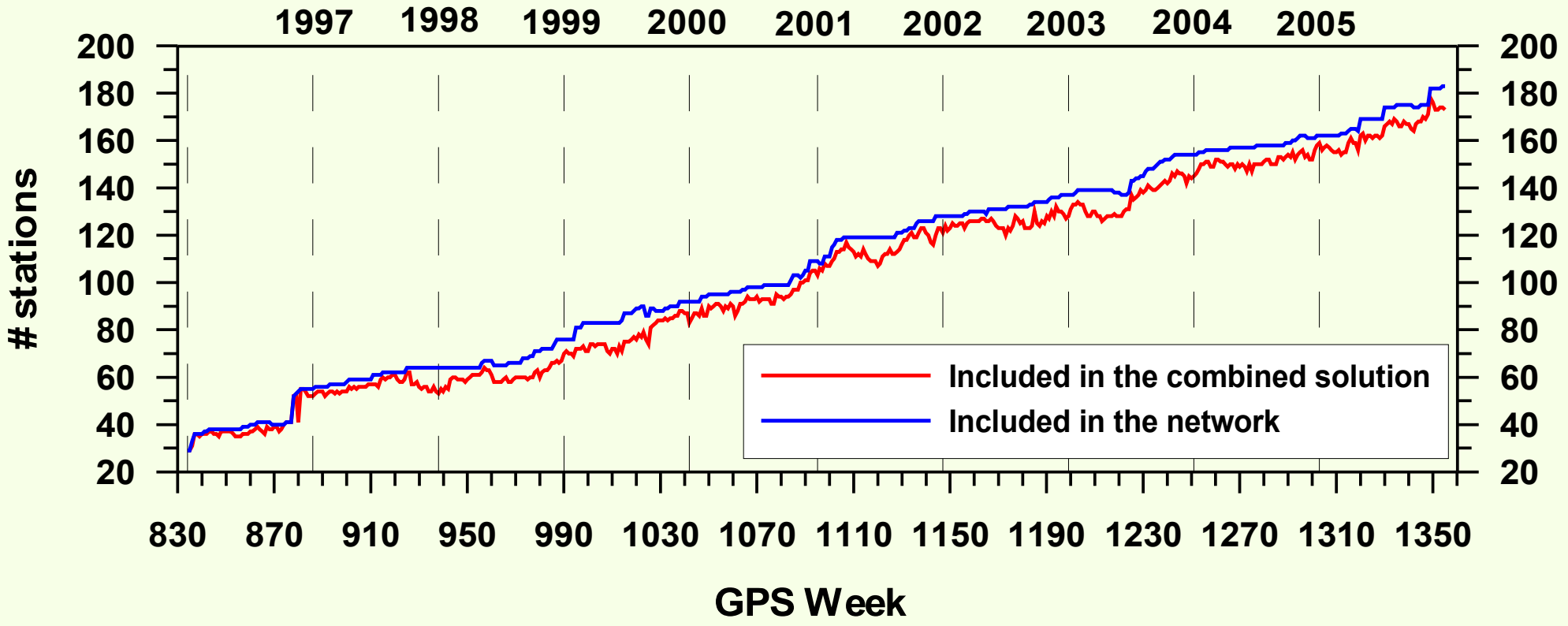
EPN Central Bureau
Royal Observatory of Belgium



GROWTH OF THE EPN TRACKING NETWORK



GROWTH OF THE EPN TRACKING NETWORK



Presently 187 EPN stations
(40 new stations since last LAC workshop in 2003)

PROPOSED STATIONS

- 1 Italian station (ROVE)
- 1 Danish station (SCOR), in Greenland
- 1 Slovakian station (BBYS)

Up to date status of proposed stations is on-line at EPN CB web-site from the moment station site log is received.

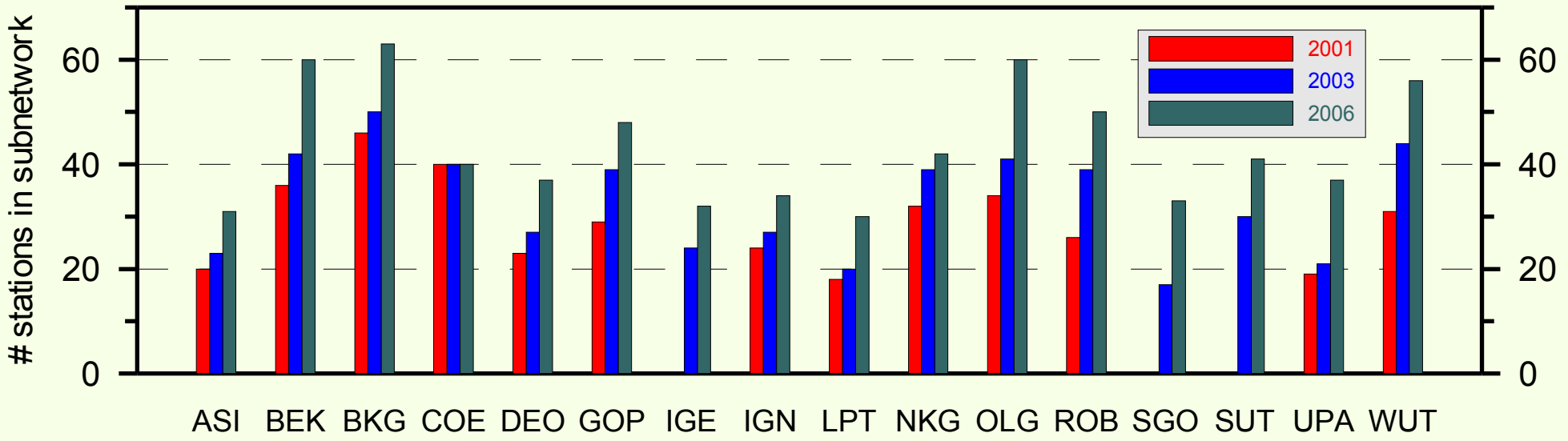
LAC can consult this web-page and propose to include station in its subnetwork (“pre-registration”).

EPN CB contacts LACs when station is completely fulfilling EPN guidelines (meta-data, data flow, data quality)

EPN LOCAL ANALYSIS CENTRES

AGENCY	LOCATION	SOFTWARE
Bayerische Akademie der Wissenschaften (BEK)	München, Germany	Bernese 4.2
Bundesamt fuer Kartographie und Geodaesie (BKG)	Frankfurt, Germany	Bernese 5.0
Warsaw University of Technology (WUT)	Warsaw, Poland	Bernese 5.0
Royal Observatory of Belgium (ROB)	Brussels, Belgium	Bernese 5.0
Observatory Lustbühel Graz (OLG)	Graz, Austria	Bernese 4.2
Center for Orbit Determination in Europe (COE)	Berne, Switzerland	Bernese 5.1
Italian Space Agency (ASI)	Matera, Italy	Microcosm 2003.0
Bundesambt für Landestopographie (LPT)	Wabern, Switzeland	Bernese 5.0
Nordic Geodetic Commission (NKG)	Onsala, Sweden	Bernese 5.0
Geodetic Observatory Pecny (GOP)	Pecny, Czech Republic	Bernese 5.0
Institut Géographique National (IGN)	Marne-la-Vallee, France	Bernese 4.2
University of Padova (UPA)	Padova, Italy	Bernese 5.0
Delft Institute for Earth-Oriented Space Research (DEO)	Delft, The Netherlands	GIPSY/OASIS II 2.5
Instituto Geográfico Nacional de España (IGE)	Madrid, Spain	Bernese 4.2
FOMI Satellite Geodetic Observatory (SGO)	Budapest, Hungary	Bernese 4.2
Slovak University of Technology (SUT)	Bratislava, Slovakia	Bernese 4.2

SIZE OF THE AC SUBNETWORKS



EPN CB SUPPORT TO AC's – WEB/FTP

Web

- Analysis Centres web page
  - subnetwork descriptions, processing options
  - archive of all LAC Mails sent to euref_ac@ifag.de
- Station web pages
  - Data quality plots (teqc, azimuth/elevation graphs)
  - Coordinate time series

Ftp

- Ocean loading table (BLQ format), updated upon integration of new EPN station
- meta-data files based on site logs
  - euref.snx (SINEX format)
  - EUREF.STA (Bernese format)

  both updated after each site log update

EPN CB SUPPORT TO AC's – EUREF.STA

TYPE 002: STATION INFORMATION

STATION NAME	FLG	FROM						TO						RECEIVER TYPE	ANTENNA TYPE		REC #	ANT #	NORTH	EAST	UP
**********	***	YYYY	MM	DD	HH	MM	SS	YYYY	MM	DD	HH	MM	SS	**********	**********		******	******	***.****	***.****	***.****
ACOR 13434M001	001	1998	12	06	00	00	00	2001	12	19	00	00	00	ASHTECH UZ-12	ASH700936D_M	SNOW	00224	16122	0.0000	0.0000	3.0420
ACOR 13434M001	001	2001	12	19	00	00	00	2004	04	15	00	00	00	ASHTECH UZ-12	ASH700936D_M	SNOW	12109	16122	0.0000	0.0000	3.0420
ACOR 13434M001	001	2004	04	15	00	00	00	2099	12	31	00	00	00	ASHTECH UZ-12	ASH700936D_M	SNOW	12110	16122	0.0000	0.0000	3.0420
AJAC 10077M005	001	2000	01	22	00	00	00	2099	12	31	00	00	00	ASHTECH Z-XII3	ASH700936A_M	NONE	471	127	0.0000	0.0000	0.0000
ALAC 13433M001	001	1998	03	06	00	00	00	1999	08	07	00	00	00	TRIMBLE 4000SSI	TRM29659.00	NONE	21045	105209	0.0000	0.0000	3.0350
ALAC 13433M001	001	1999	08	07	00	00	00	1999	09	01	00	00	00	TRIMBLE 4000SSI	TRM29659.00	NONE	21045	105209	0.0000	0.0000	3.0350
ALAC 13433M001	001	1999	09	01	00	00	00	1999	12	16	00	00	00	TRIMBLE 4000SSI	TRM29659.00	NONE	22992	105209	0.0000	0.0000	3.0350
ALAC 13433M001	001	1999	12	16	00	00	00	2005	11	15	00	00	00	TRIMBLE 4000SSI	TRM29659.00	NONE	021045	105209	0.0000	0.0000	3.0350
ALAC 13433M001	001	2005	11	15	00	00	00	2099	12	31	00	00	00	TRIMBLE 4000SSE	TRM29659.00	NONE	A02534	105209	0.0000	0.0000	3.0350
ALME 13437M001	001	1999	12	04	00	00	00	2001	11	29	00	00	00	TRIMBLE 4000SSI	TRM29659.00	TCWD	26987	173864	0.0000	0.0000	3.0440
ALME 13437M001	001	2001	11	29	00	00	00	2002	04	10	00	00	00	TRIMBLE 4000SSI	TRM29659.00	TCWD	28641	173864	0.0000	0.0000	3.0440
ALME 13437M001	001	2002	04	10	00	00	00	2099	12	31	00	00	00	TRIMBLE 4000SSI	TRM29659.00	TCWD	026987	173864	0.0000	0.0000	3.0440
AMMN 22201M001	001	1999	06	15	00	00	00	2099	12	31	00	00	00	ASHTECH Z-XII3	ASH700936D_M	SCIS	P01391	R12740	0.0000	0.0000	0.0083
ANKR 20805M002	001	1995	06	21	00	00	00	1996	02	07	00	00	00	ROGUE SNR-8000	AOAD/M_T	NONE	T344	393	0.0000	0.0000	0.0600
ANKR 20805M002	001	1996	02	07	00	00	00	1996	07	23	00	00	00	ROGUE SNR-8000	AOAD/M_T	NONE	T344	393	0.0000	0.0000	0.0600
ANKR 20805M002	001	1996	07	23	00	00	00	1997	07	24	00	00	00	ROGUE SNR-8000	AOAD/M_T	NONE	T318	404	0.0000	0.0000	0.0600
ANKR 20805M002	001	1997	07	24	00	00	00	1998	09	16	00	00	00	ROGUE SNR-8000	AOAD/M_T	NONE	T319	391	0.0000	0.0000	0.0600
ANKR 20805M002	001	1998	09	16	00	00	00	1999	07	09	00	00	00	ROGUE SNR-8000	AOAD/M_T	NONE	T319	290	0.0000	0.0000	0.0600
ANKR 20805M002	001	1999	07	09	00	00	00	2000	07	04	00	00	00	ROGUE SNR-8000	AOAD/M_T	NONE	T394	290	0.0000	0.0000	0.0600
ANKR 20805M002	001	2000	07	04	00	00	00	2000	11	24	00	00	00	AOA SNR-8000	ACT AOAD/M_T	NONE	T-398U	290	0.0000	0.0000	0.0600
AQUI 12757M001	001	1999	06	11	00	00	00	2001	08	27	00	00	00	TRIMBLE 4000SSI	TRM22020.00+GP	NONE	21525	111286	0.0000	0.0000	0.0000
AUT1 12619M002	001	2005	03	29	00	00	00	2006	02	15	00	00	00	LEICA GRX1200PRO	LEIAT504	LEIS	455989	808	0.0000	0.0000	0.1824
AUT1 12619M002	001	2006	02	15	00	00	00	2099	12	31	00	00	00	LEICA GRX1200PRO	LEIAT504	LEIS	455989	808	0.0000	0.0000	0.1824
AUTN 10080M001	001	2005	04	15	00	00	00	2099	12	31	00	00	00	ASHTECH UZ-12	ASH701945E_M	SCIS	303021	030207	0.0000	0.0000	0.0000
BACA 11405M001	001	2005	08	05	00	00	00	2099	12	31	00	00	00	LEICA GRX1200PRO	LEIAT504	LEIS	452503	102525	0.0000	0.0000	0.0000
BAIA 11406M001	001	2005	06	10	00	00	00	2099	12	31	00	00	00	LEICA GRX1200PRO	LEIAT504	LEIS	451105	102187	0.0000	0.0000	0.0000
BELL 13431M001	001	1997	05	13	00	00	00	2005	11	07	00	00	00	TRIMBLE 4000SSI	TRM29659.00	NONE	18091	080346	0.0000	0.0000	0.0540
BELL 13431M001	001	2005	11	07	00	00	00	2099	12	31	00	00	00	TRIMBLE NETRS	TRM29659.00	NONE	57134	080346	0.0000	0.0000	0.0540
BISK 11520M001	001	2001	09	06	00	00	00	2099	12	31	00	00	00	ASHTECH Z18	ASH701946.2	SNOW	112203	N/A	0.0000	0.0000	0.0350

