



Analysis Working Group, 23-24 March 2009

CNES/CLS Analysis Center (LCA)

Status Report

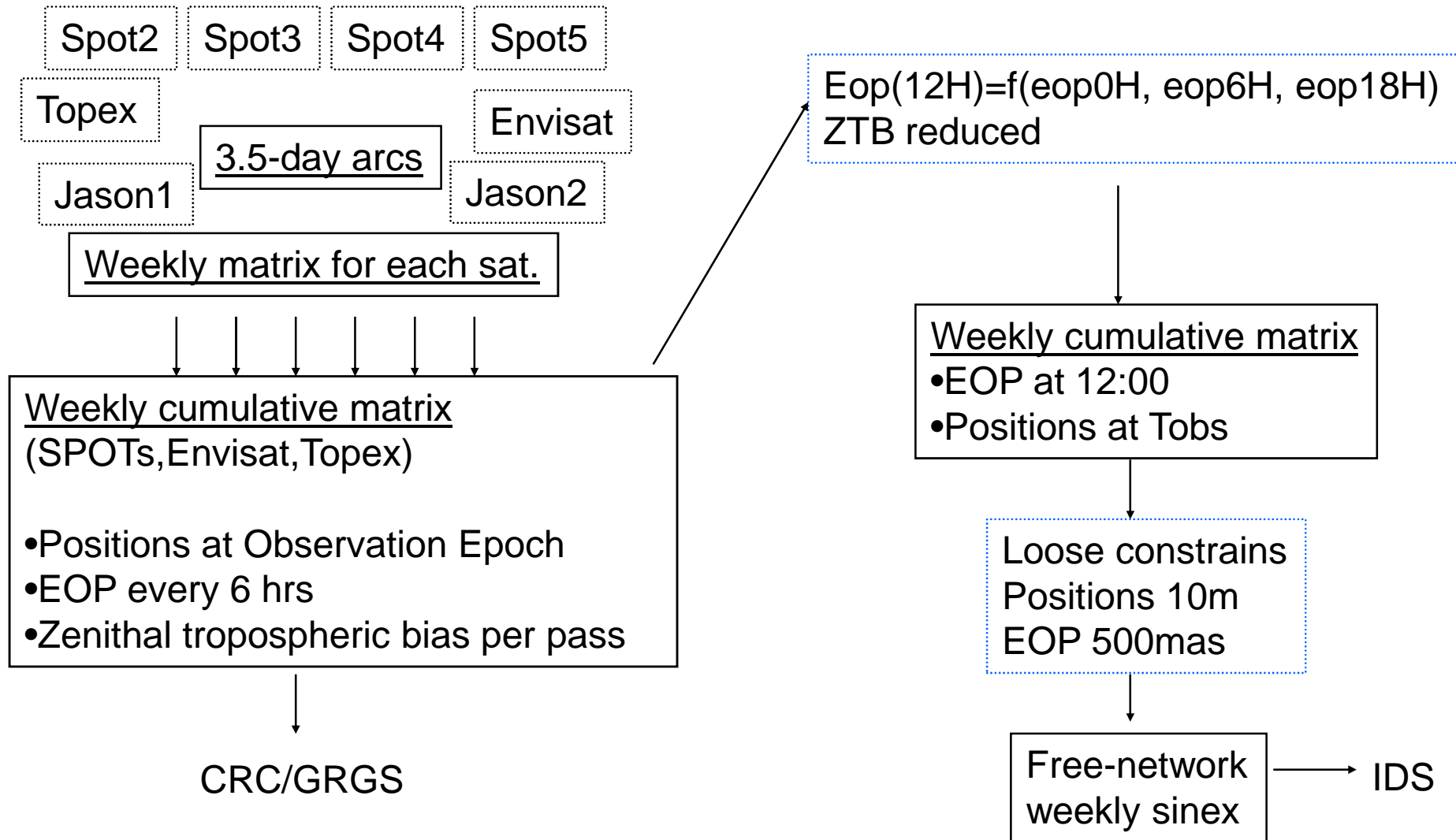
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¹ CLS, Collecte Localisation Satellites, Ramonville, France

² CNES, Toulouse, France



Data Analysis



Model and analysis standards (1)

- Gravity field = EIGEN_GL04S_ANNUAL with drift terms
- Tidal forces :
 - Solid earth: model of IERS2003 conventions
 - Ocean: FES2004 (with admittance)
 - Atmosphere: ECMWF
- Atmospheric gravitational attraction: computed from 6h ECMWF 3D pressure grids over land, inverted barometer model over the ocean
- Atmospheric density = DTM94
- Solar radiation pressure: albedo +IR pressure values
 - Before 2000/07/01: mean monthly values
 - From 2000/07/01: interpolated from 6-hour grids from ECMWF
- Satellite Center of Mass – Antenna Phase Center: computed
- Satellite physical model = IDS

Model and analysis standards (2)

- Station displacements:
 - atmospheric loading= from 6h ECMWF 3D pressure grids
 - ocean loading= Amplitudes and phases from FES2004
 - Solid earth : Wahr model (IERS Conventions 2003)
 - Pole tide : applied (IERS, 2003)
- Troposphere:
 - Before 2002 (before week 1144): DORIS met data
 - After 2002 (from week 1144): Dry and wet a priori ZTD interpolated from 6-hour grids derived from ECMWF meteorological model (available from 2002)
 - Mapping function: Guo & Langley
- EOP: a priori EOP05C04 polar motion
- Stations Positions and Velocities: ITRF/DPOD2005
- Cut-off: 12 deg all satellites; Down-weighting law under 20 deg
- Arc lengths: 3.5 days
- GINS version 8.2d2

Participation to ITRF2008

1993/01/03-2009/01/03 = week 678 to 1512 = 834 weeks

805 weekly combined SINEX created

29 weekly combined matrices still to create

Among 805 weekly combined SINEX created,

123 could be reprocessed after investigation: arcs with higher residuals, higher number of eliminated data, higher number of data...

Among the 29 matrices still to create,

4 (3+1): problem with Spot2 (divergence)

3 (1+2): problem with Spot2 (weeks 908; 1130-1131)

2: problem with Spot3 (weeks 848-849)

4 (2+2): problem with Spot4 (weeks 1124-1125; 1138-1139)

1: problem with Topex (week 1025)

15 (14+1): no data for Spot3 in DORIS 1.0 format

Participation to ITRF2008

lcawd20: 1993/01-2008/12

- with atmospheric loading correction
- series available at CDDIS (682 files, 123 still to deliver)

lcawd21: 1993/01-2008/12

- atmospheric loading correction removed
- complete series available at CDDIS (805 files)

lcawd22: 2008/07-2008/12

- atmospheric loading correction removed
- with Jason2
- provided to JJV (25 files, 1 still missing)

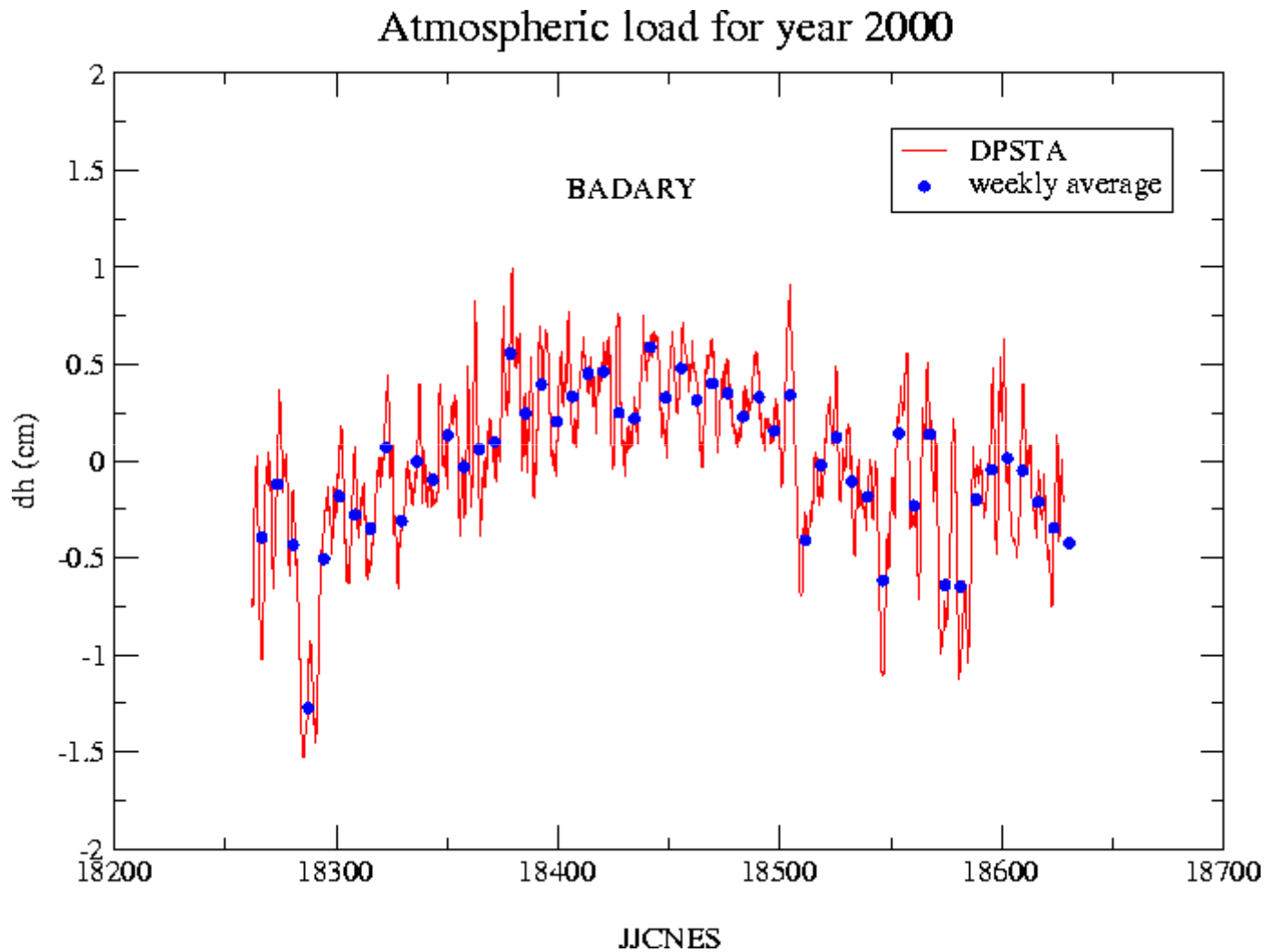
NB: 1993-2008 sp1 orbits for Spot-2,-3,-4,-5, Topex, Envisat and Jason2 available at CDDIS

Atmospheric loading correction

The position correction due to the atmospheric loading is applied at the observation level from 6-hour time series derived from the ECMWF met grids.

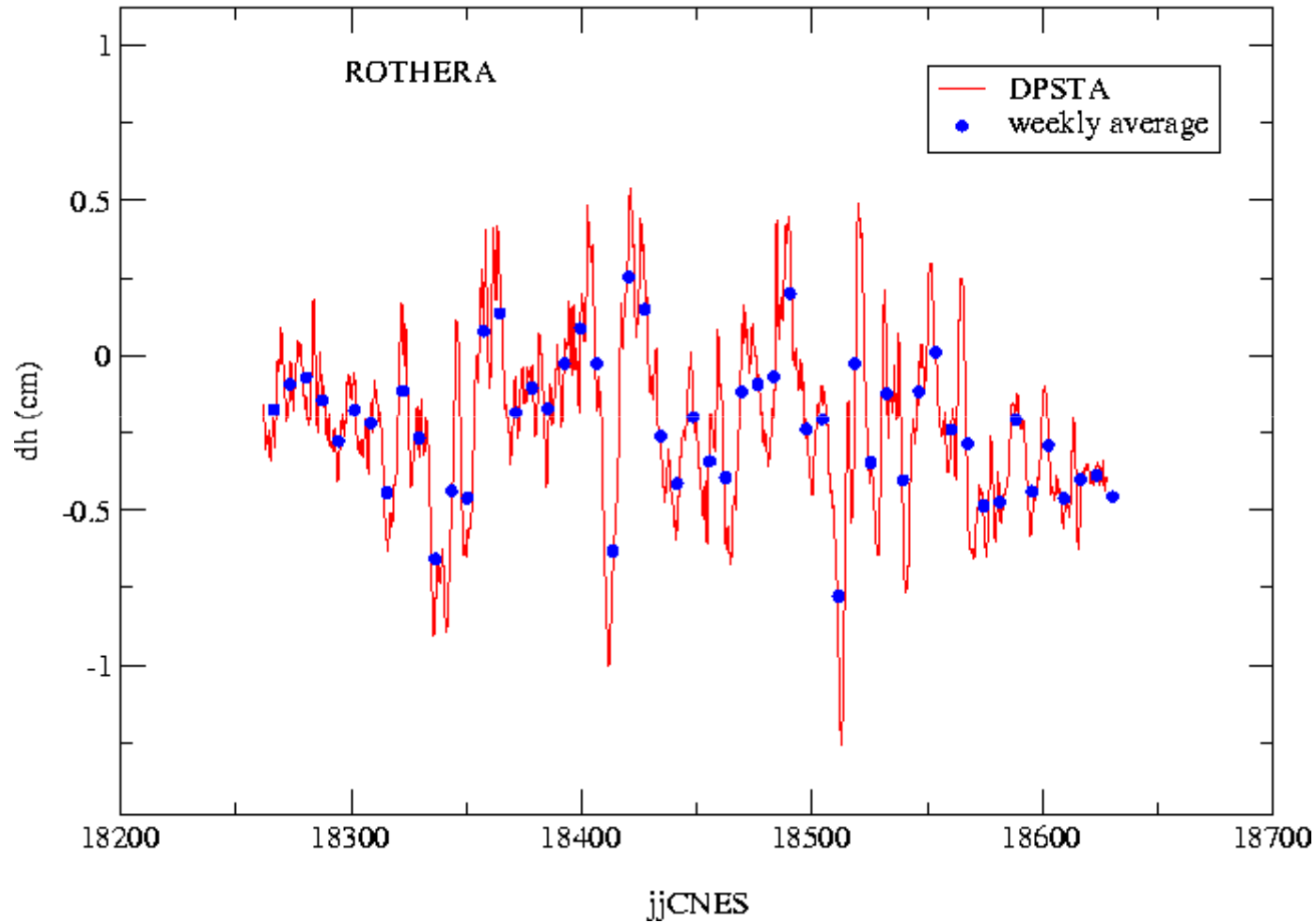
To form the `lcawd21` series without the atmospheric loading, a mean value is computed for each week from the 6h time series and removed from the initial station coordinates in the weekly normal matrices before the solution is obtained.