EPN CB SUPPORT TO AC's – MAIL

Mail

- cc of RINEX error notifications to station managers

- inactive/active status of stations
  inactive (3 months not in combined solution) :
  LACs stops submitting solutions for that station and waits for EPN CB to declare station as active again

  not to make life difficult of LAC, but exclusion from EPN solution is sometimes the only pressure means on station managers

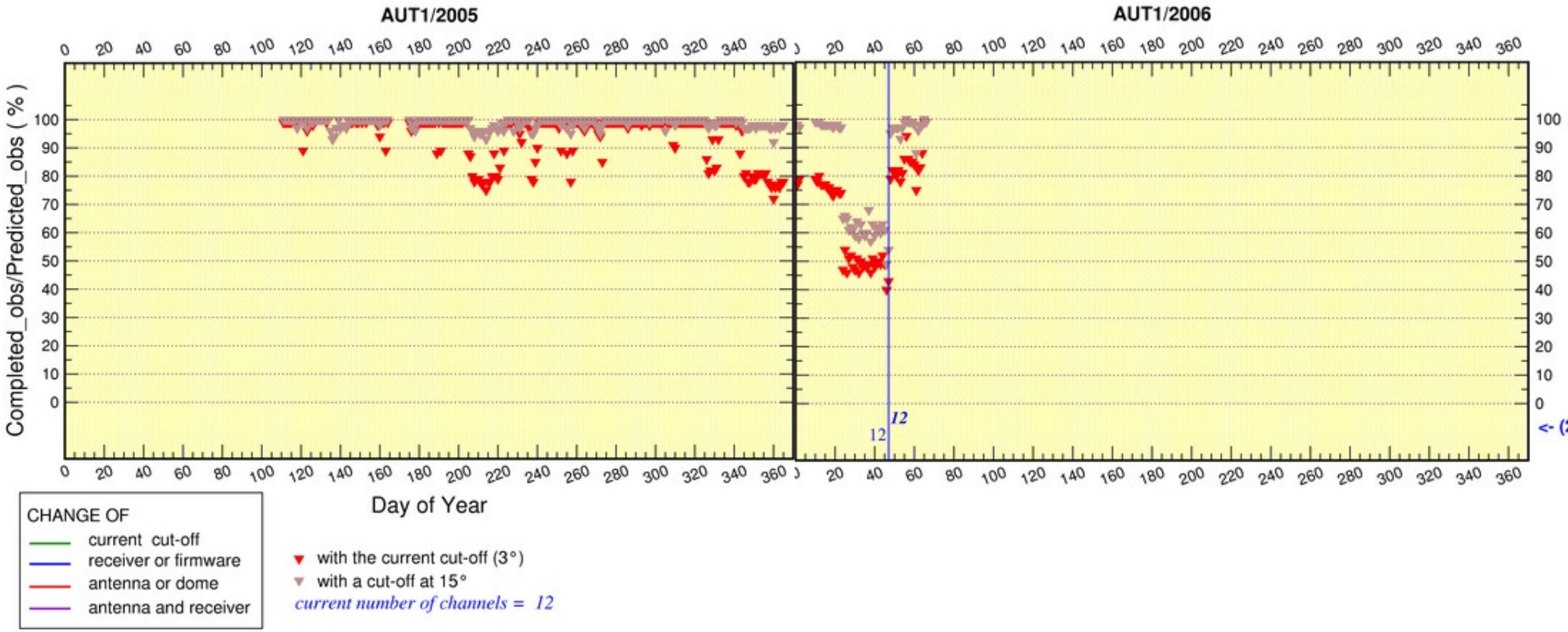
- cc of notification to station manager when degraded data quality is detected

EPN CB SUPPORT TO AC's

EPN CB welcomes additional suggestions:

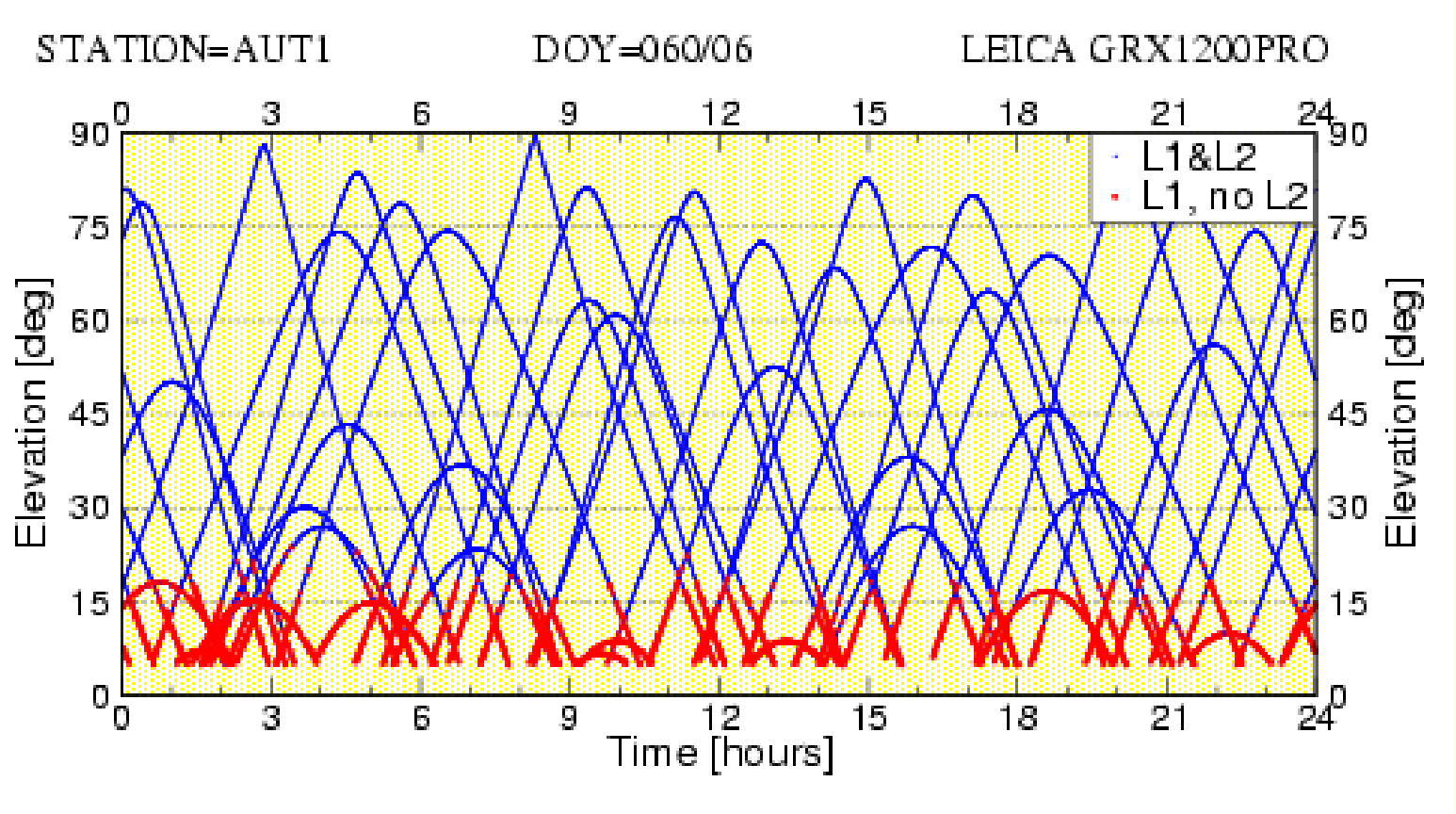
- *ITRF2000 coord/vel file for EPN stations in Bernese format*
- *support is not limited to Bernese users !!!!!*

TRACKING PROBLEM FOR AUT1

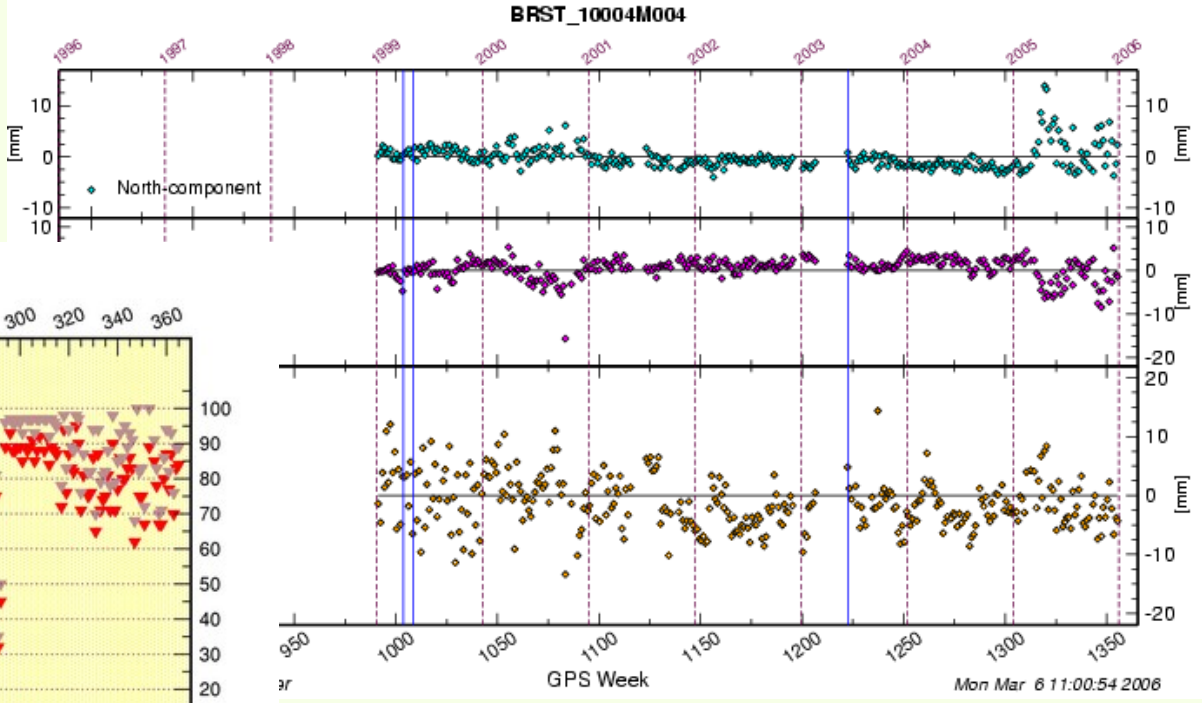


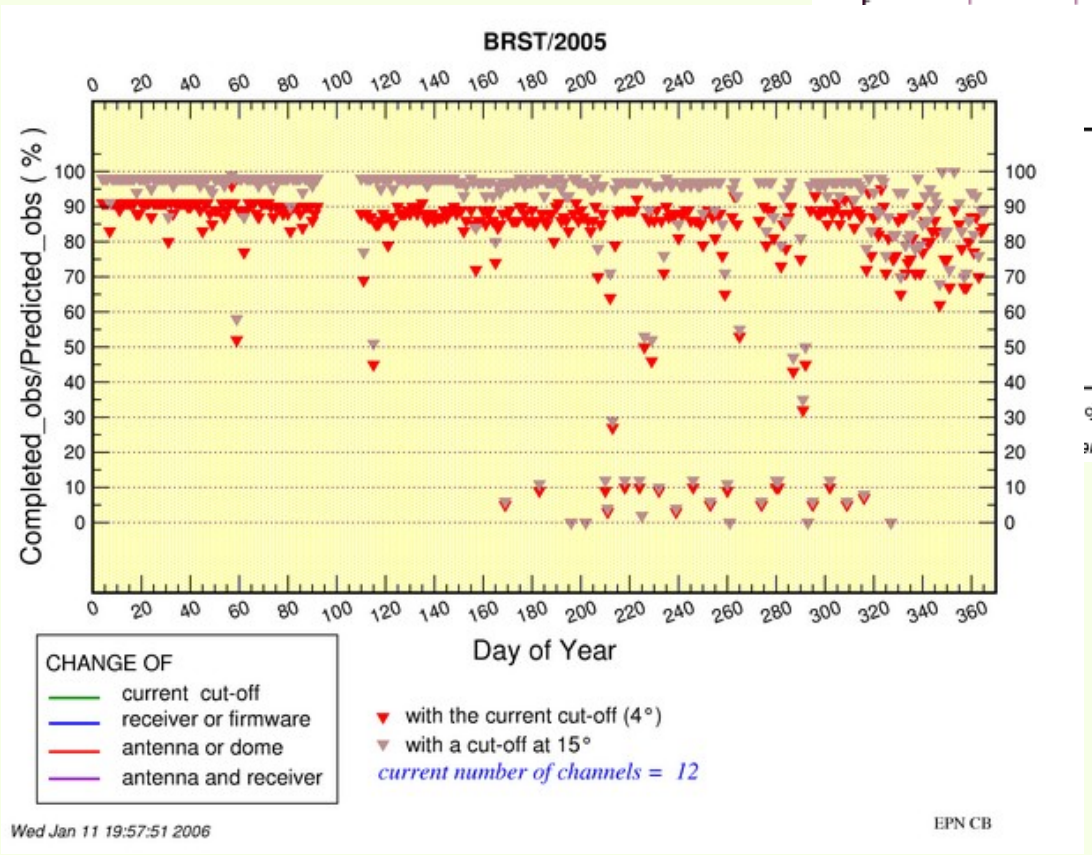
Since DOY 345/2005, loss of low elevation data.
Firmware upgrade early 2006, but still tracking problems