Atmospheric loading correction

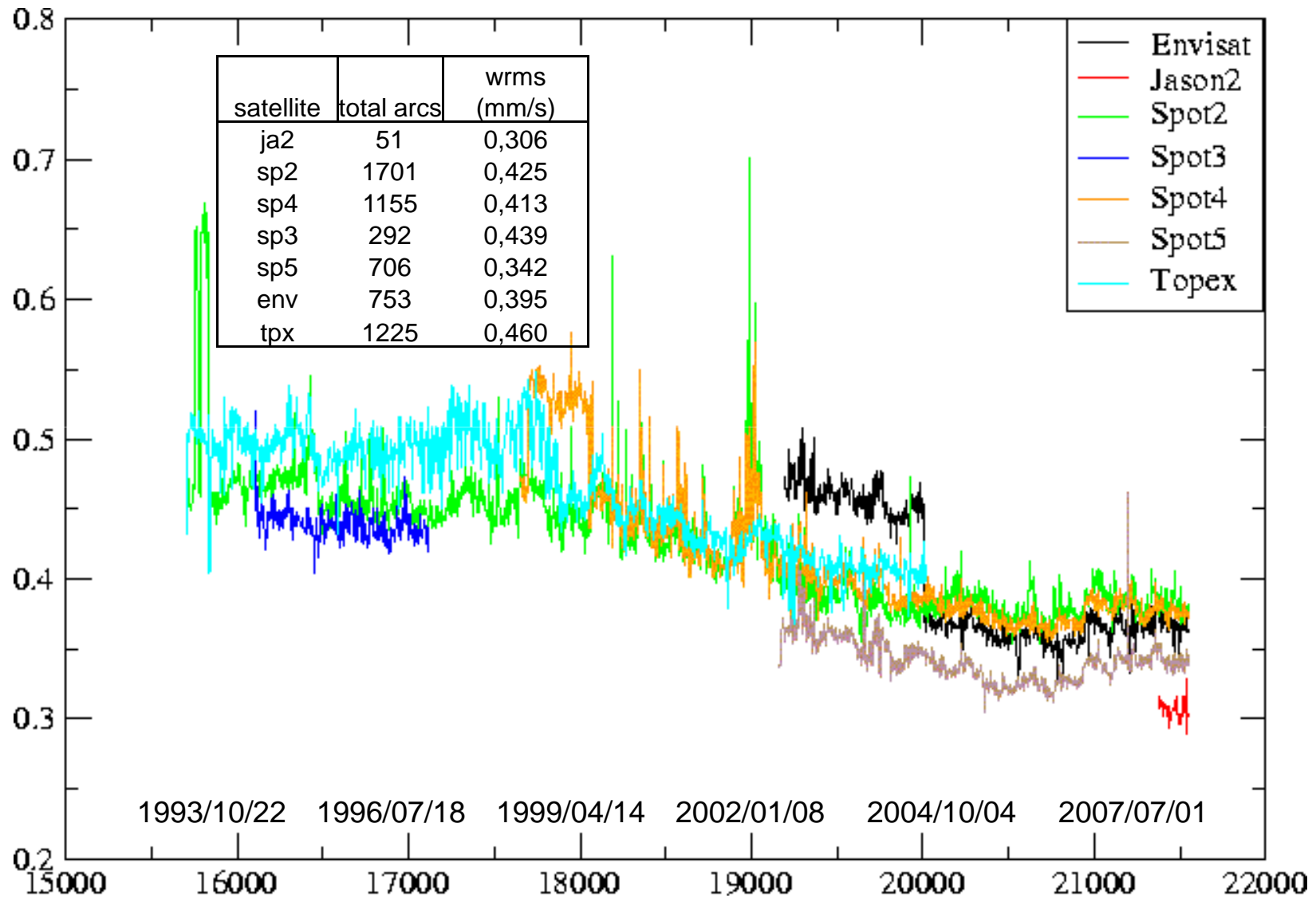


Atmospheric loading correction

Atmospheric load for year 2000



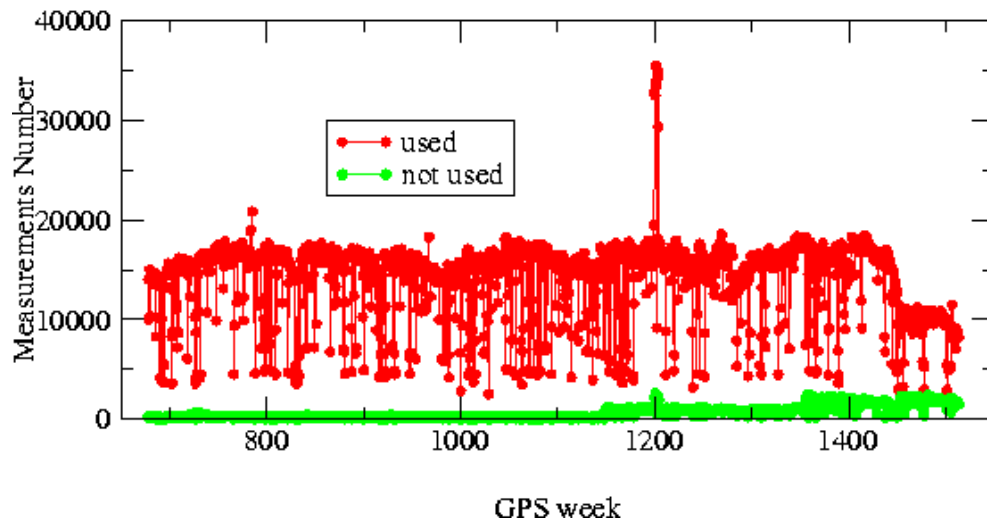
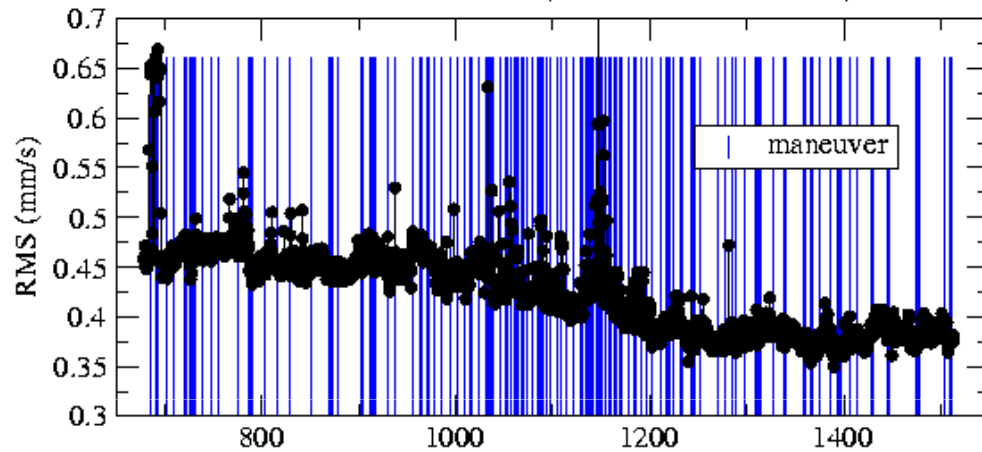
Orbit fit residuals



DORIS residuals and number of measurements

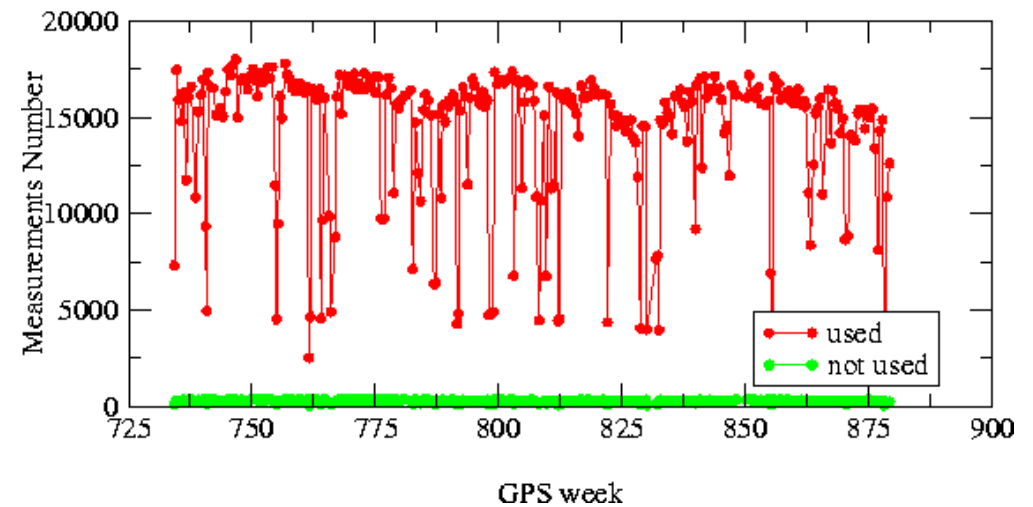
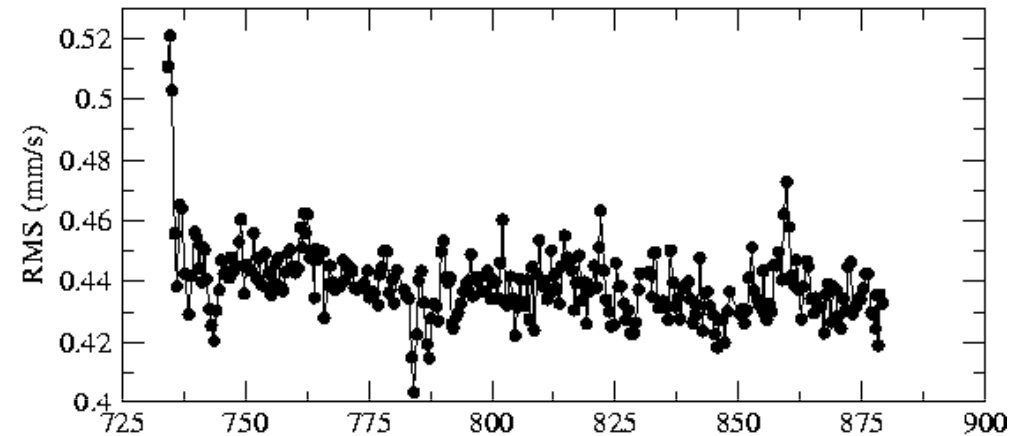
DORIS Spot2

GPS week 678-1512 (03/01/1993-03/01/2009)



DORIS Spot3

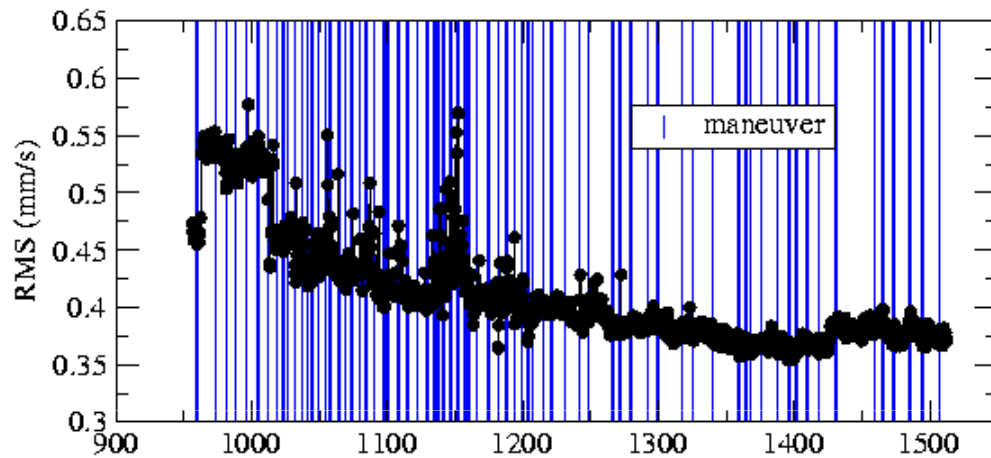
GPS week 734-879 (30/01/1994-16/11/1996)



DORIS residuals and number of measurements

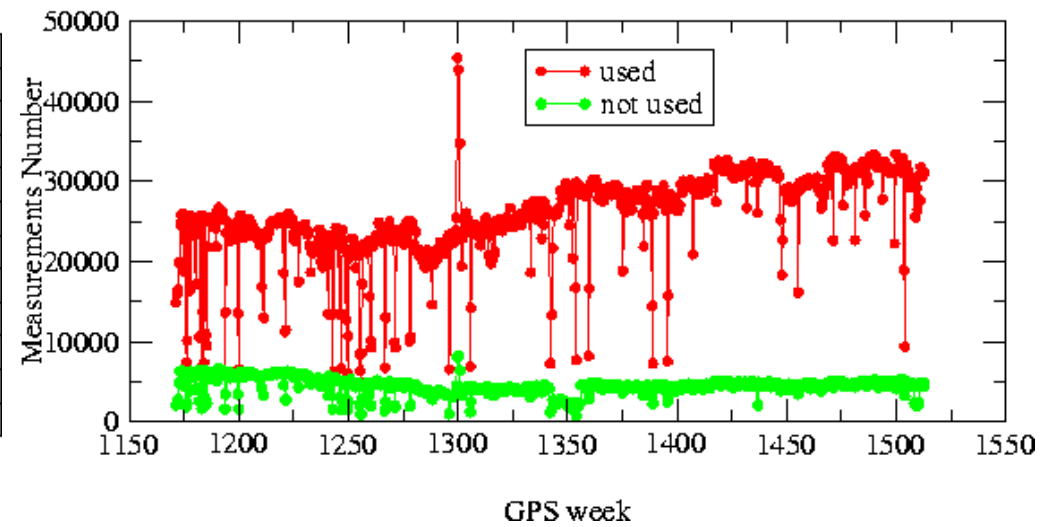
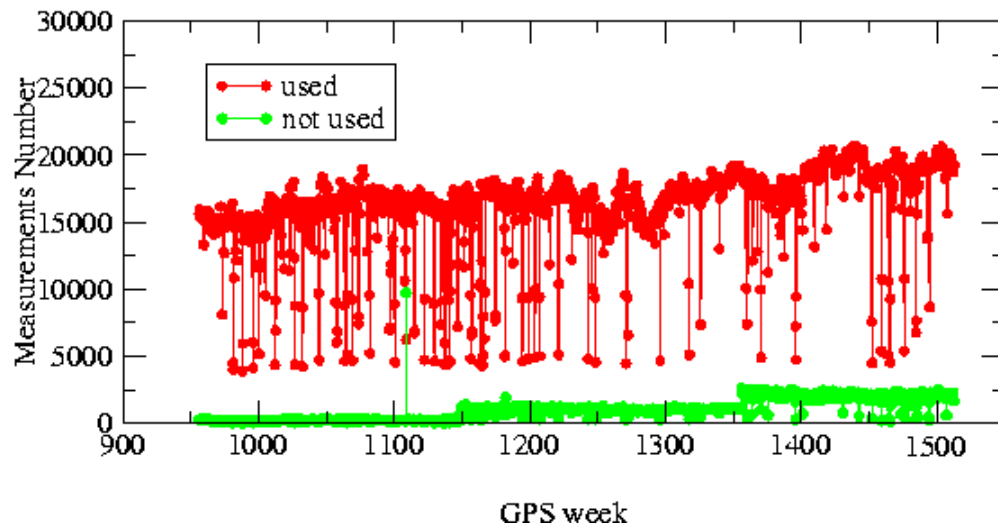
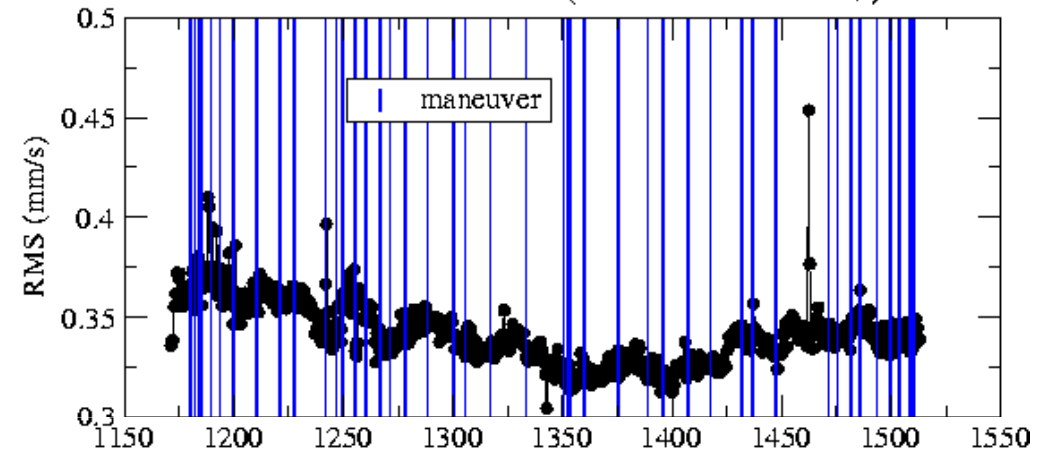
DORIS Spot4