Receiver will be replaced



TRACKING PROBLEM AT BRST

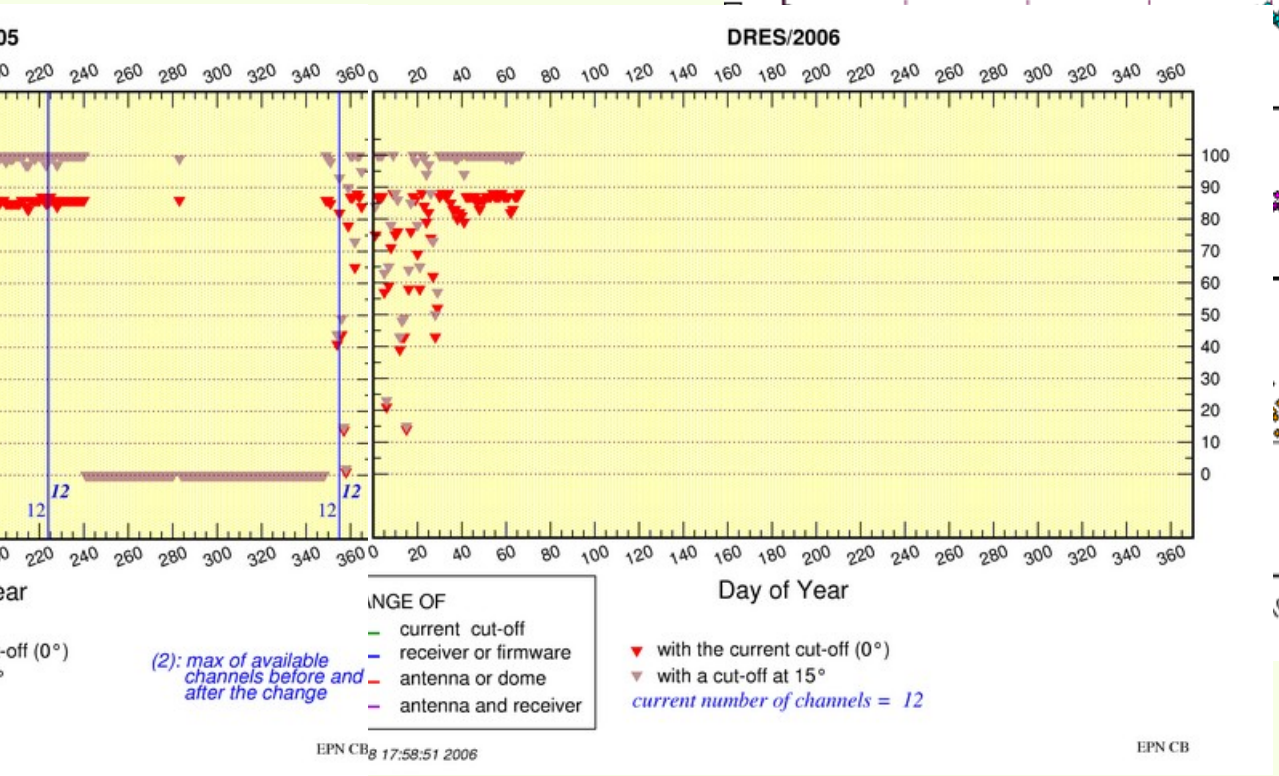


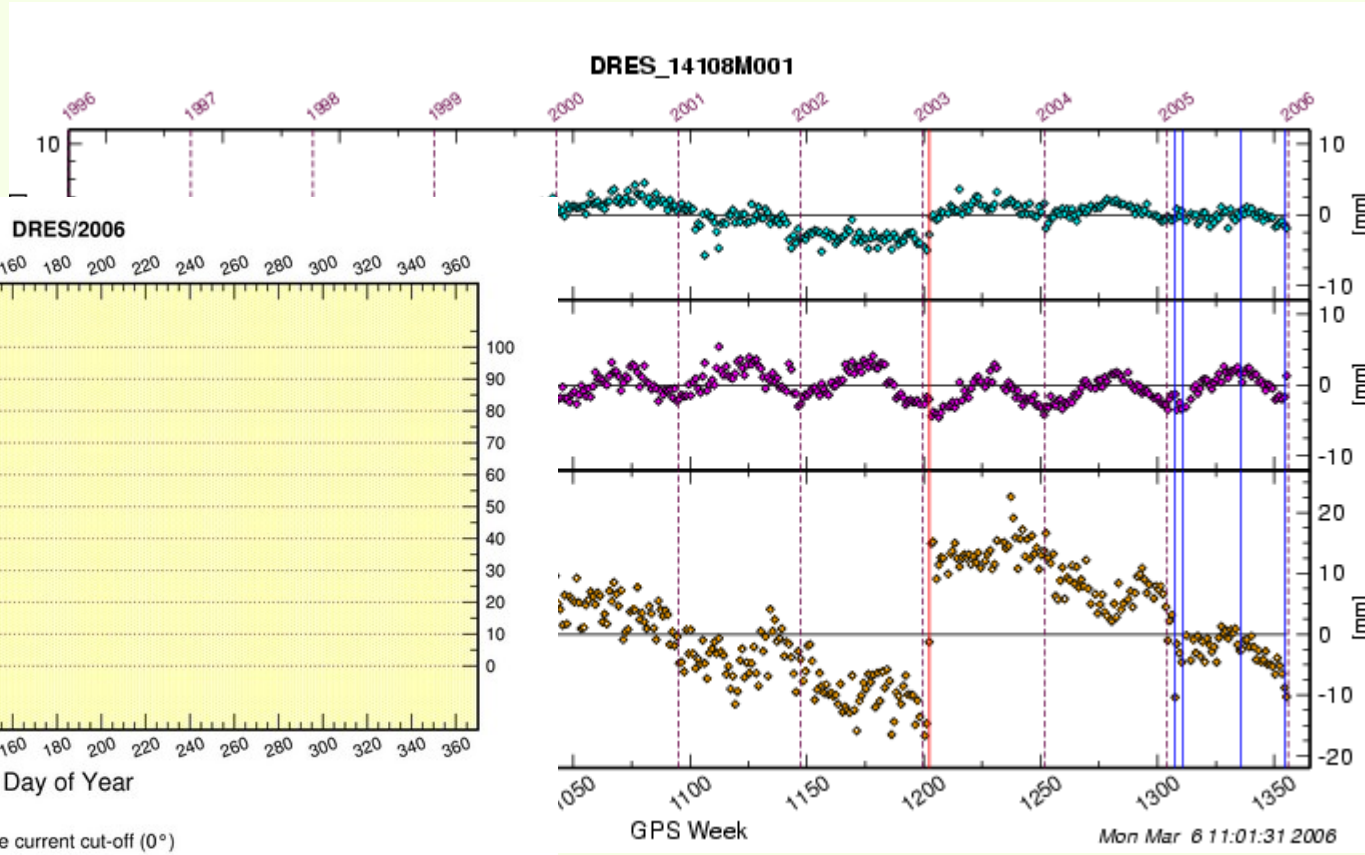


Station stopped submitting data at request of EPN CB

TRACKING PROBLEM AT DRES

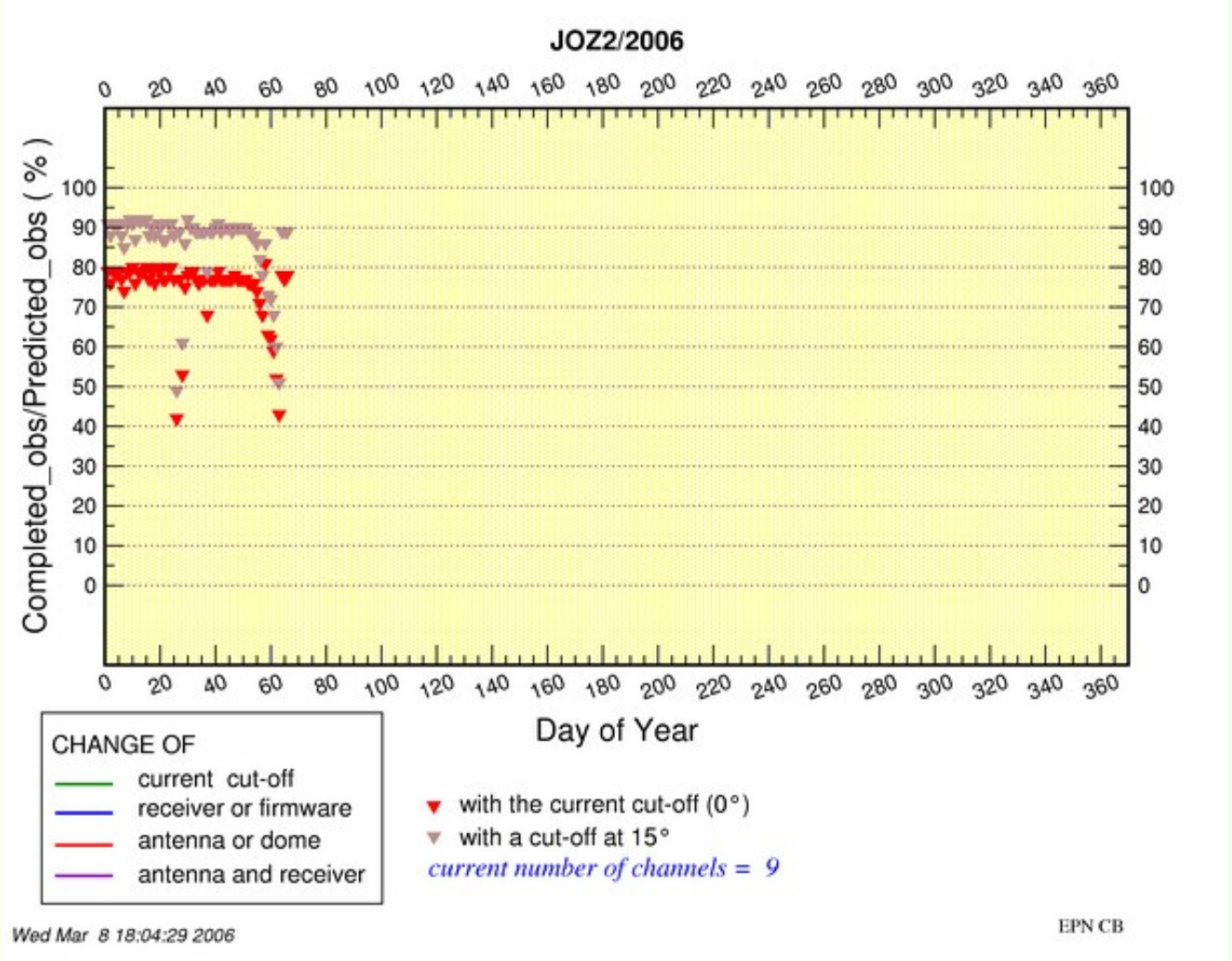
Bug in MultiNav software



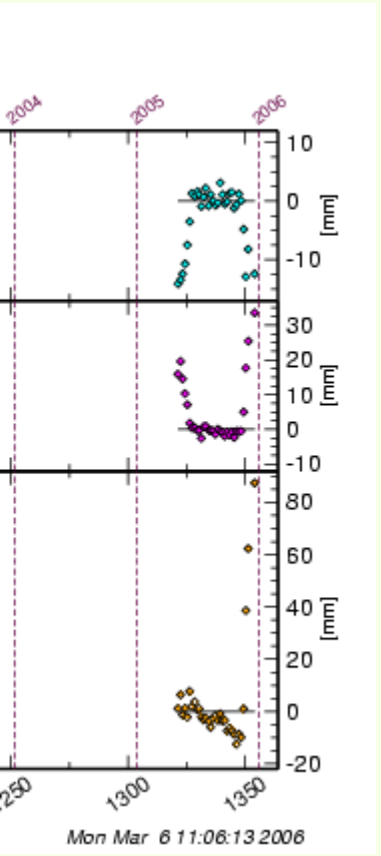


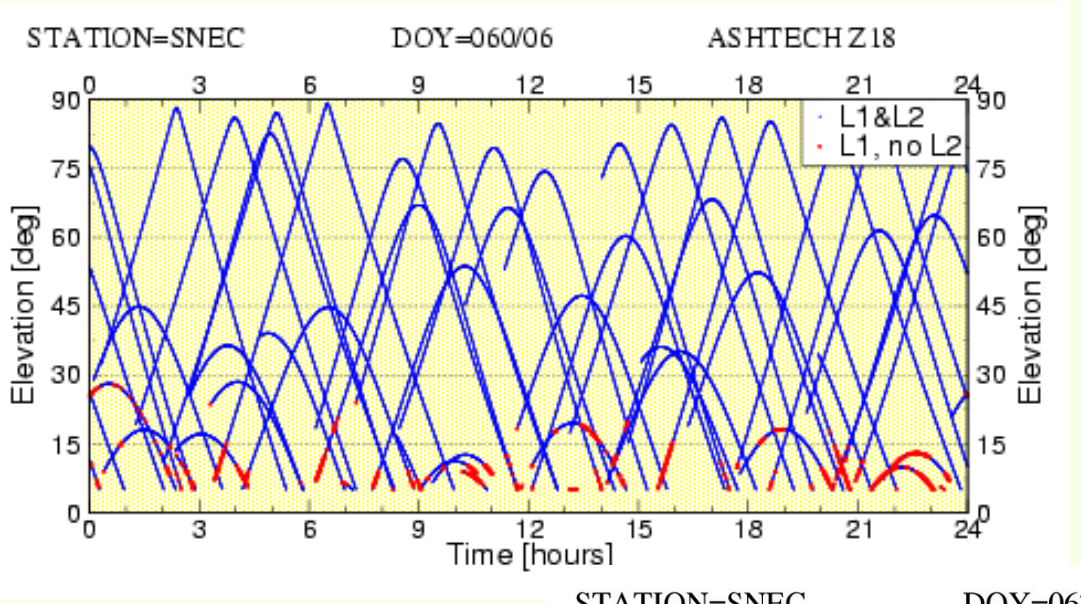
TRACKING PROBLEM AT JOZ2

Firmware ? (similar problems in the past)

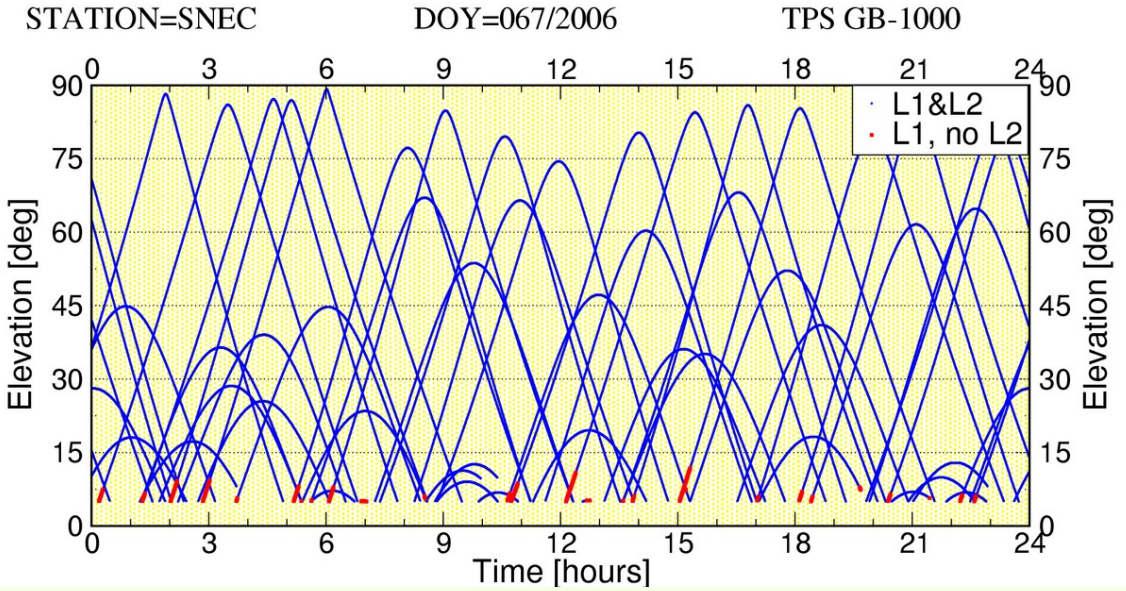


TRACKING PROBLEM AT SNEC

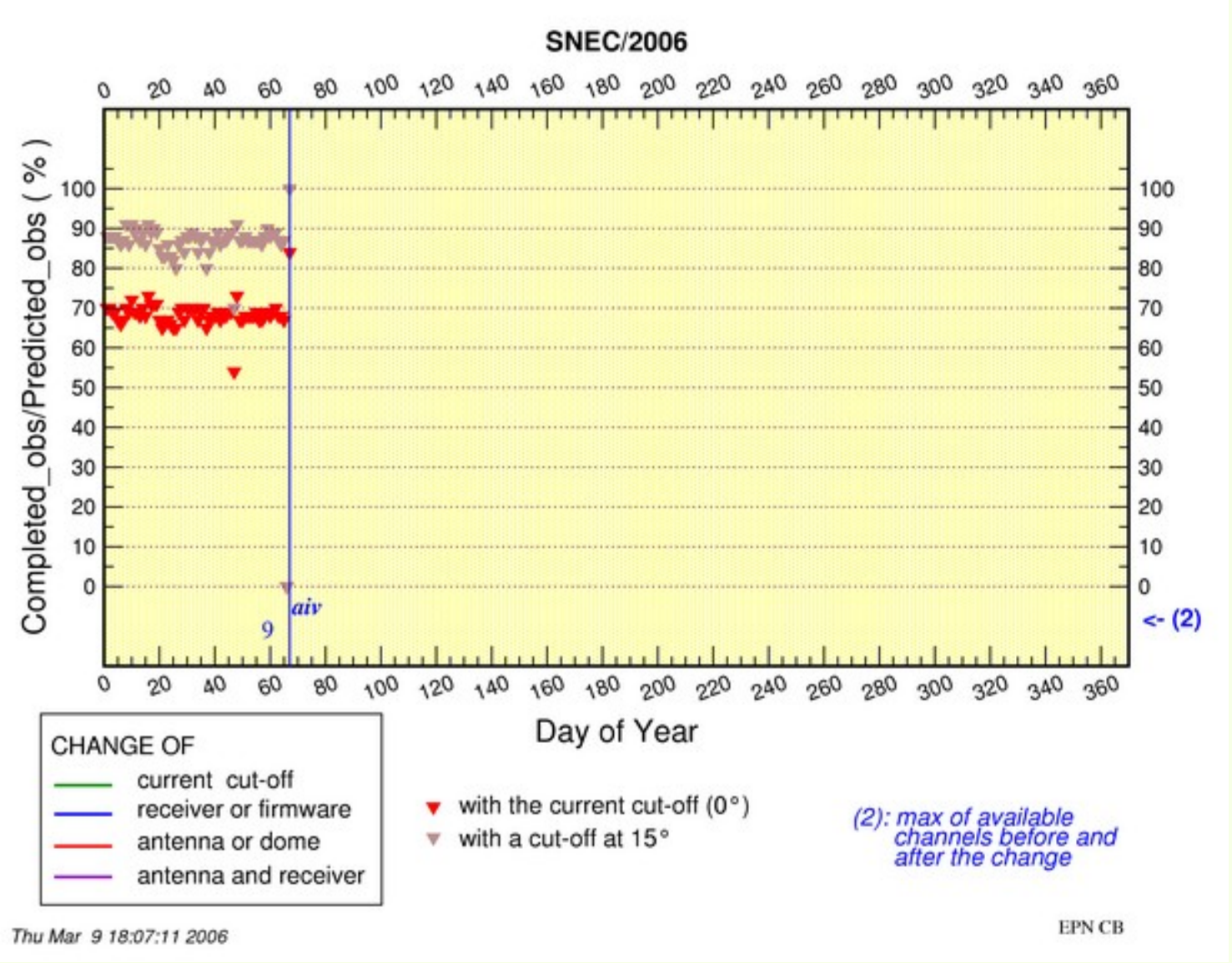




Receiver has been replaced, significant tracking improvement.