GPS week 956-1512 (03/05/1998-03/01/2009)



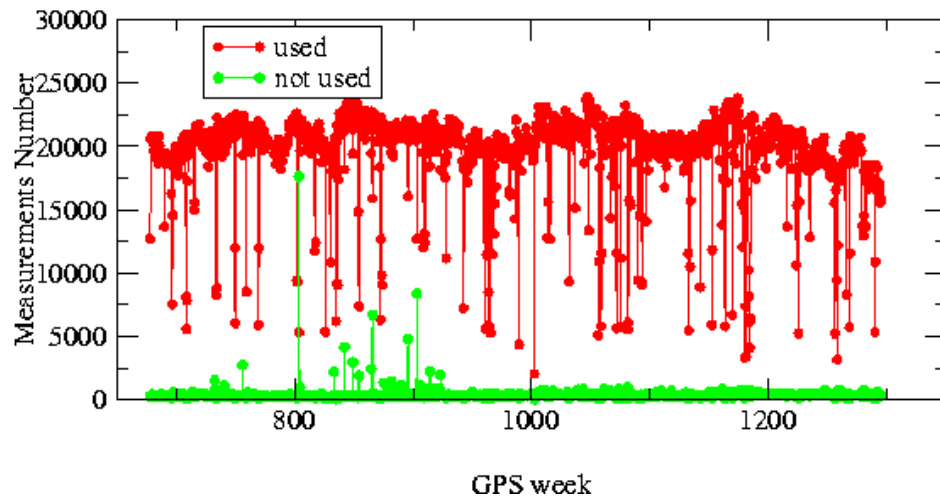
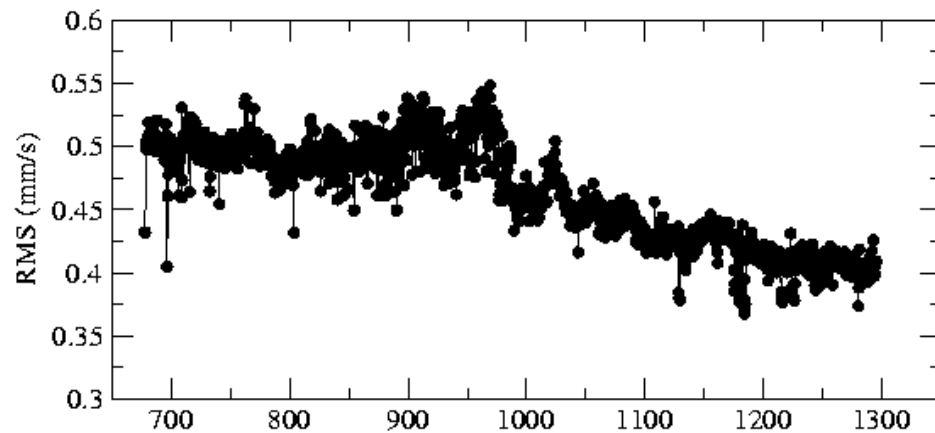
DORIS Spot5

GPS week 1171-1512 (16/06/2002-03/01/2009)

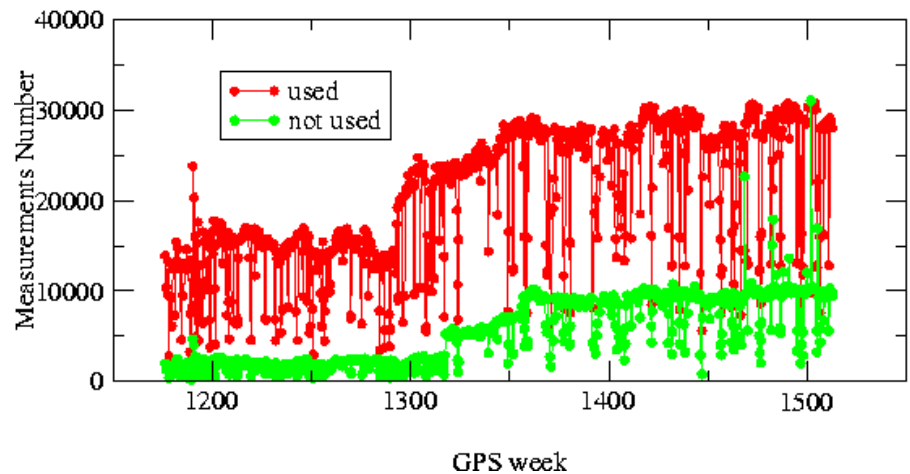
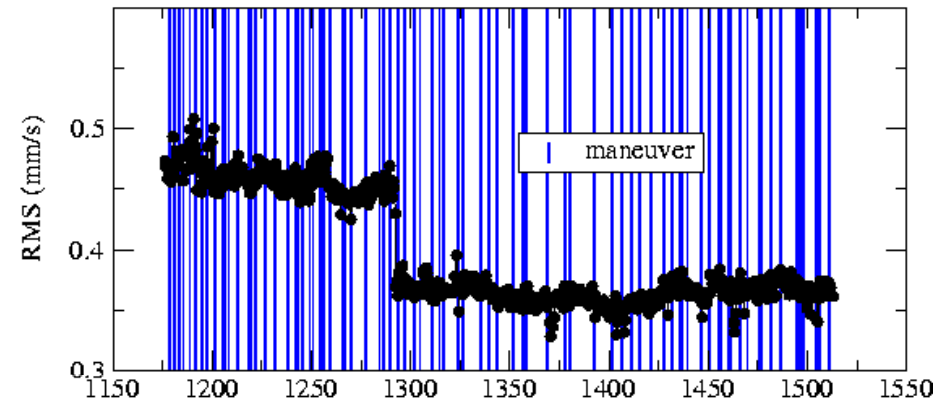


DORIS residuals and number of measurements

DORIS Topex

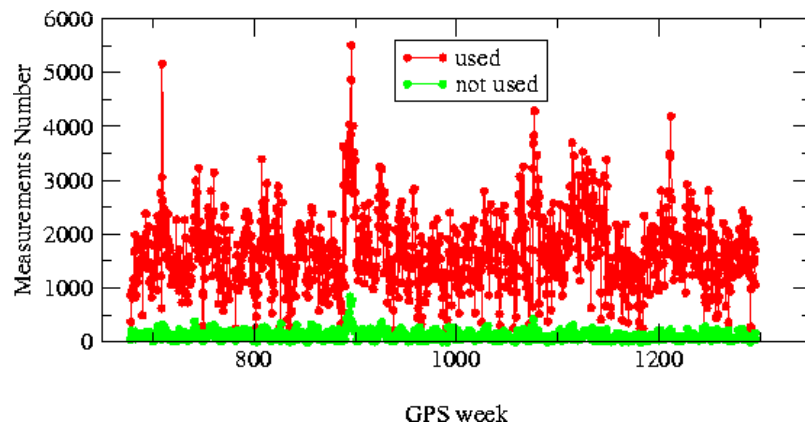
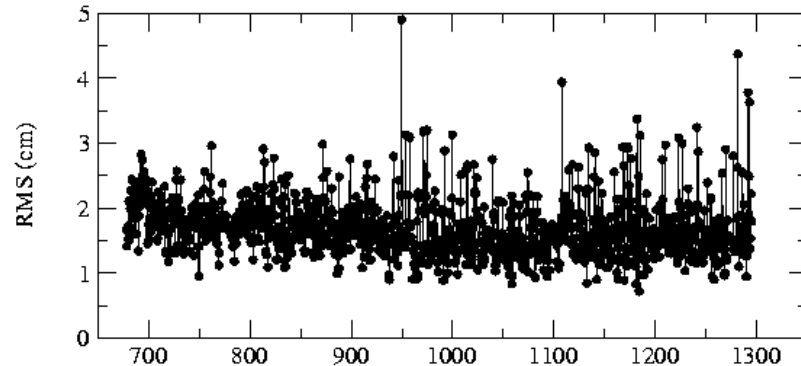


DORIS Envisat1

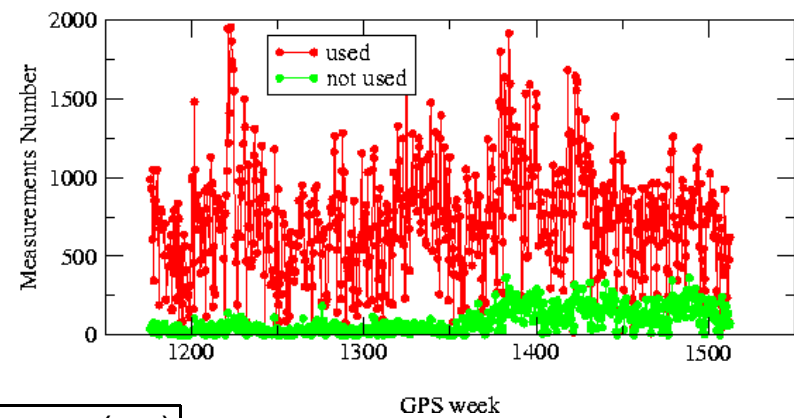
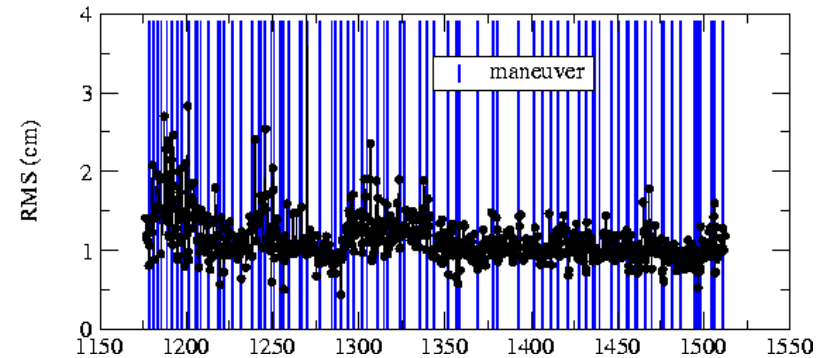


SLR residuals and number of measurements

SLR Topex



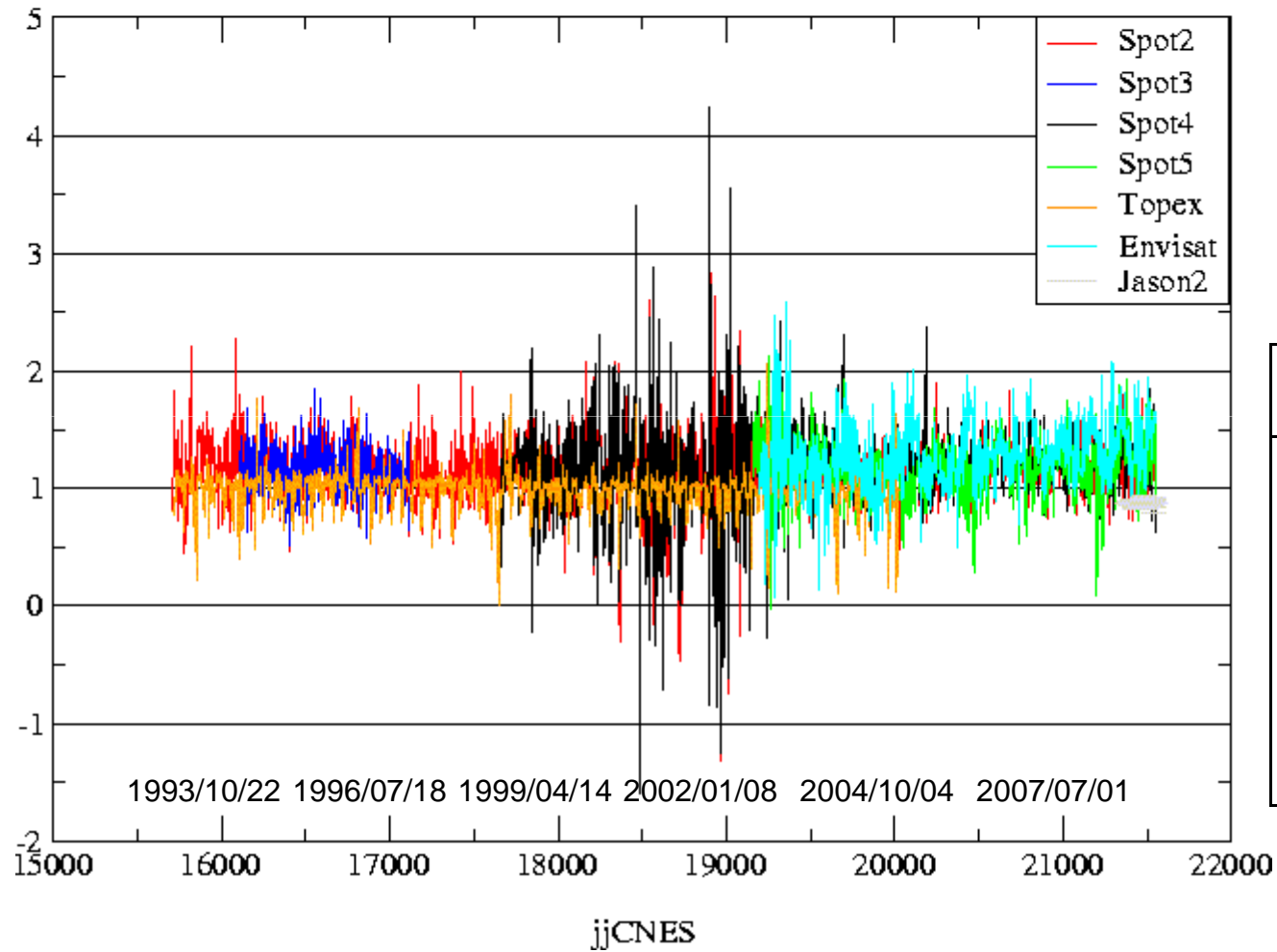
SLR Envisat1



	# arcs	wrms (cm)
envisat	753	1,13
topex	1225	1,70

Solar Radiation Pressure

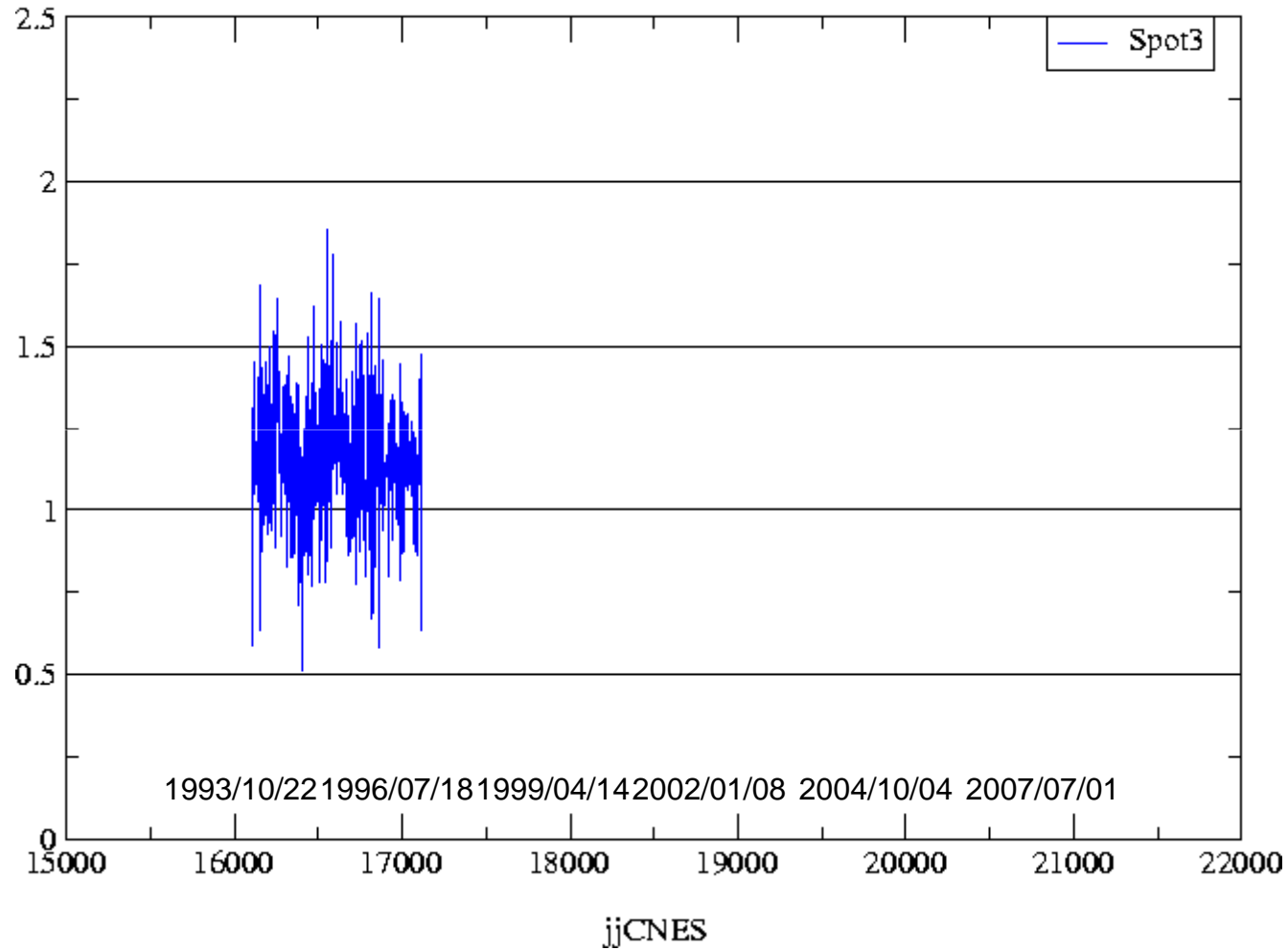
Solar Pressure Coefficients



satellite	avg	std dev
ja2	0,87	0,02
sp2	1,15	0,31
sp4	1,16	0,42
sp3	1,15	0,23
sp5	1,17	0,26
env	1,29	0,30
tpx	0,98	0,16