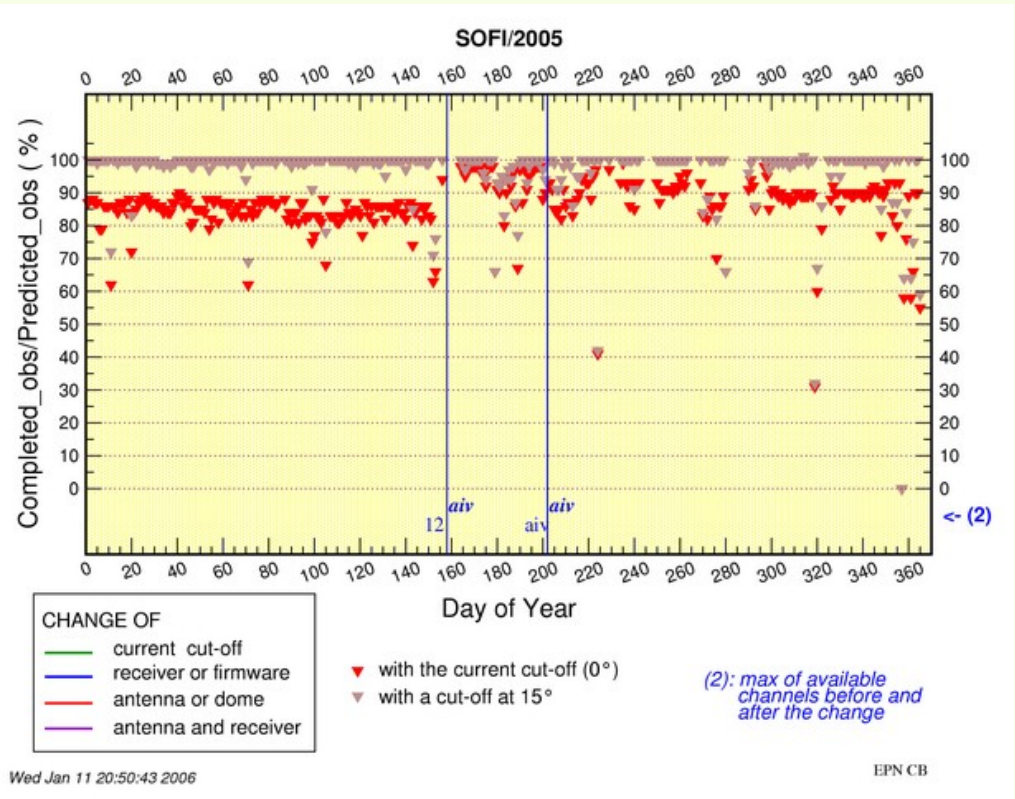


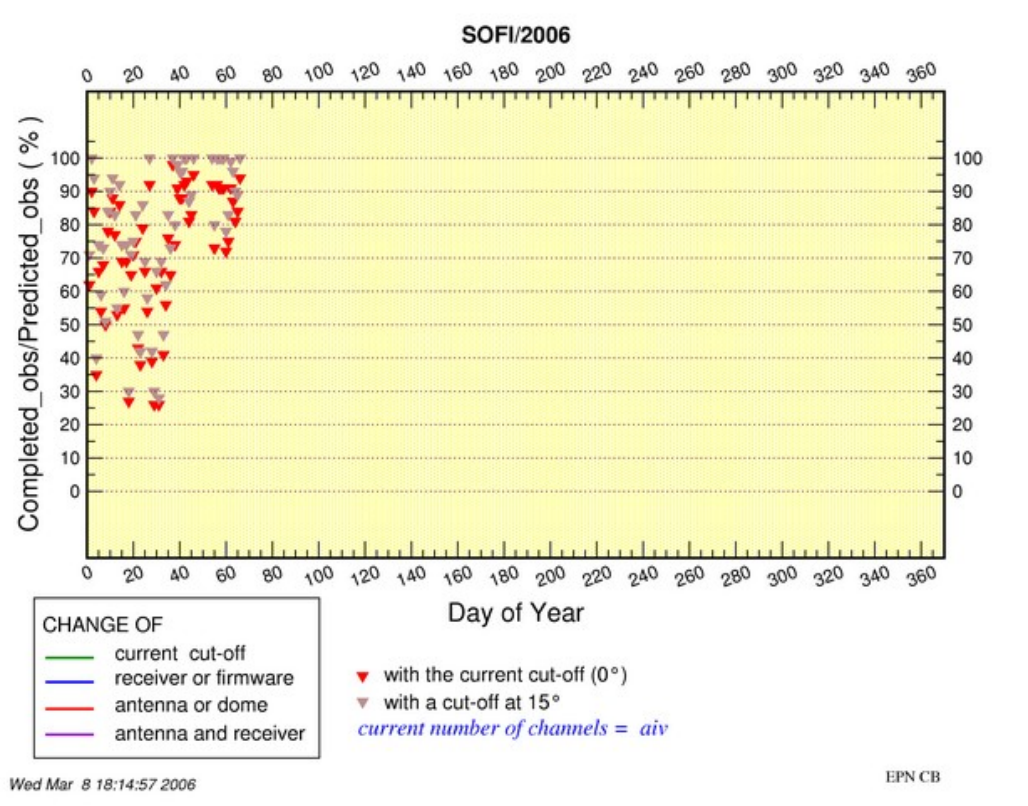
TRACKING PROBLEM AT SNEC (2)



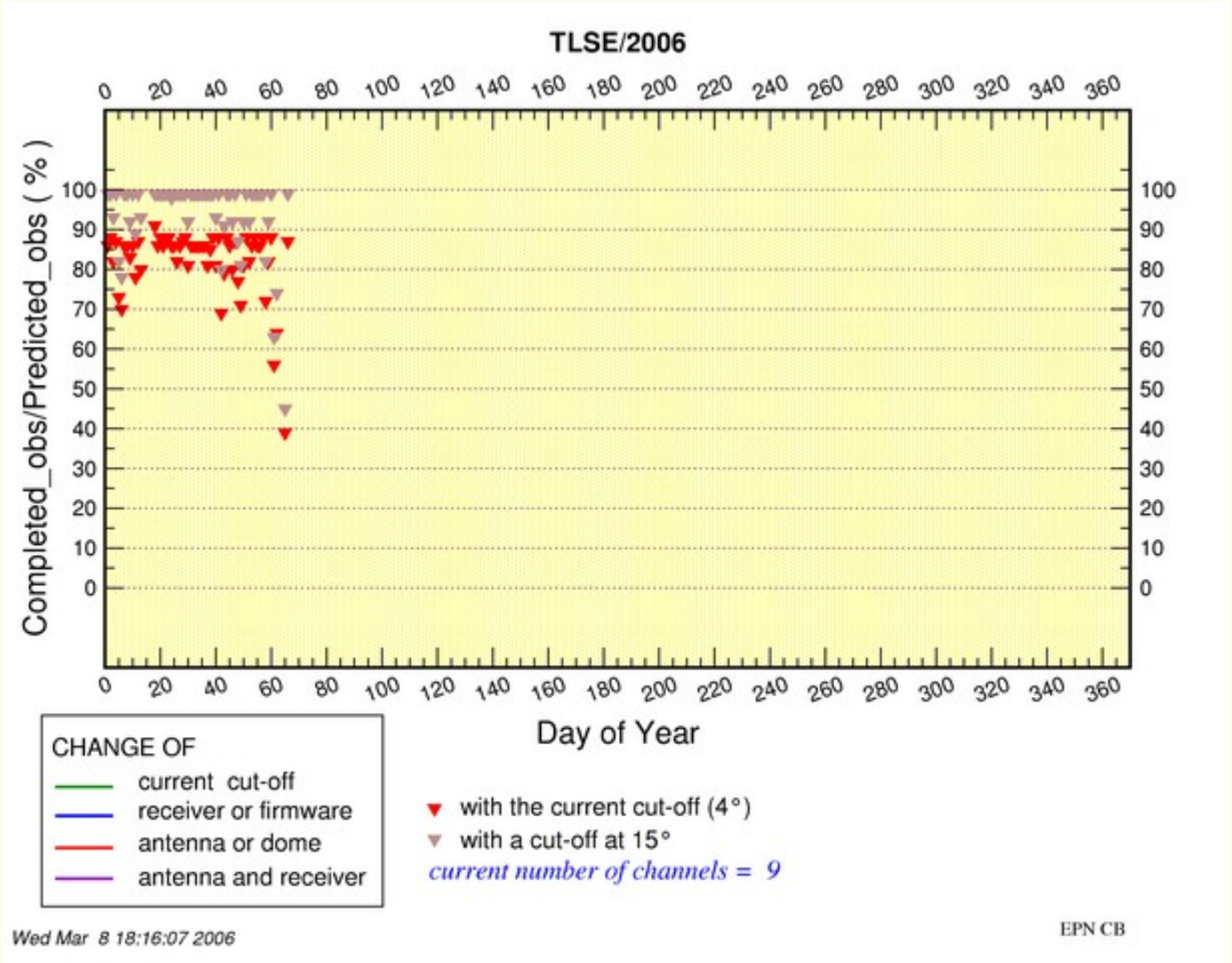
TRACKING PROBLEM AT SOFI

Since DOY 348/2005, the computer regularly shutdowns without reason and has to be restarted manually.