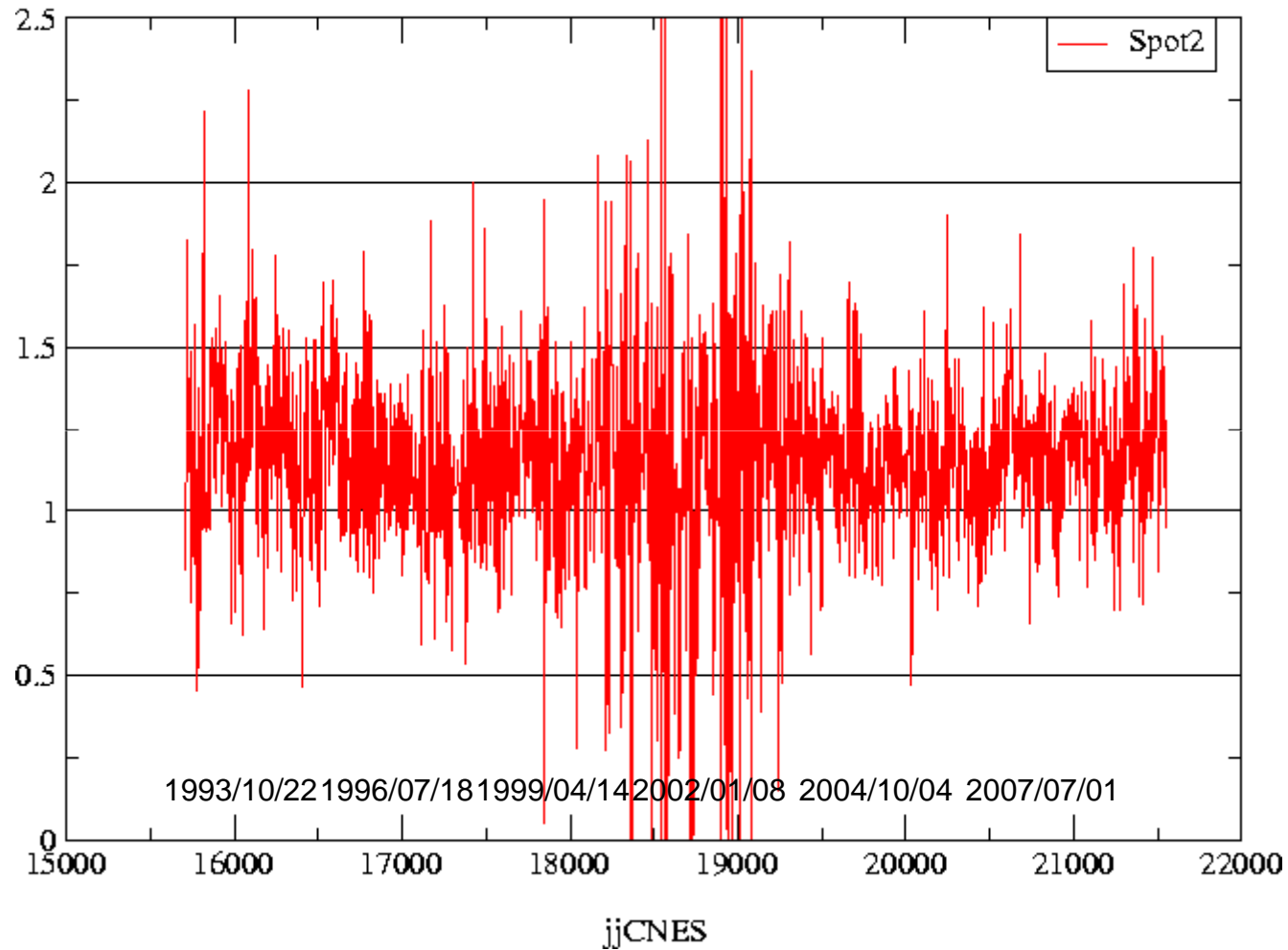
Solar Radiation Pressure

Solar Pressure Coefficients



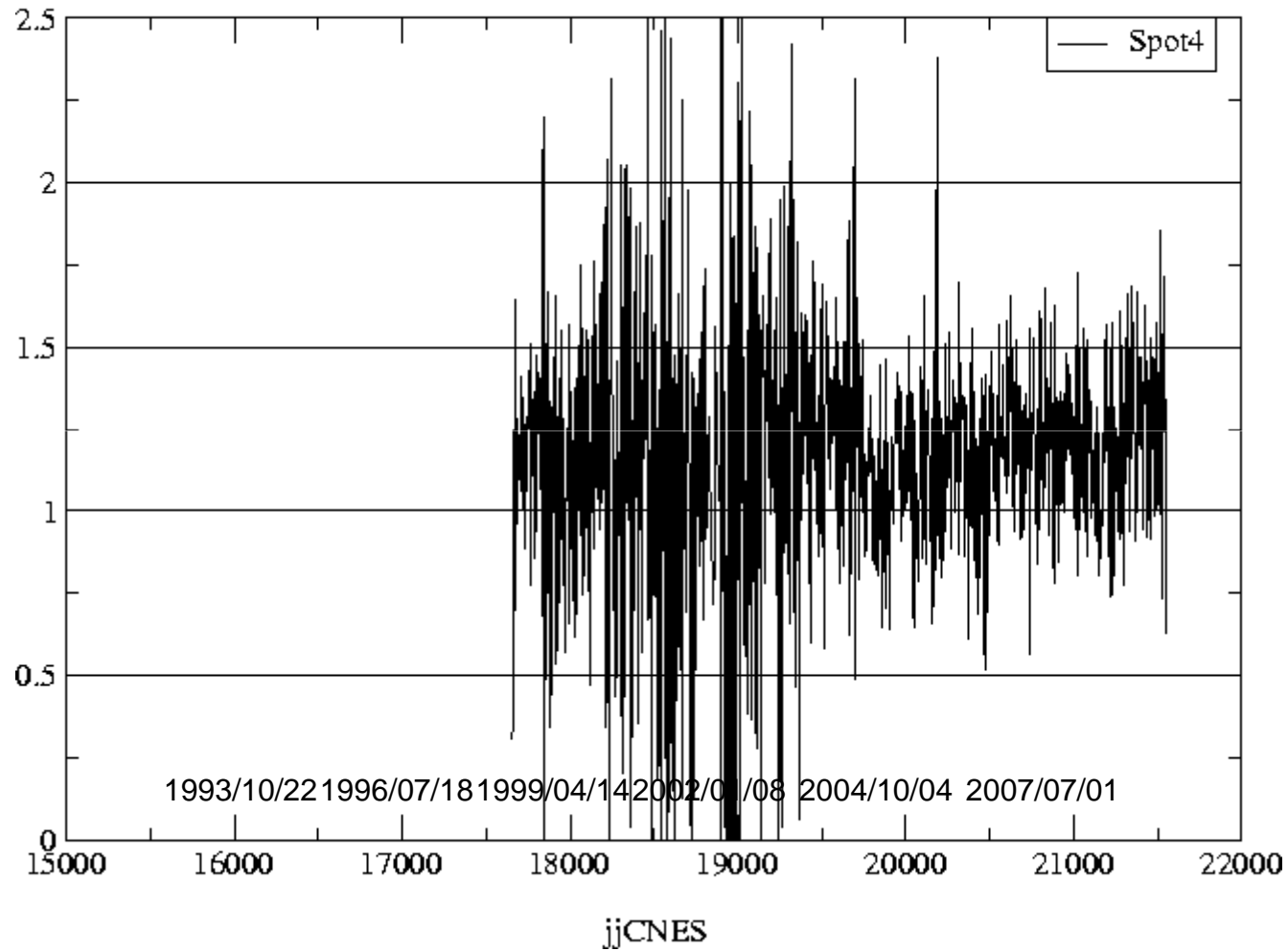
Solar Radiation Pressure

Solar Pressure Coefficients



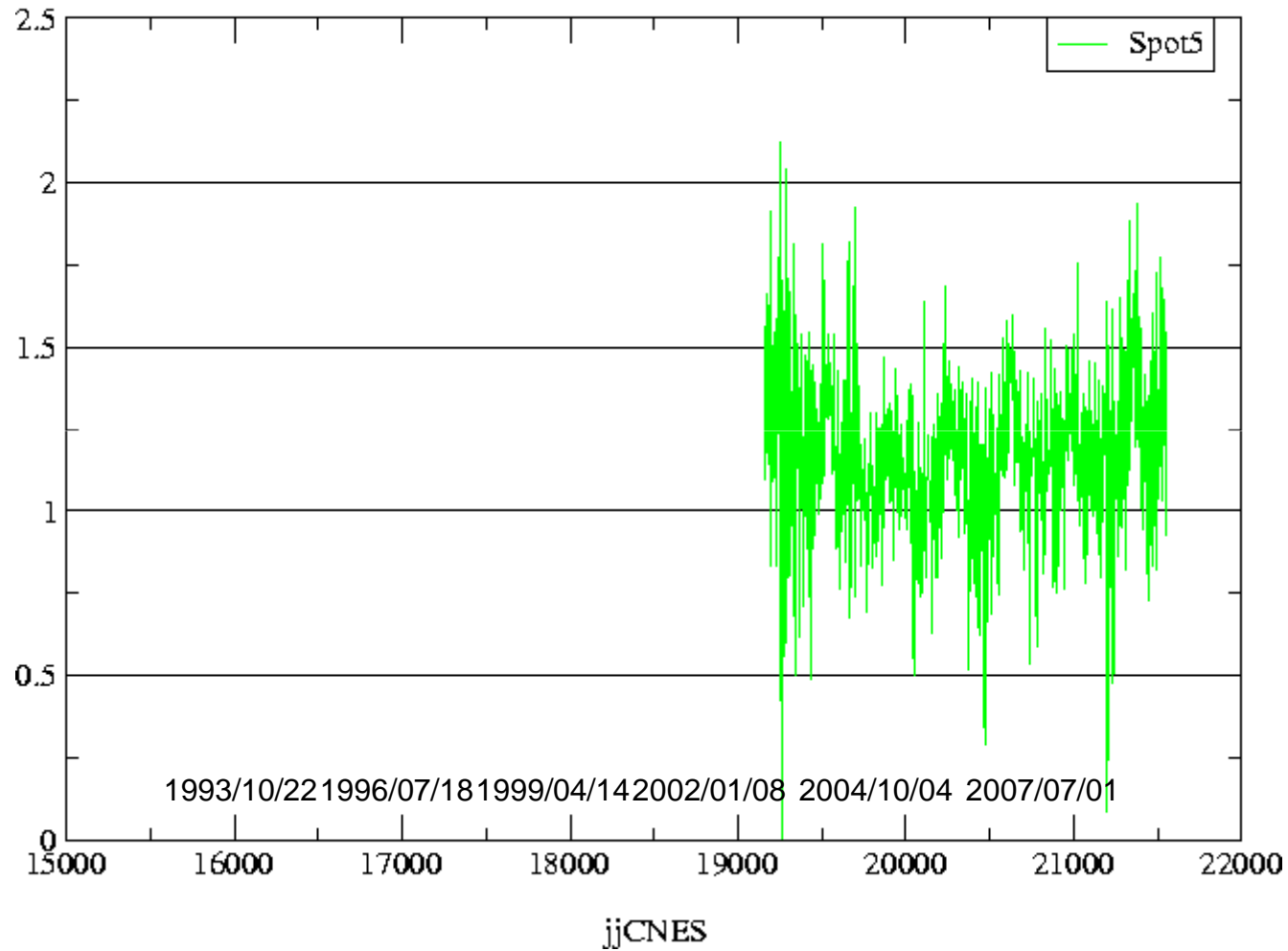
Solar Radiation Pressure

Solar Pressure Coefficients



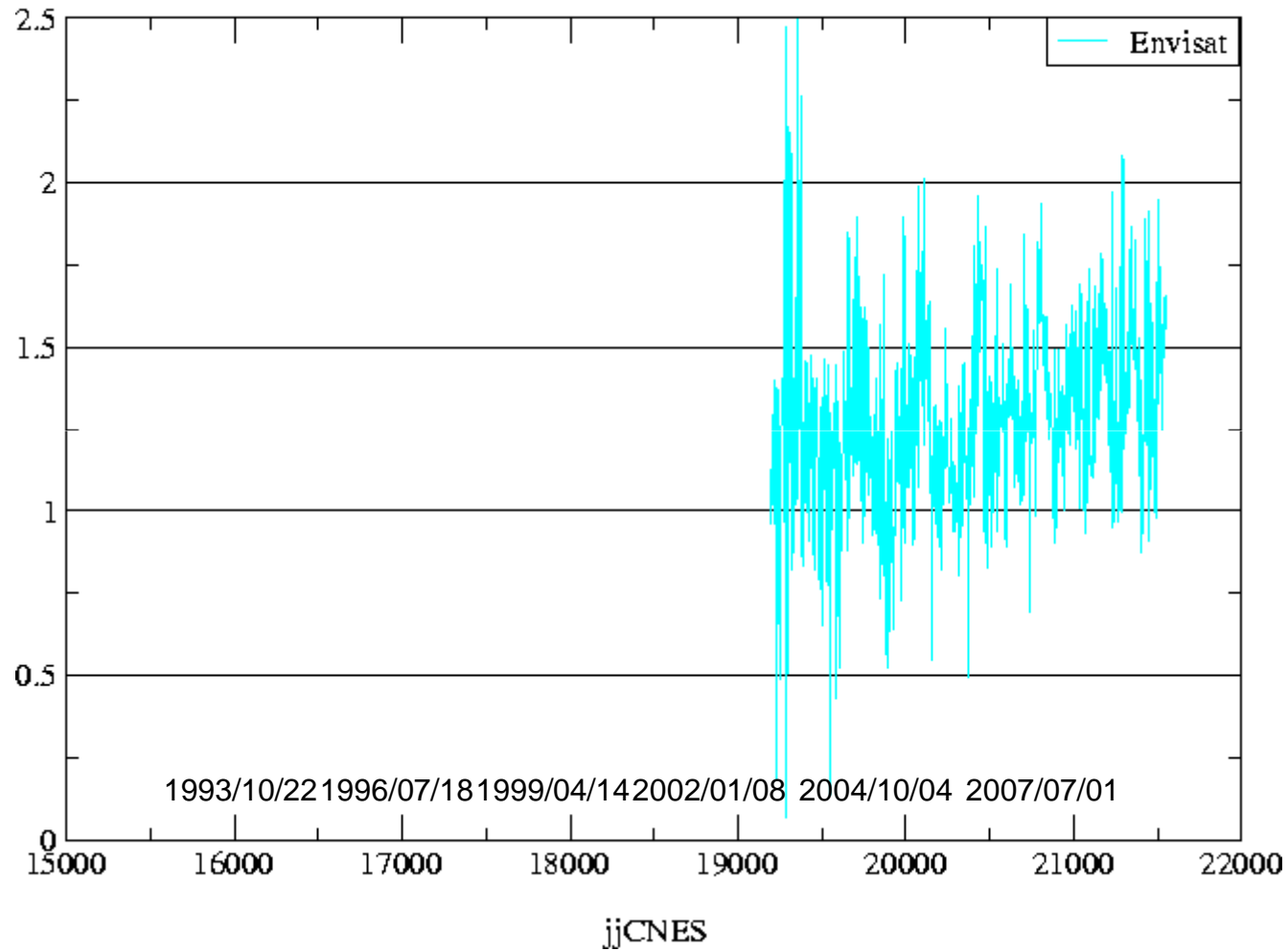
Solar Radiation Pressure

Solar Pressure Coefficients



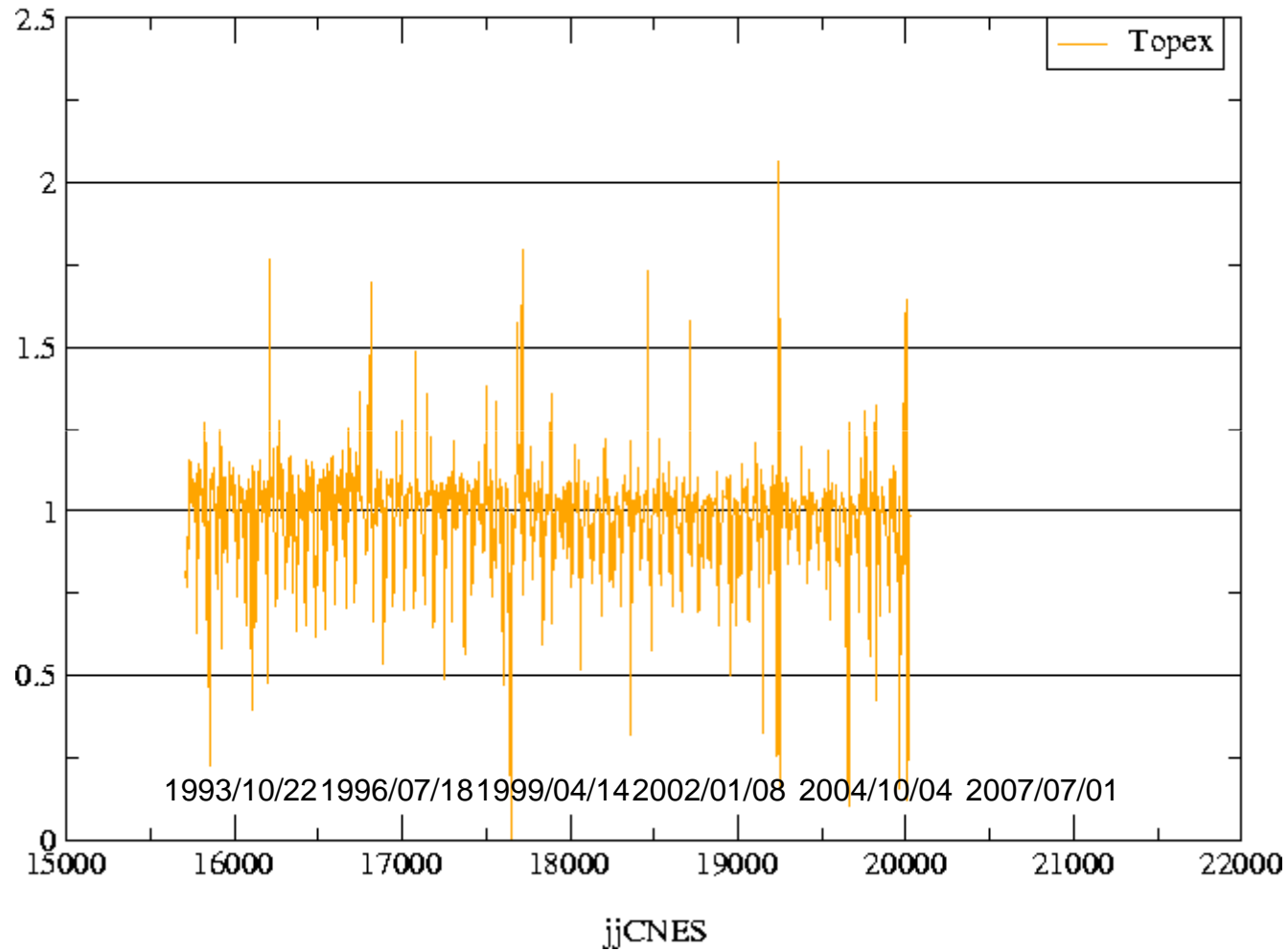
Solar Radiation Pressure

Solar Pressure Coefficients



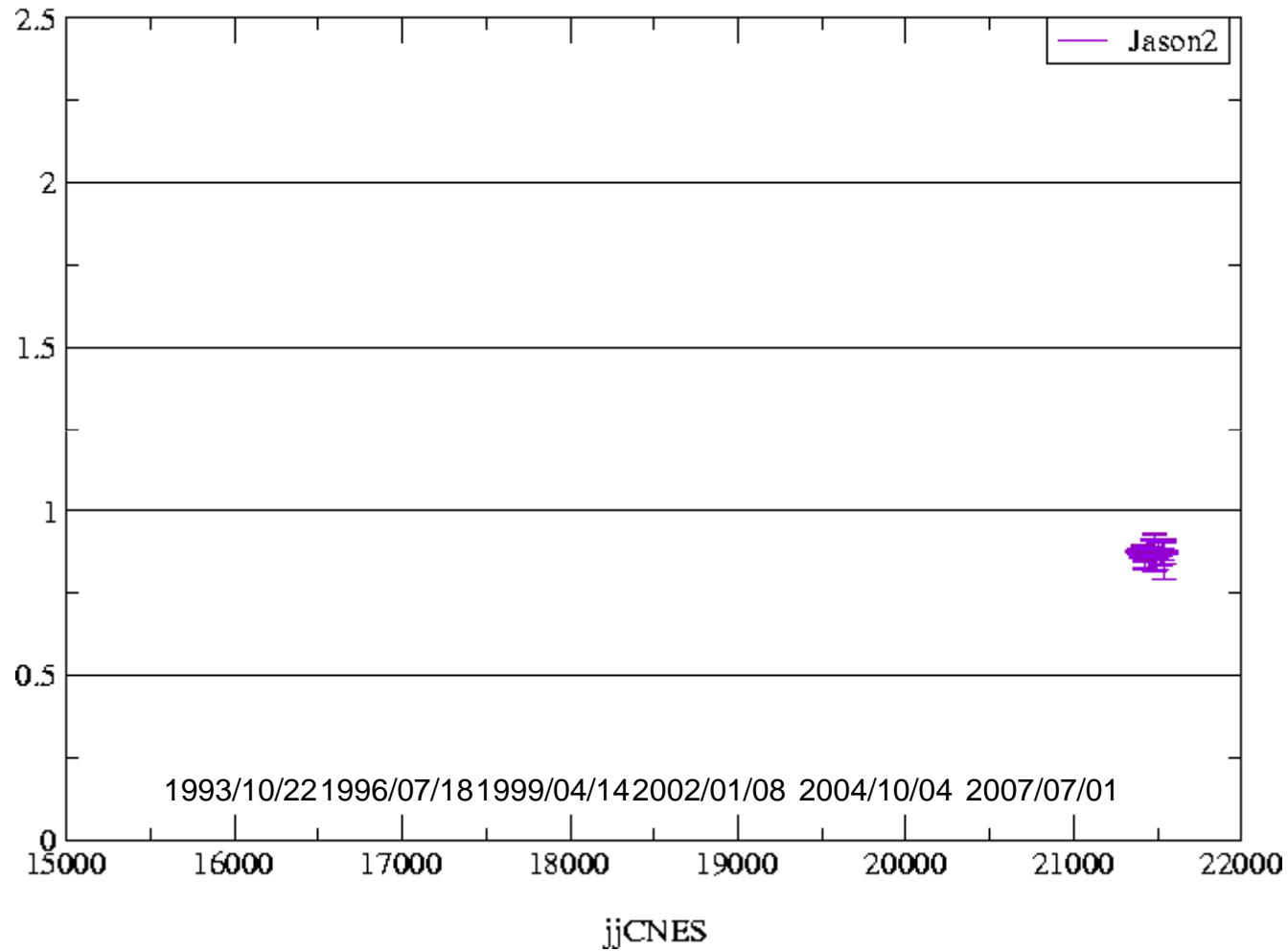
Solar Radiation Pressure

Solar Pressure Coefficients



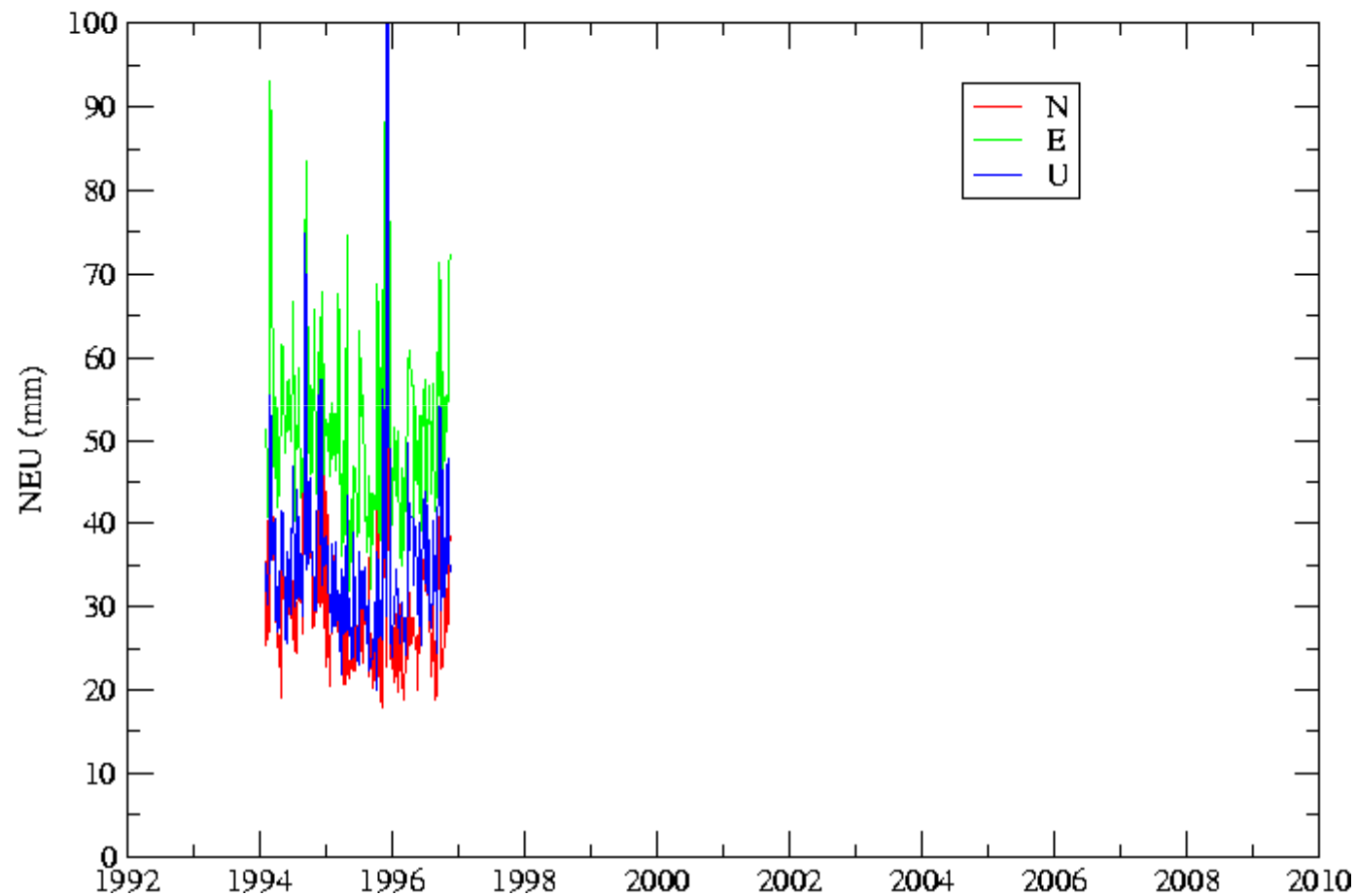
Solar Radiation Pressure

Solar Pressure Coefficients



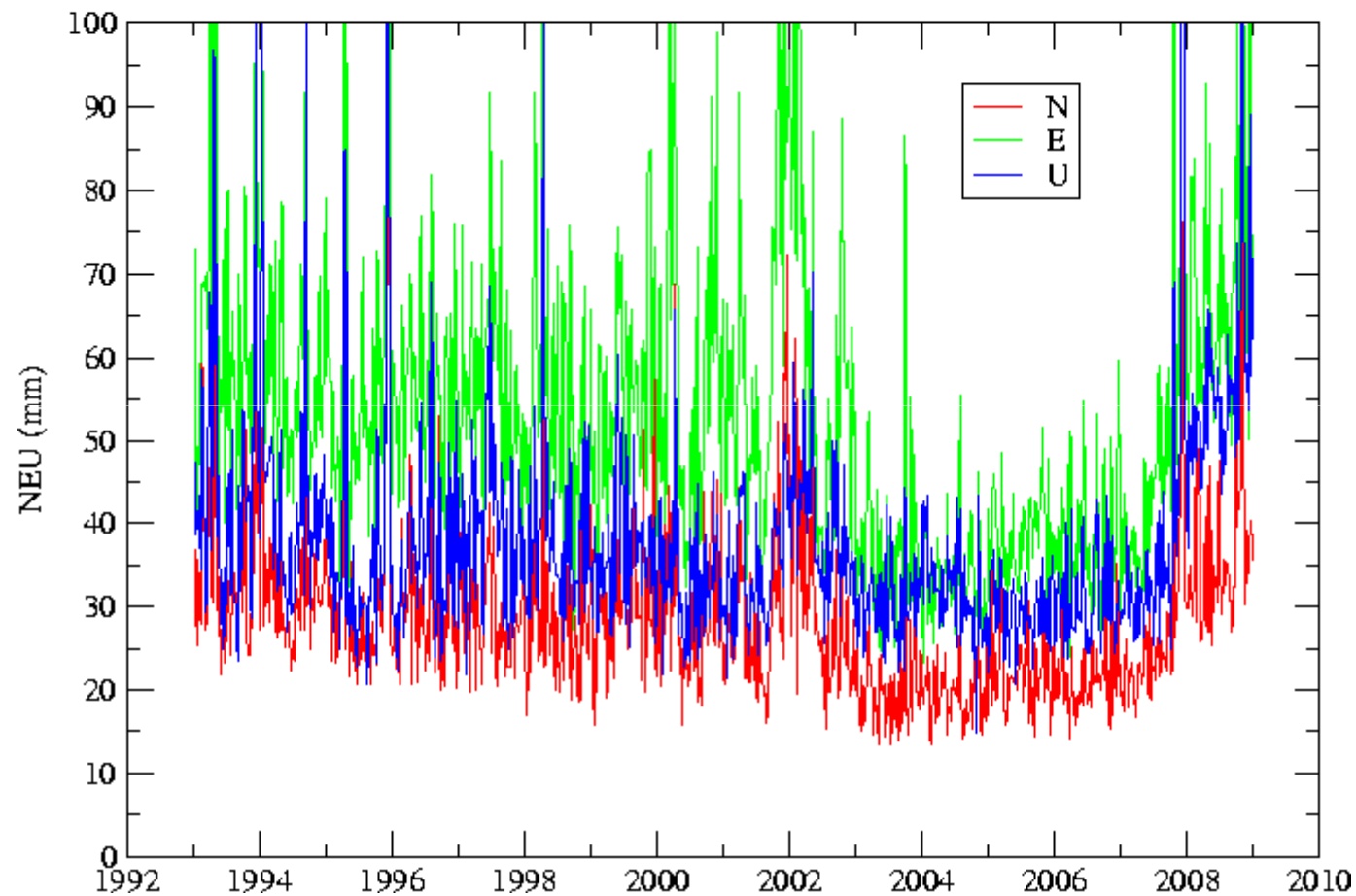
Weekly solutions vs DPOD2005: NEU rms

SPOT3



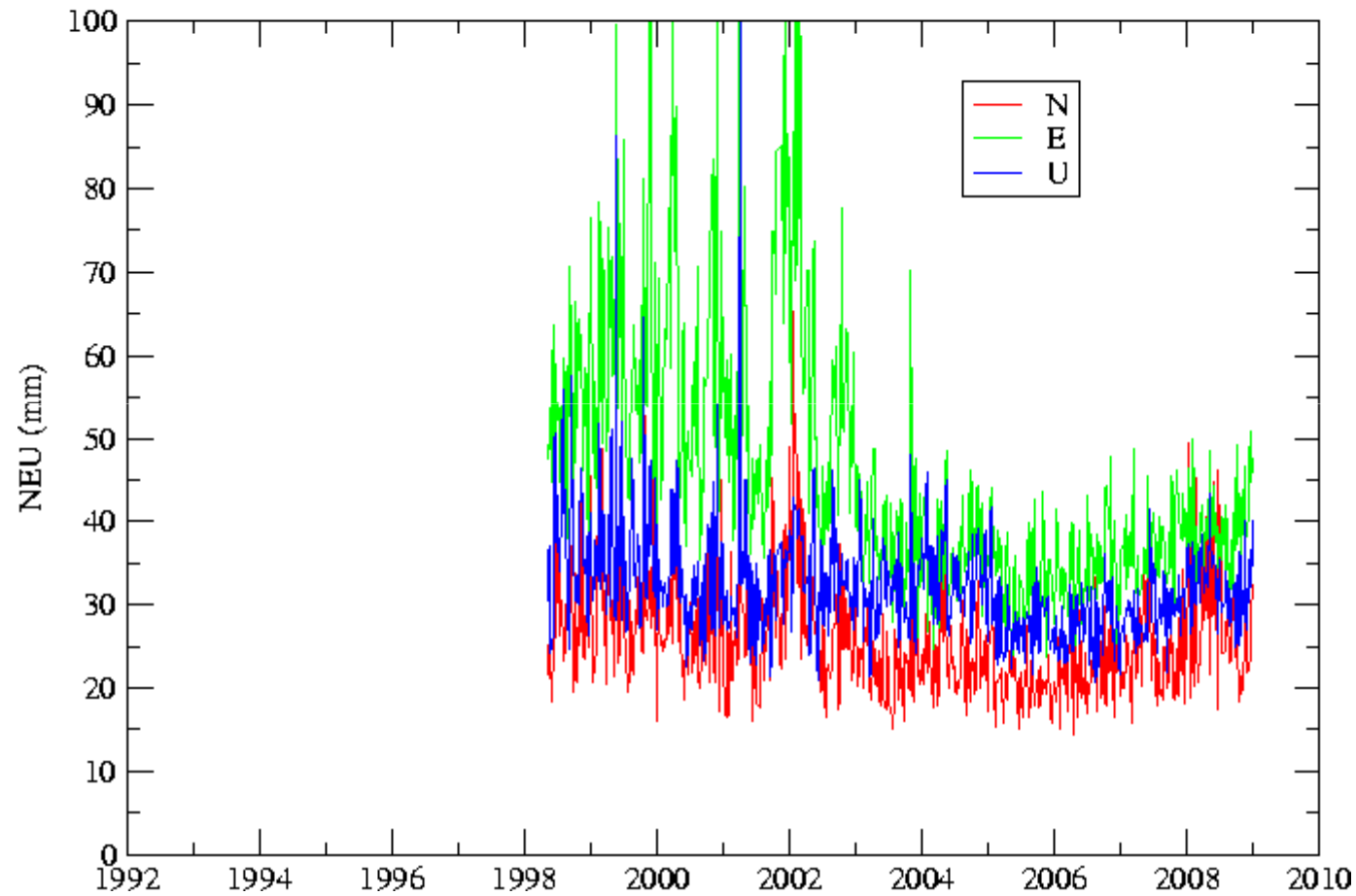
Weekly solutions vs DPOD2005: NEU rms