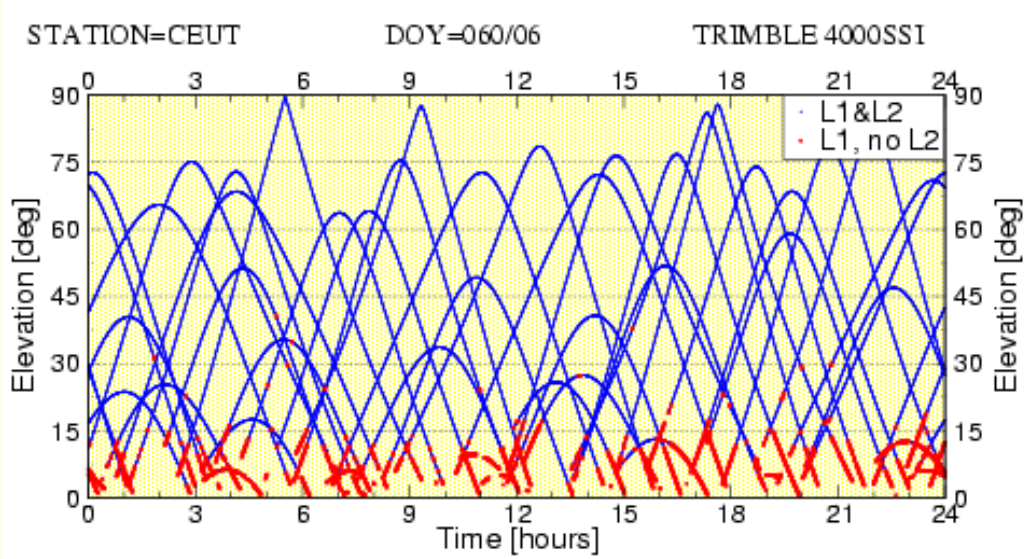


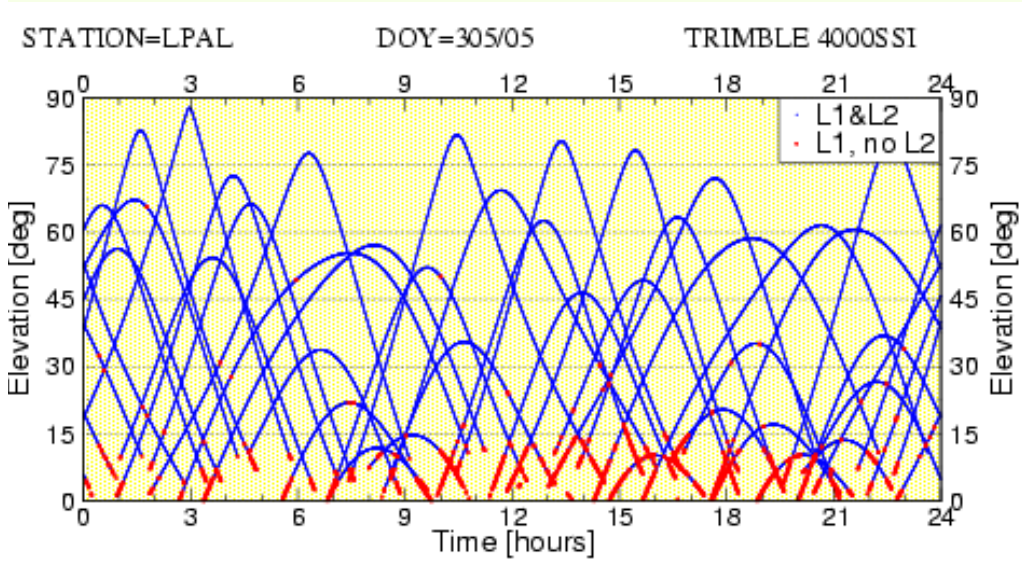


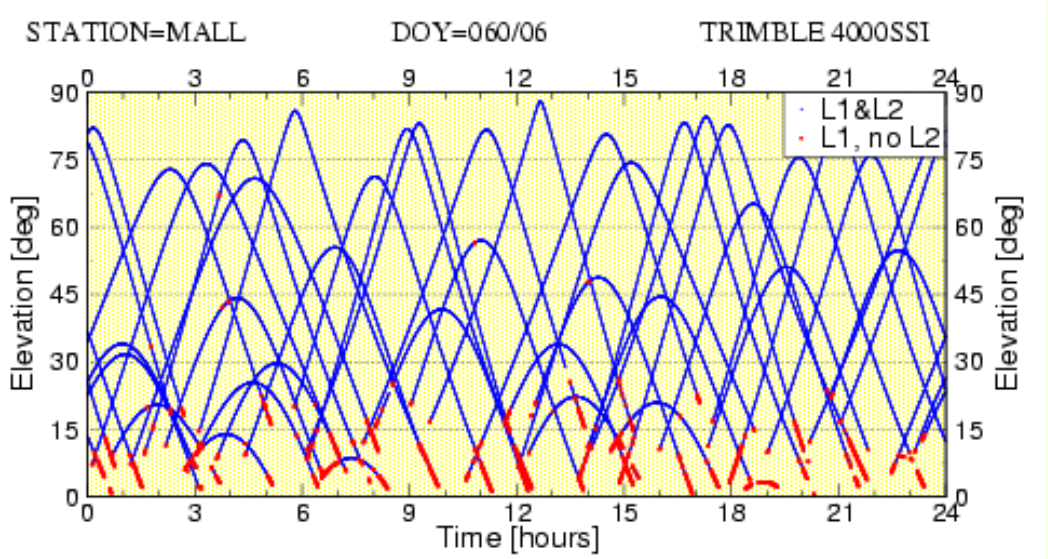
TRACKING PROBLEM AT TLSE

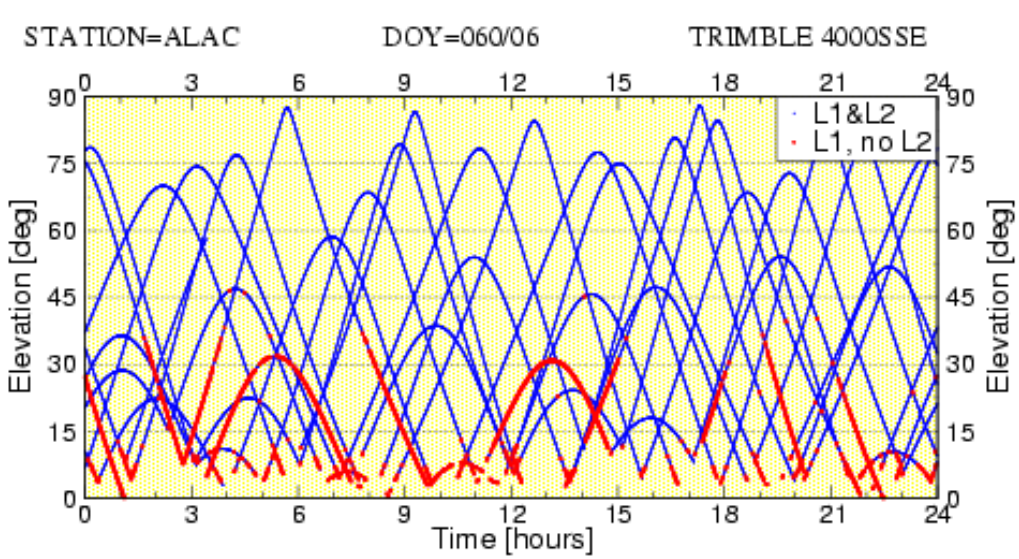


MORE EXAMPLES OF BAD TRACKING

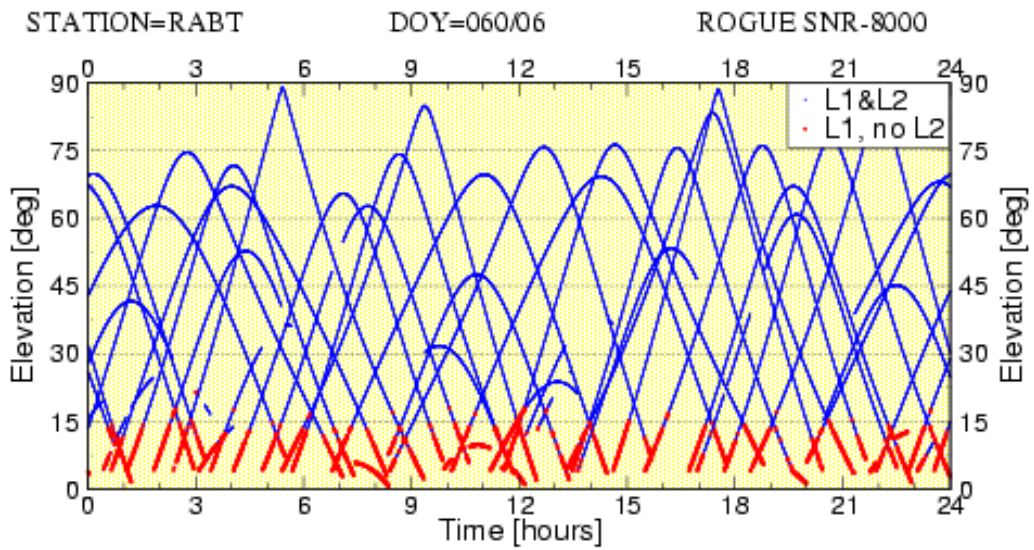


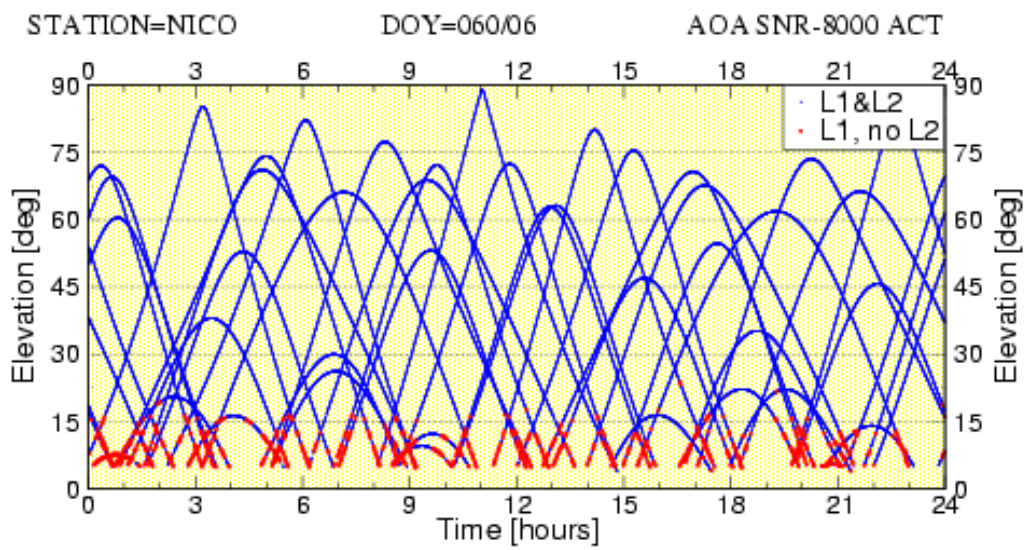


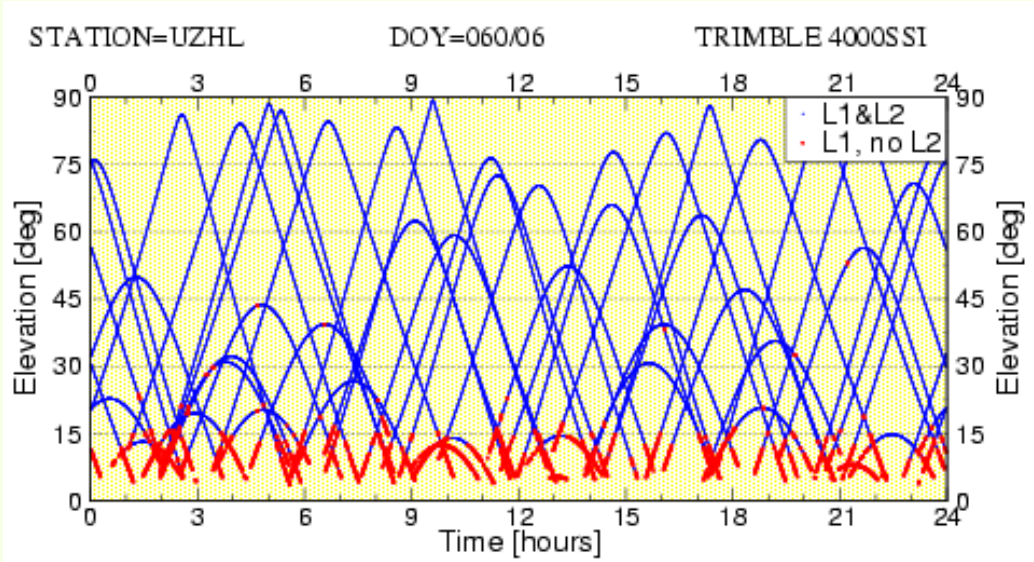


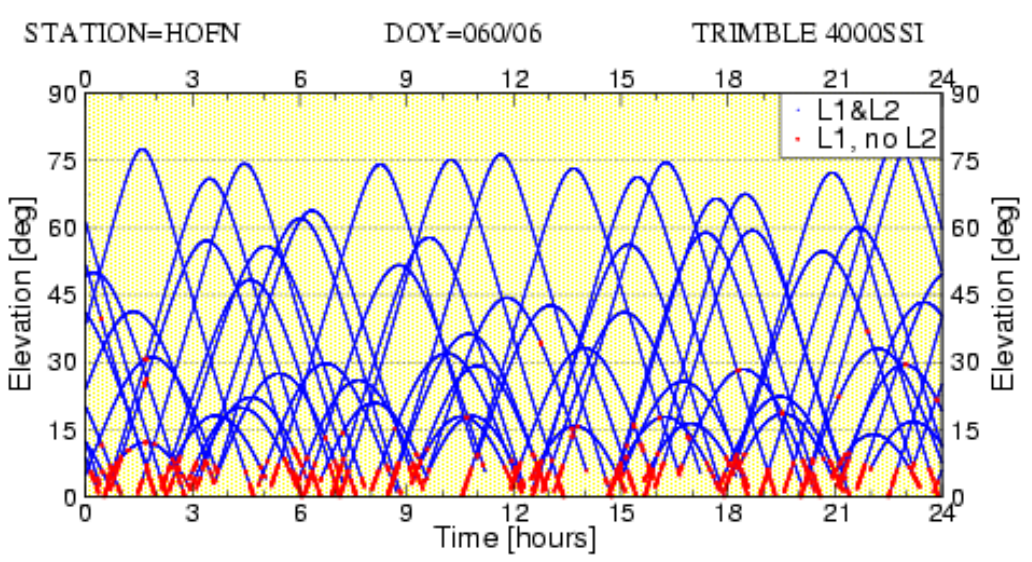


MORE EXAMPLES OF BAD TRACKING (2)









TYPICAL WINTER TRACKING PROBLEMS

MOPI, PFAN, TRFB, VAAS, JOEN, SODA, GRAZ?, KIRU?, SBGZ?