SPOT2



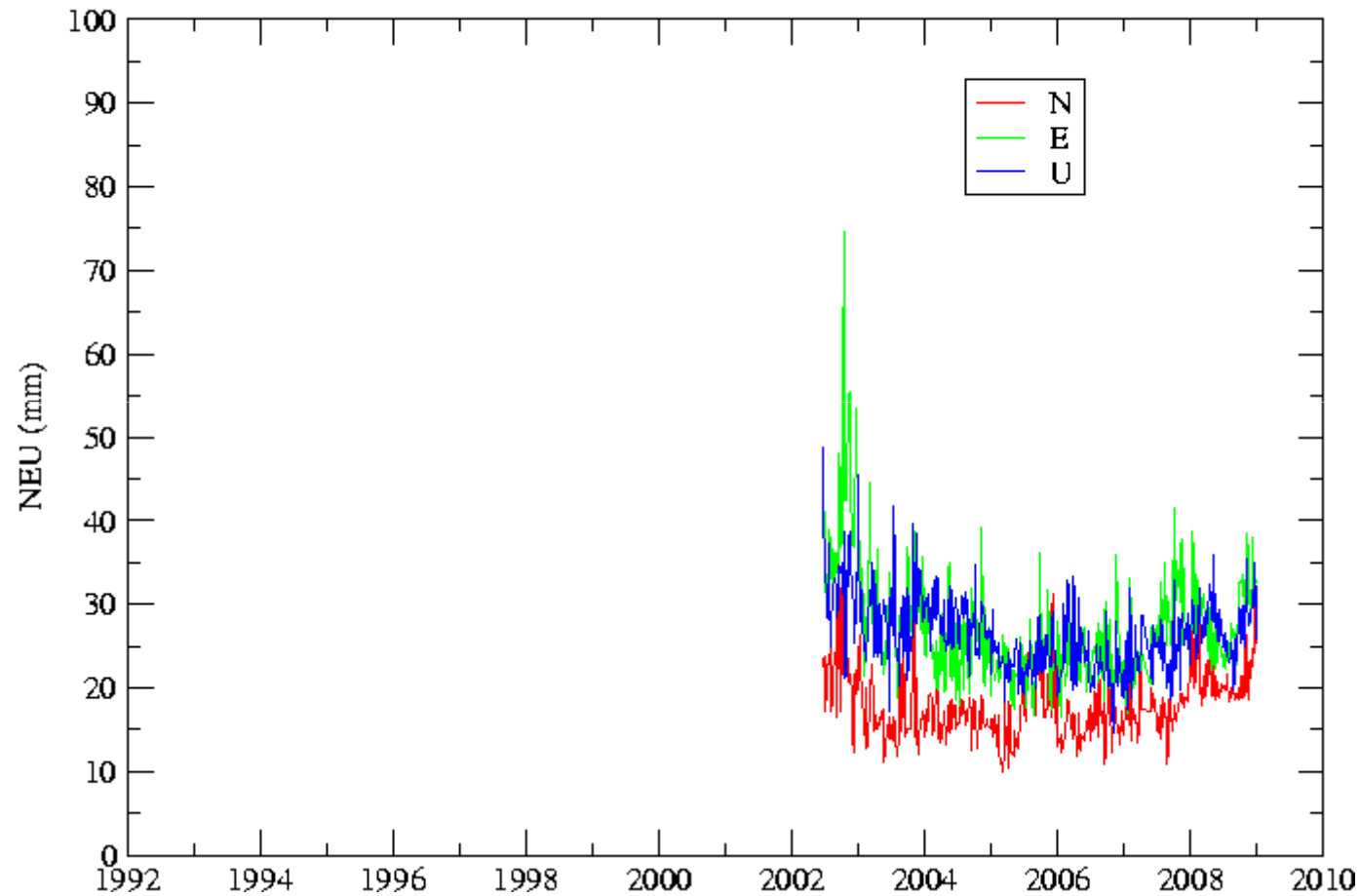
Weekly solutions vs DPOD2005: NEU rms

SPOT4



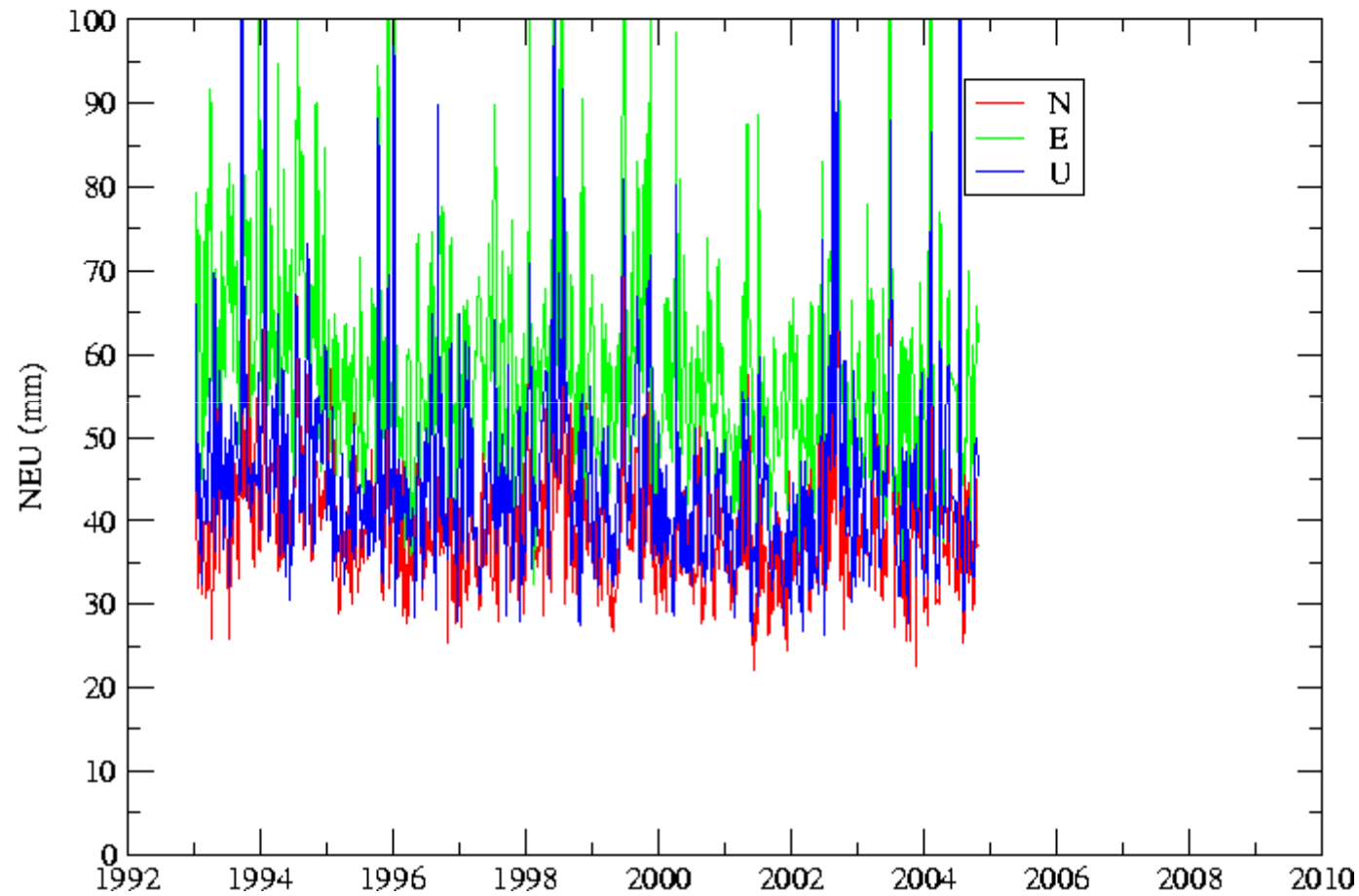
Weekly solutions vs DPOD2005: NEU rms

SPOT5



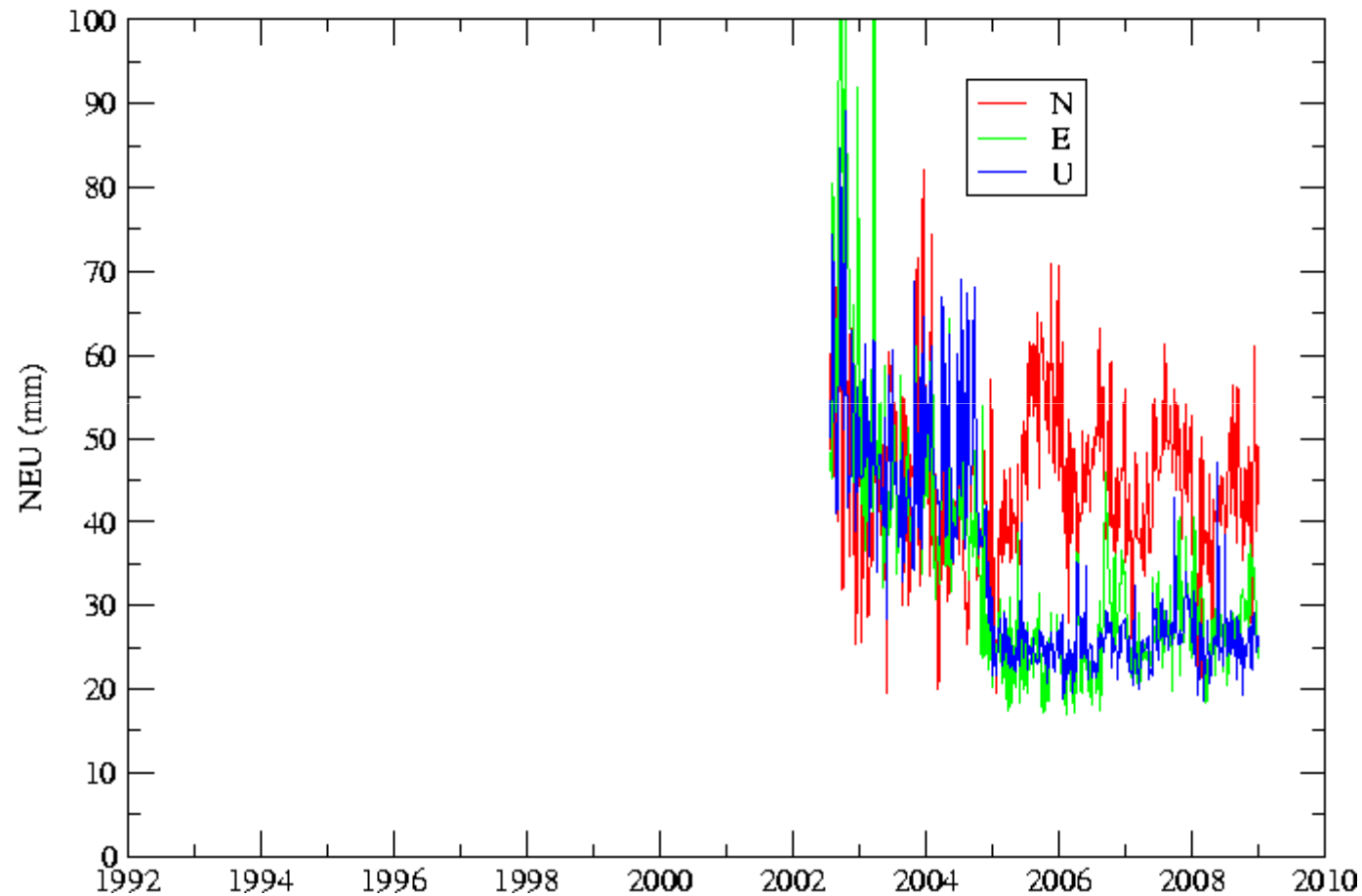
Weekly solutions vs DPOD2005: NEU rms

TOPEX



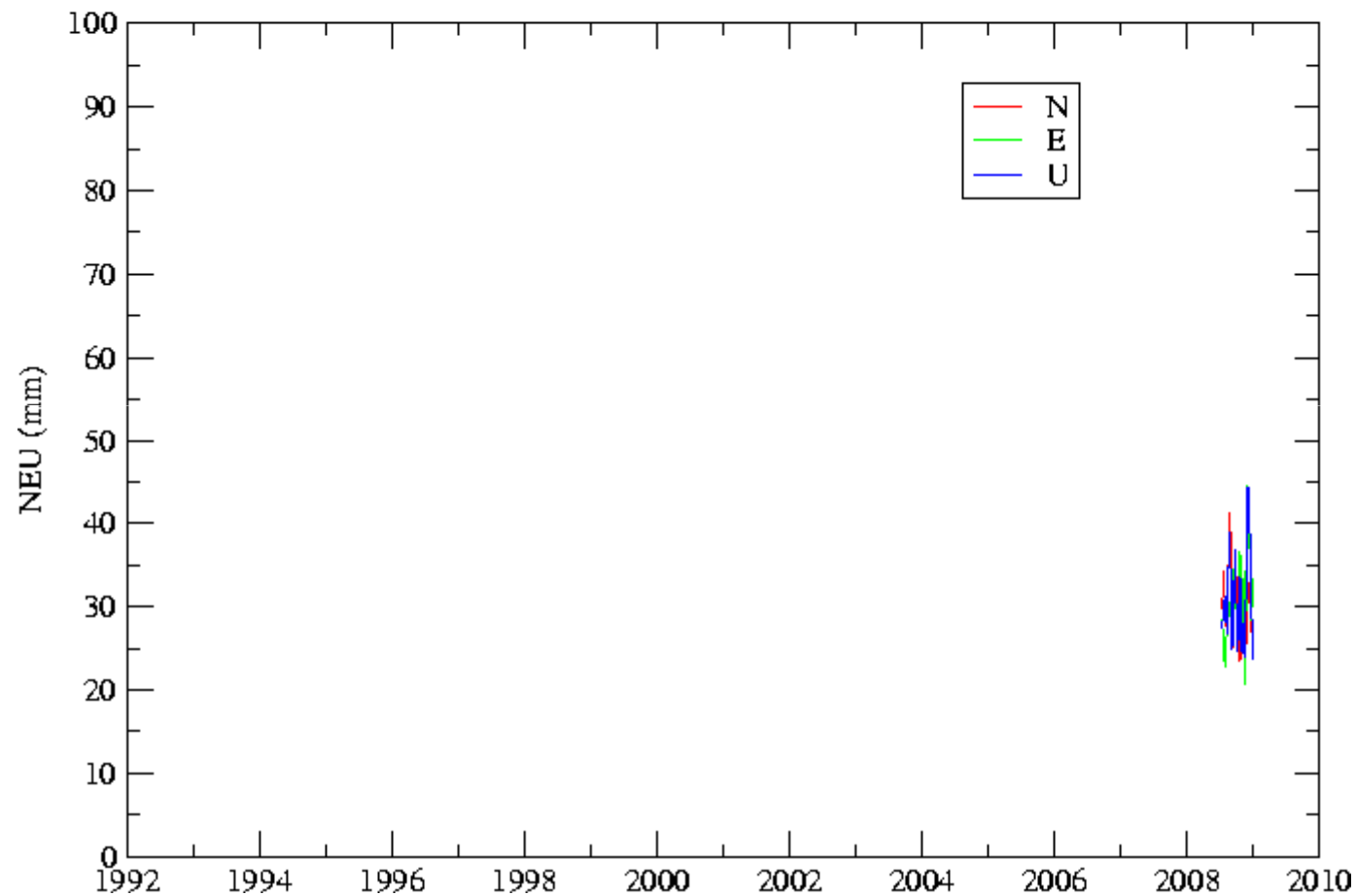
Weekly solutions vs DPOD2005: NEU rms

ENVISAT



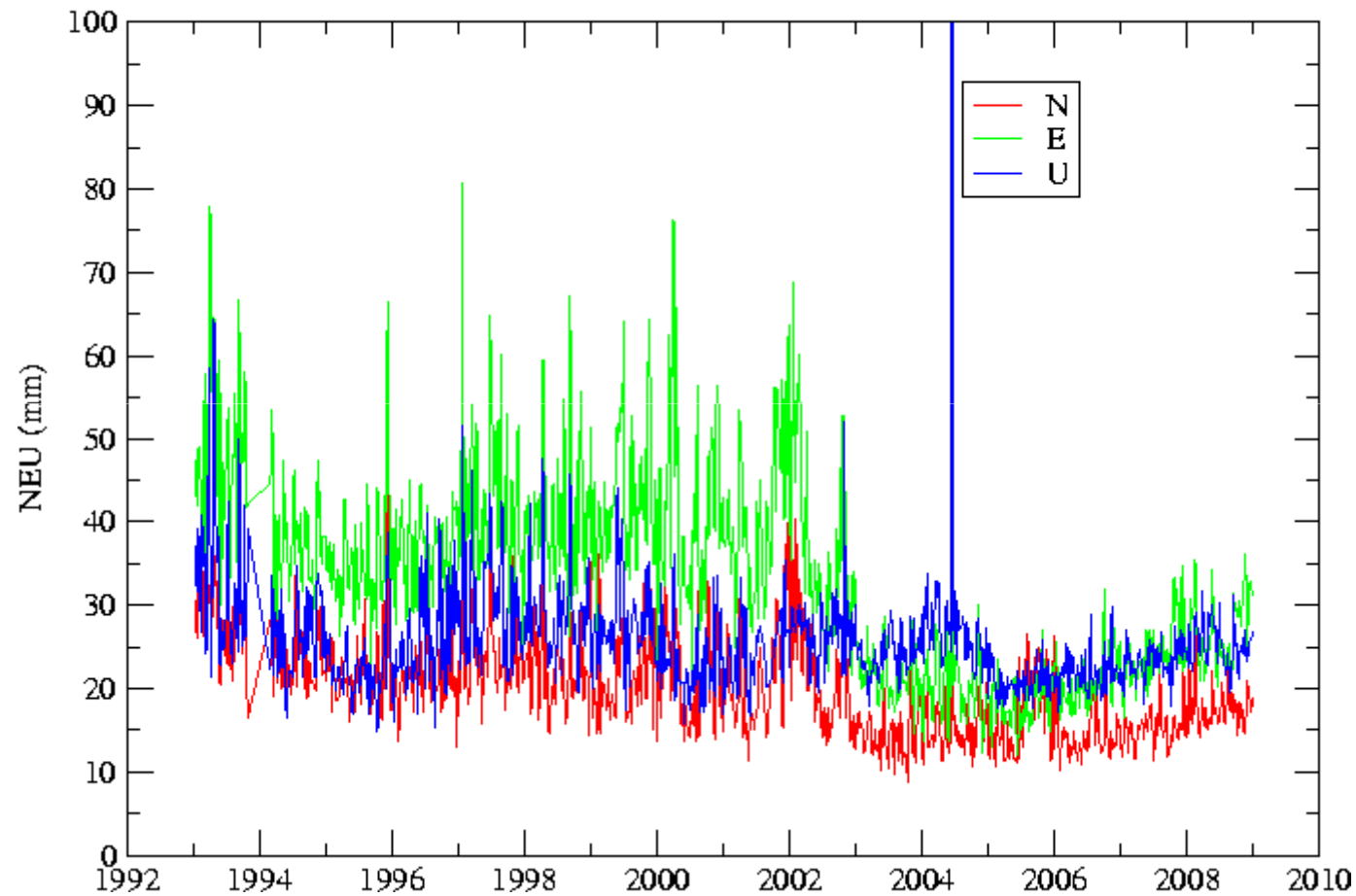