BAD REPEATABILITIES

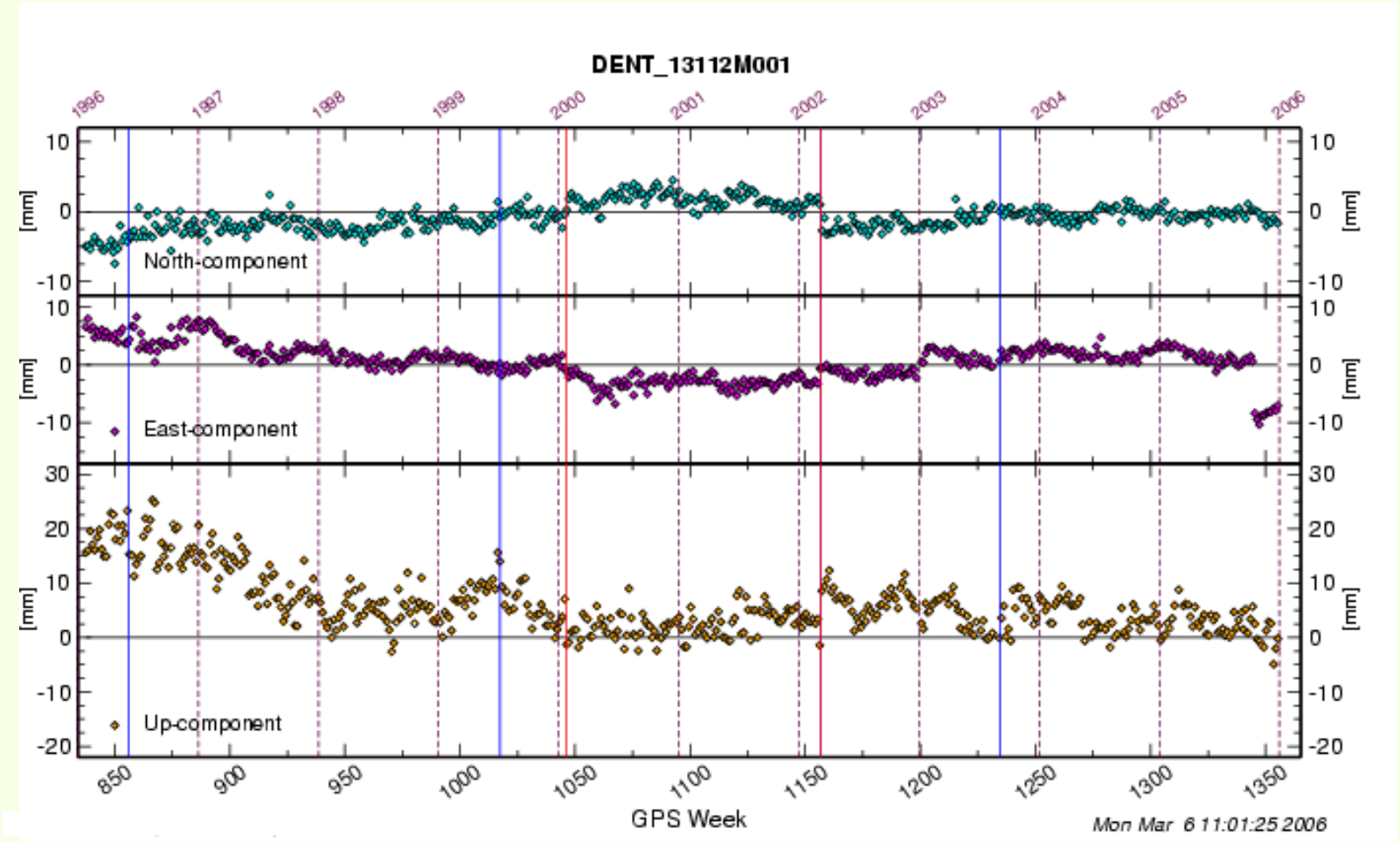
HOFN, REYK, KELY, QAQ1, THU3

DEGRADED REPEATABILITIES/AMBIGUITY RESOLUTION

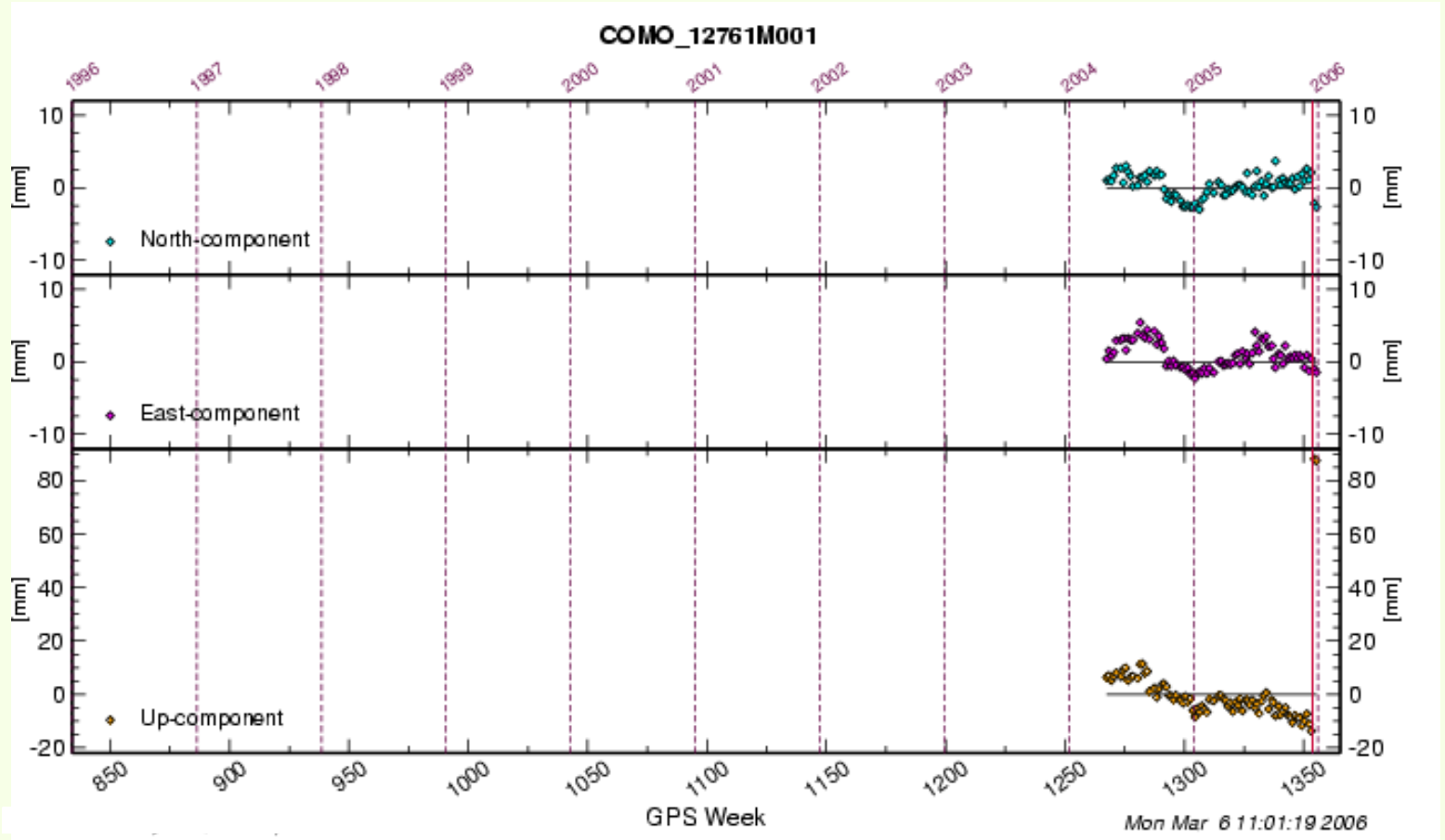
COMO, WTZR, MATE, MORP, VENE, REDU

COORDINATE JUMP AT DENT

Coordinate jump in fall 2005, no problem with data quality, vandalism?



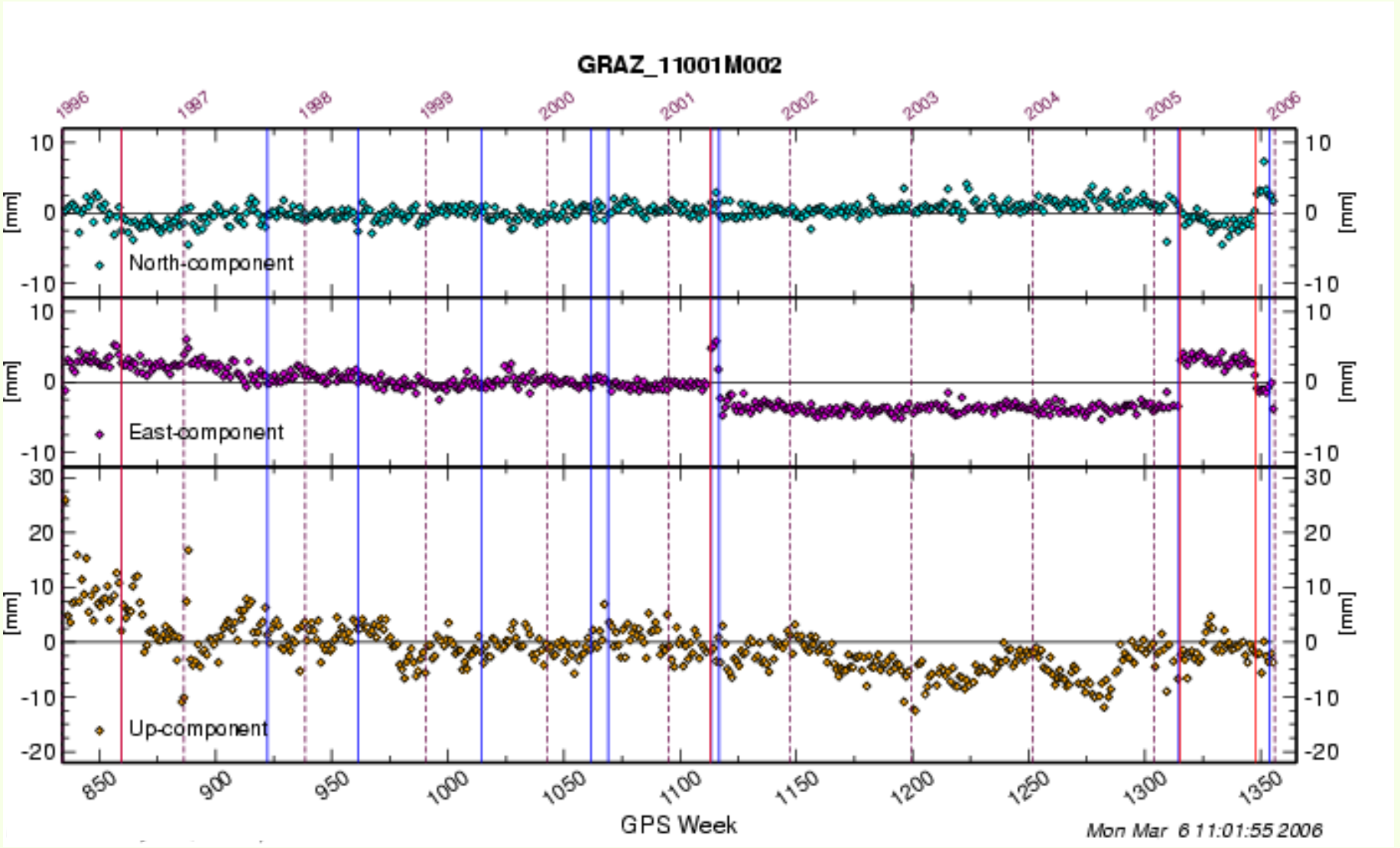
ANTENNA CHANGE AT COMO



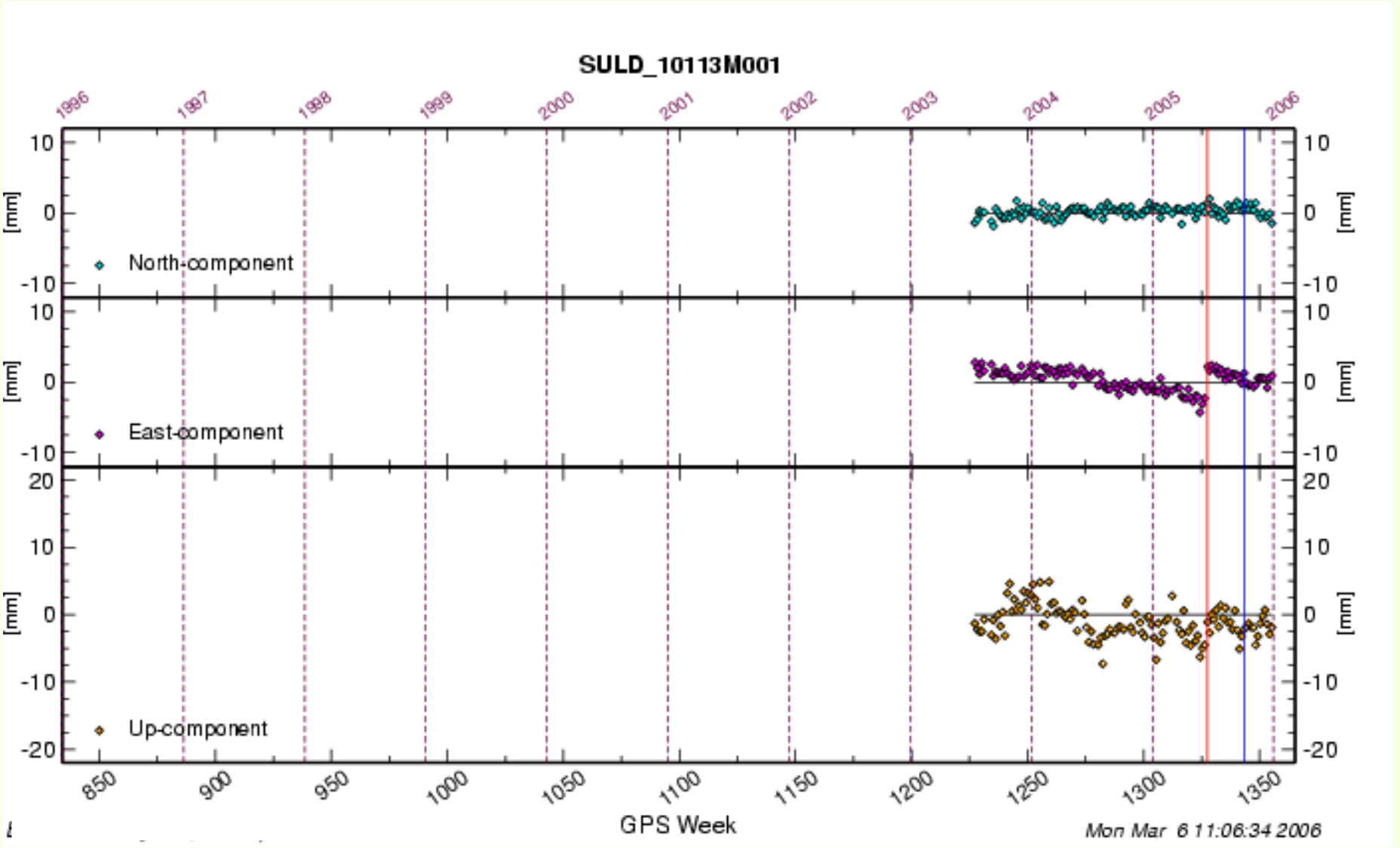
GPS week 1353: antenna change + change of antenna height

Some LAC submitted solution for week 1353 of antenna change, resulting in erroneous solution

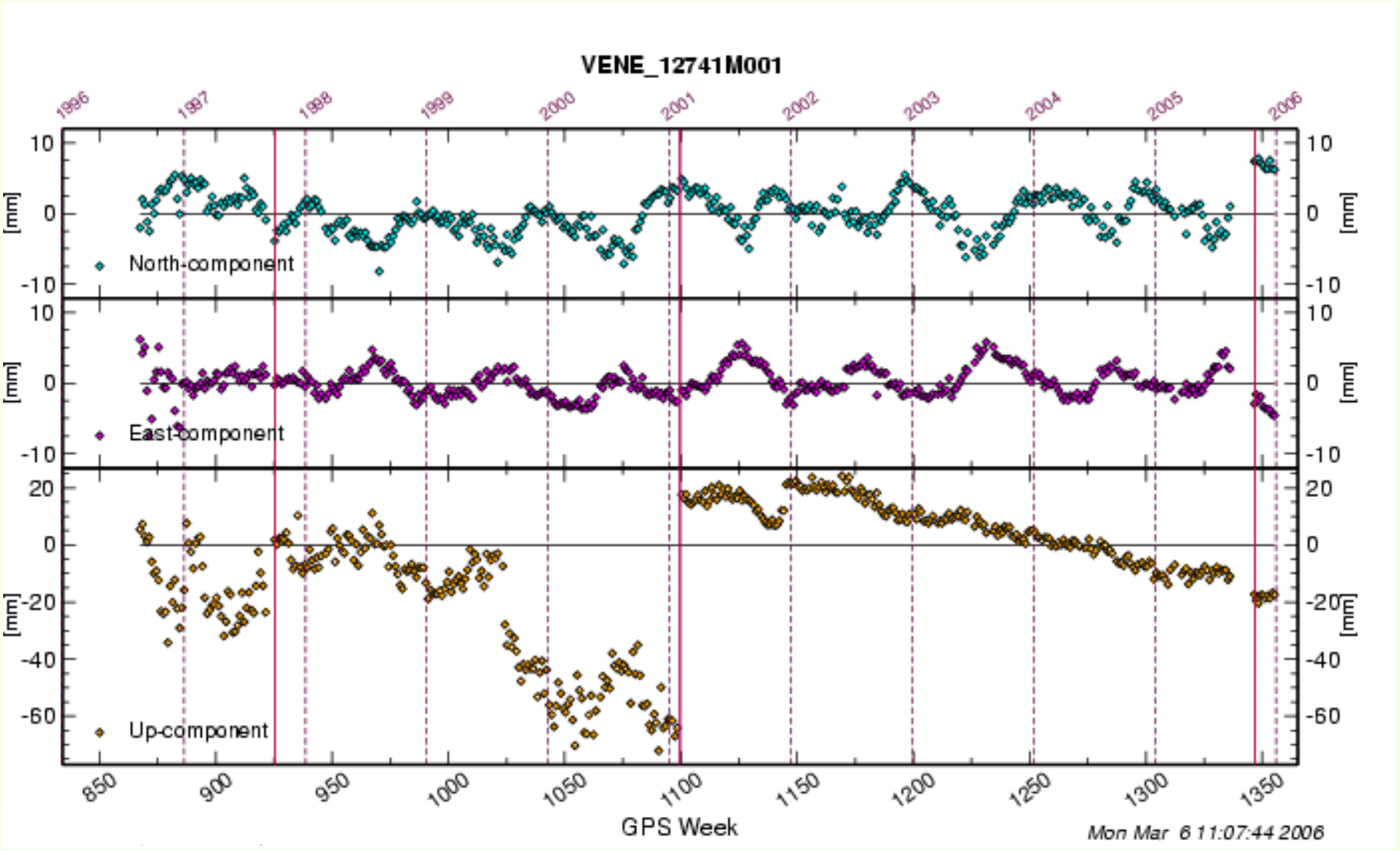
ANTENNA CHANGE AT GRAZ



ANTENNA CHANGE AT SULD



ANTENNA CHANGE AT VENE



ANTENNA/RADOME CALIBRATIONS

- IGS has special agreement with GEO++ which allowed the IGS to use/make available the antenna/radome PCV used within the IGS
  -> present igs_05.atx file

- Some EPN antenna/radome are not included, although available at Geo++

- Request to IGS to include EPN antenna/radome combinations

- Reply that EUREF

- Introduction of new antenna/radome within EPN:
  - not included in IGS
  - no absolute PCV available for antenna+radome
    -> use antenna-only PCV

- few months later: same antenna/radome shows up in IGS and Geo++ values are used for antenna/radome

Different PCVs used in IGS and EPN!

THE “KELY” ISSUE

Sept. 2001: antenna change in KELY (43005M001), ant. Height= 76.2 mm, before 0.0 mm

0.0 mm was incorrect, and all previously computed positions were wrong!

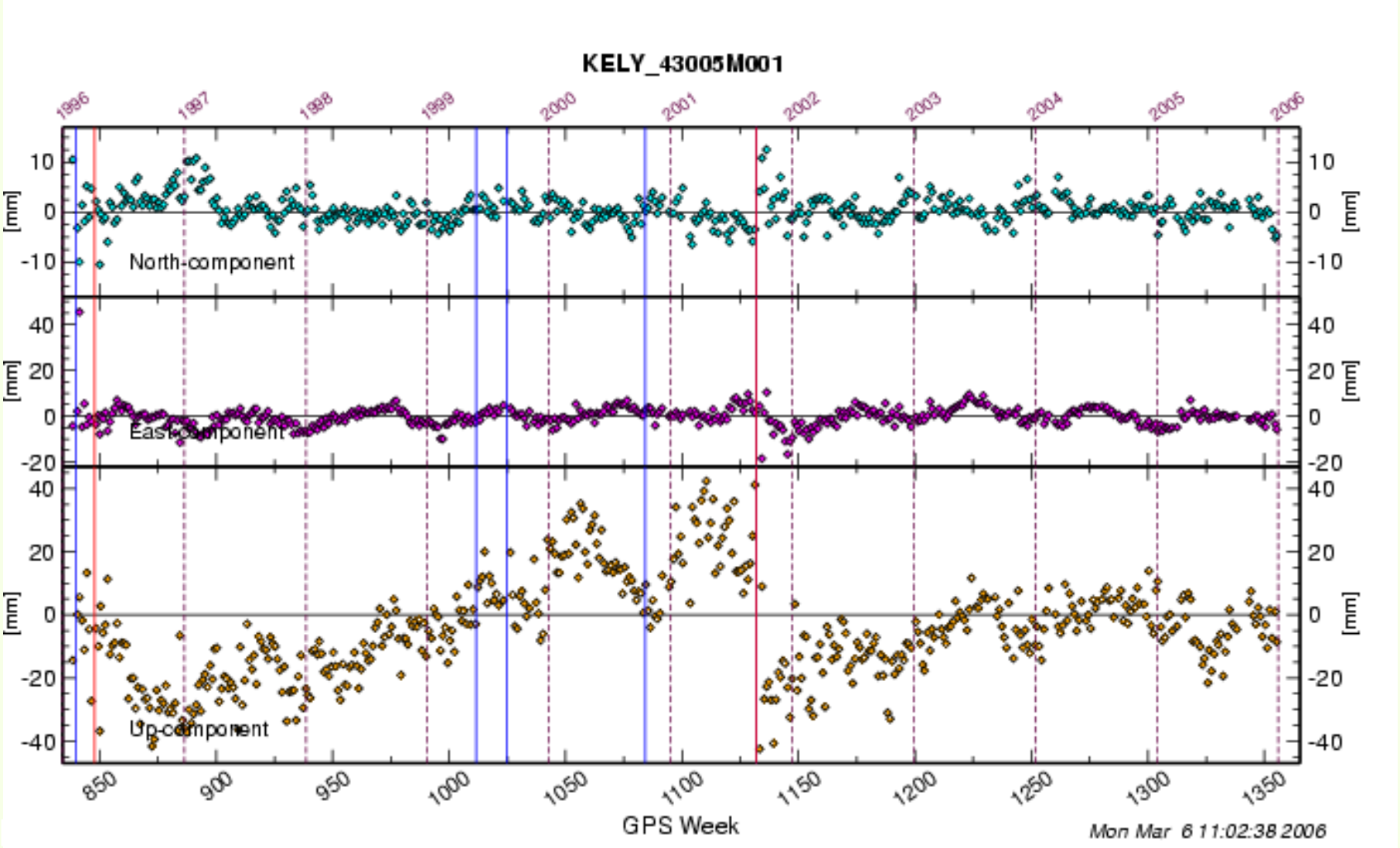
IGS decides: use from now on : KELY 43005M002 (EPN not informed)
station manager agrees and promises to update site log/RINEX
….but no site log update and no change to RINEX header

Feb 2006, IGS requests correct DOMES number in RINEX and site log
IGS mail IGSSTATION-835 "KELY: updated log with new DOMES#" message.

Since Sept. 2001, EPN computes coordinates for 43005M002 and not 43005M001 as we are (incorrectly) reporting in all our SINEX solutions

Introduce 2 stations :

- Before Sept. 2001 : KELY 43005M001 (former station)
- After Sept. 2001 : KELY 43005M002

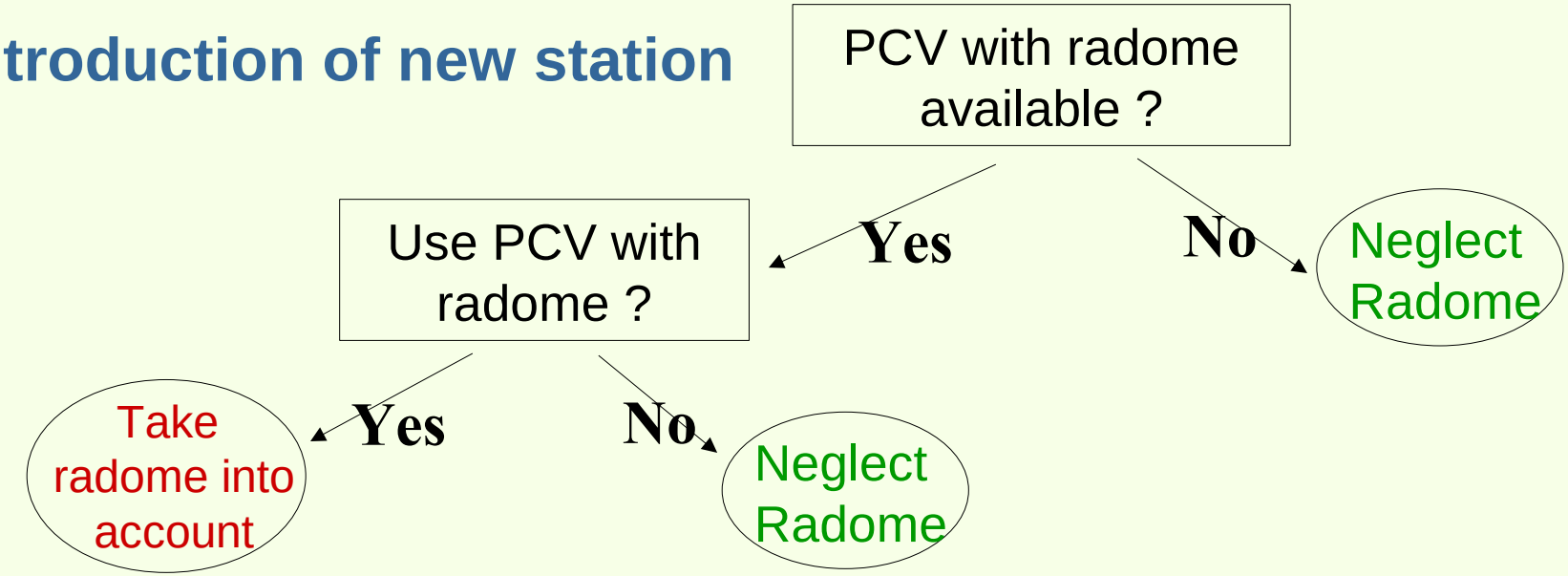

KELY_43005M001
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
North-component
East-component
Up-component
[mm]
GPS Week
850
900
950
1000
1050
1100
1150
1200
1250
1300
1350
Mon Mar 6 11:02:38 2006

TREATMENT OF RADOMES

- Bernese 4.2 : - radome info is neglected
  for EPN computations: all LACs neglect radome

- Bernese 5.0 : possible to rake radome into account
  introduce 5.0, but keep 4.2 processing options, avoid crd jumps

Introduction of new station



ROB *(HOE2, POUS,PUYV,SASS, VFCH, WARN),* LPT *(HOE2)*

EPN ANTENNA/RADOME CALIBRATION NOT INCLUDED IN IGS ATX FILE

AOAD/M_B	DOME	NYAL
AOAD/M_B	DUTD	KOSG
AOAD/M_B	OSOD	ONSA
AOAD/M_T	DOME	IAVH
AOAD/M_T	DUTD	SODA WSRT
AOAD/M_T	OSOD	KIR0 MAR6 SKE0 SPT0 VIL0 VIS0
ASH700936F_C	SNOW	LAMA
ASH701073.1	SCIS	THU3
ASH701073.1	SNOW	NYA1
ASH701941.1	SNOW	WROC
ASH701941.B	SNOW	JOZ2
ASH701941.B	UNAV	BUDP SMID
ASH701945C_M	GRAZ	PFAN SBGZ
ASH701945C_M	UNAV	NSSP
ASH701945E_M	UNAV	SULD
ASH701946.2	SNOW	BISK MARJ SNEC VACO
LEIAT504	GRAZ	TRFB
TRM14532.00	DOME	MOPI
TRM29659.00	DOME	ESCO
TRM29659.00	GRAZ	HFLK
TRM29659.00	SCIS	RABT STAS STAV TRDS TRON VARD VARS
TRM29659.00	SNOW	BORK HOBU

40 EPN stations