Weekly solutions vs DPOD2005: NEU rms

JASON2



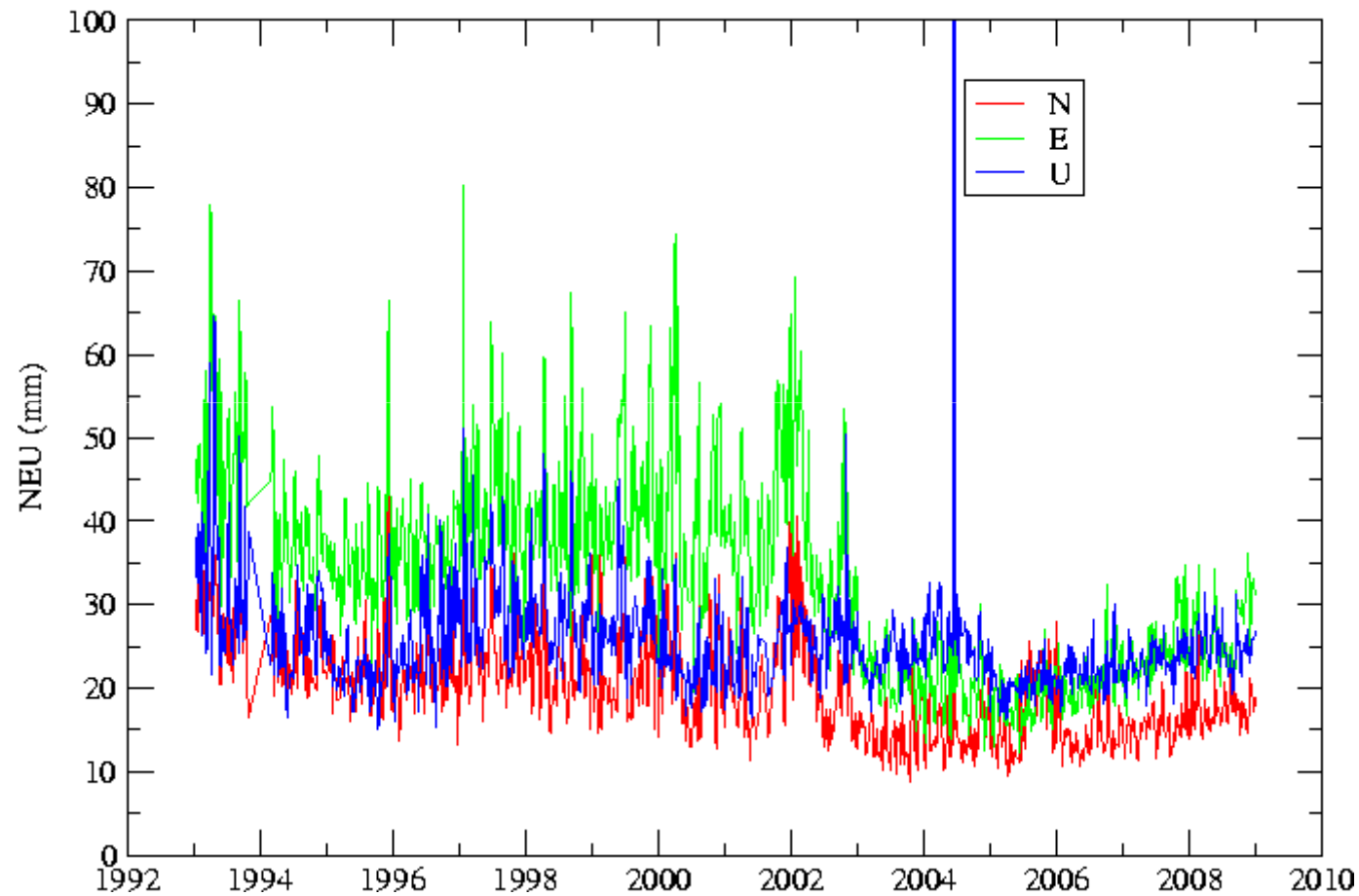
Weekly solutions vs DPOD2005: NEU rms

lcawd20

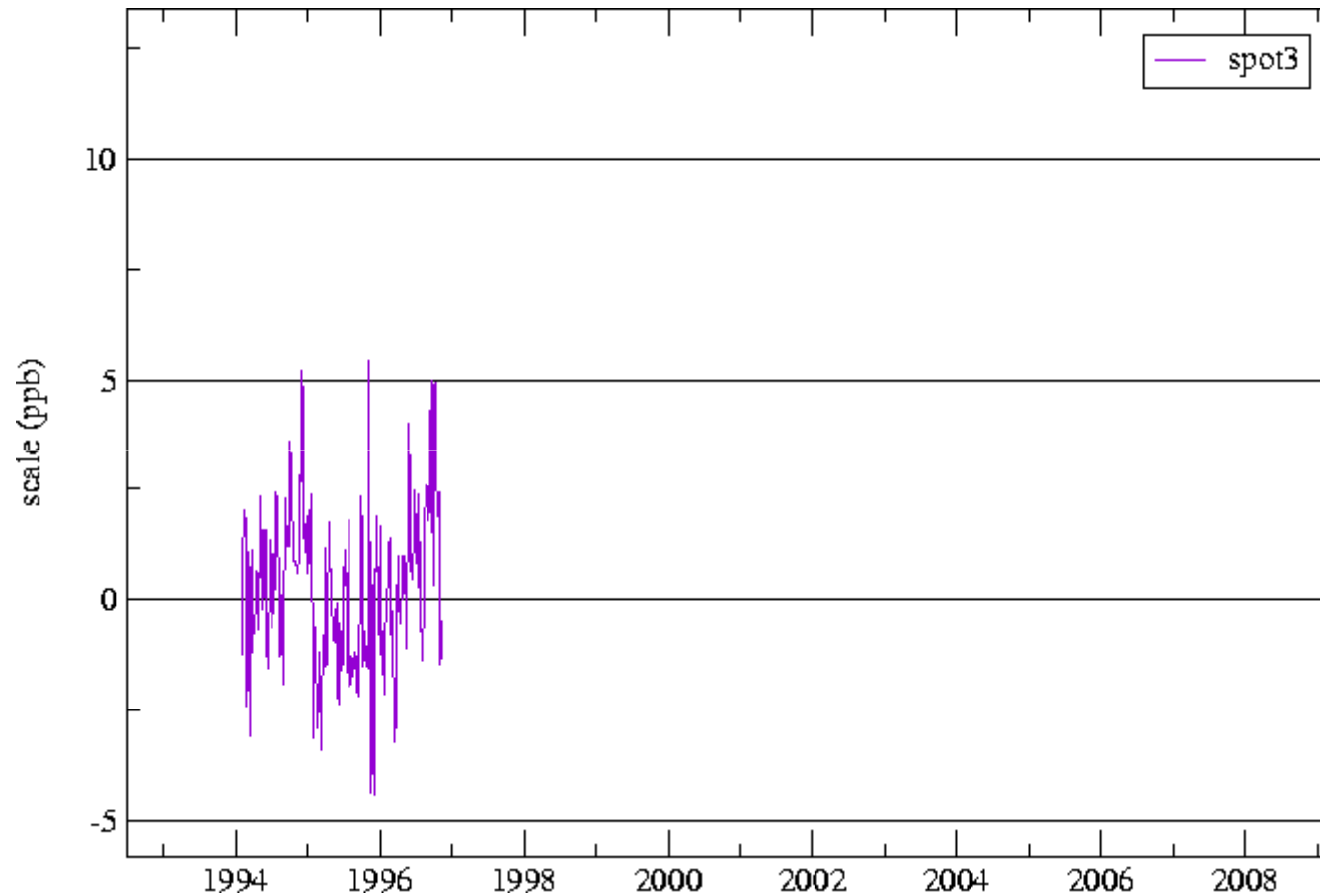


Weekly solutions vs DPOD2005: NEU rms

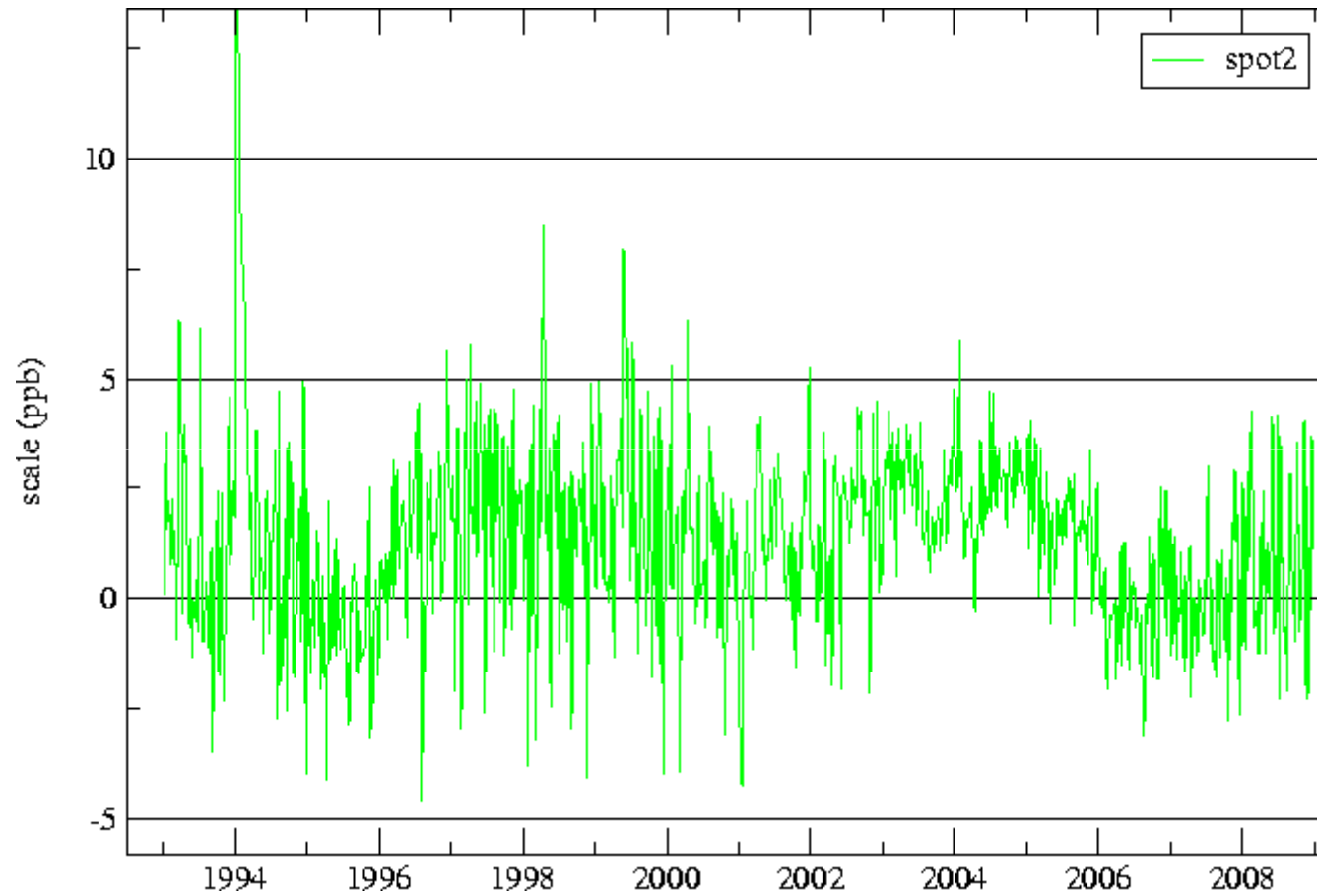
lcawd21



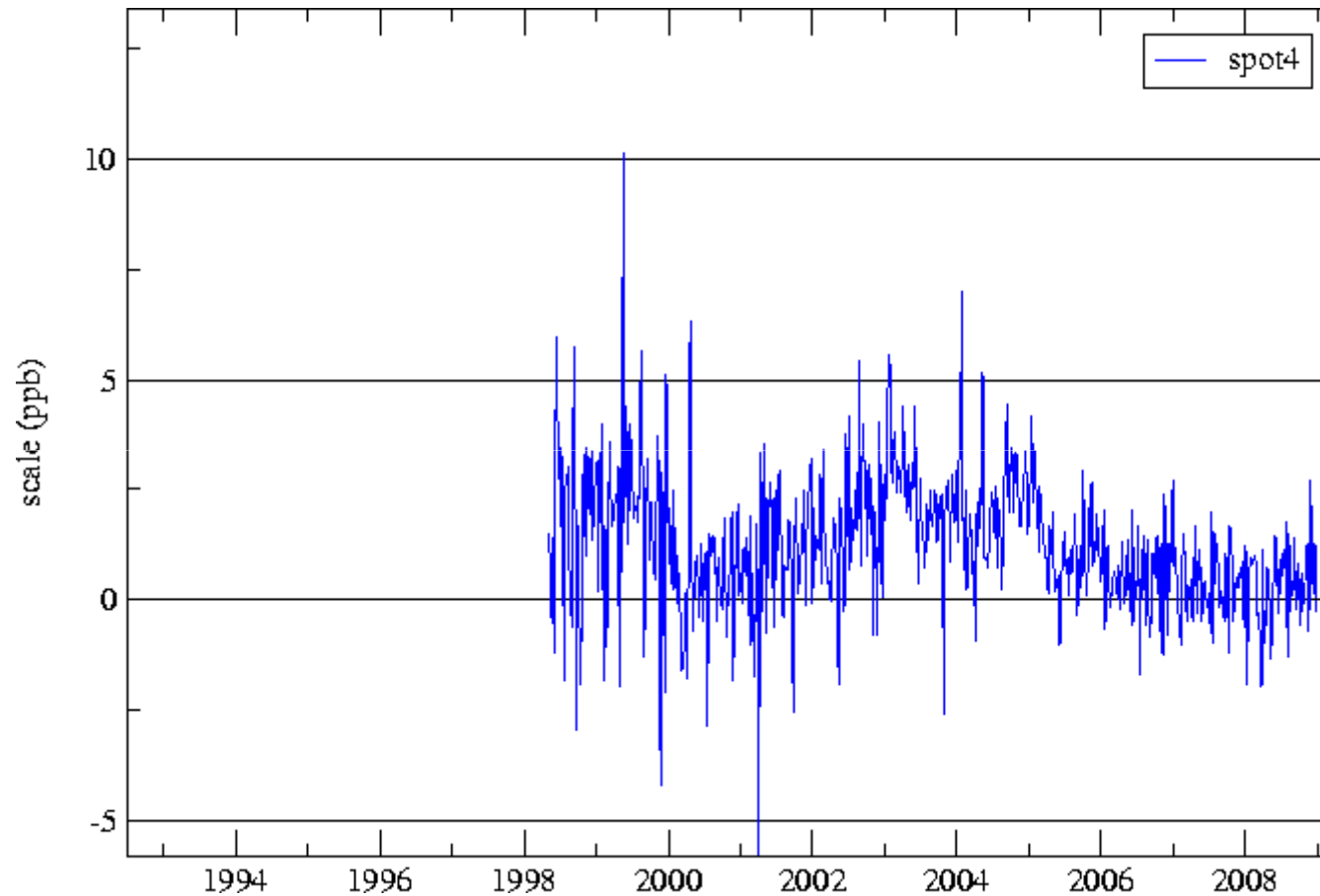
Scale factor vs DPOD2005



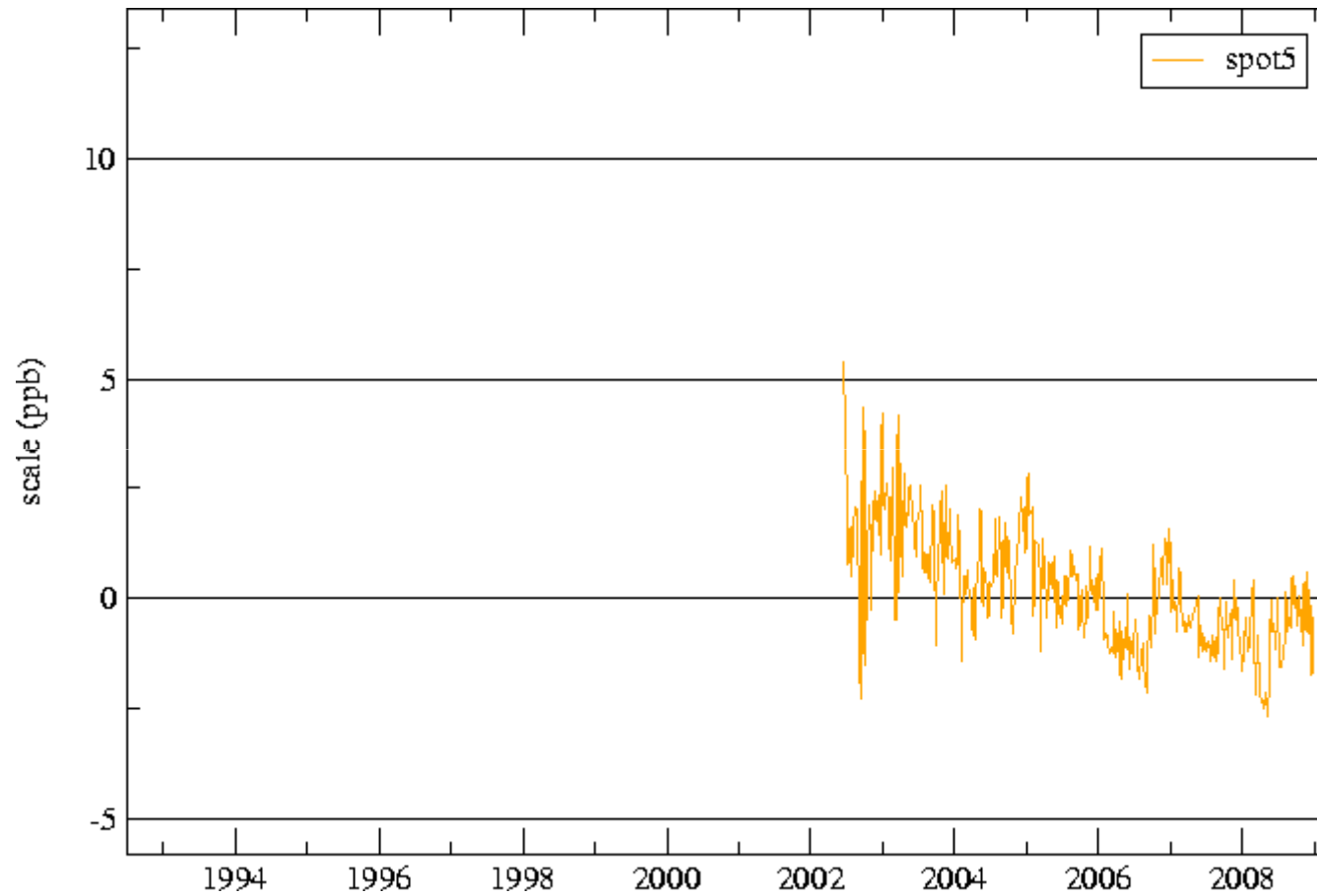
Scale factor vs DPOD2005



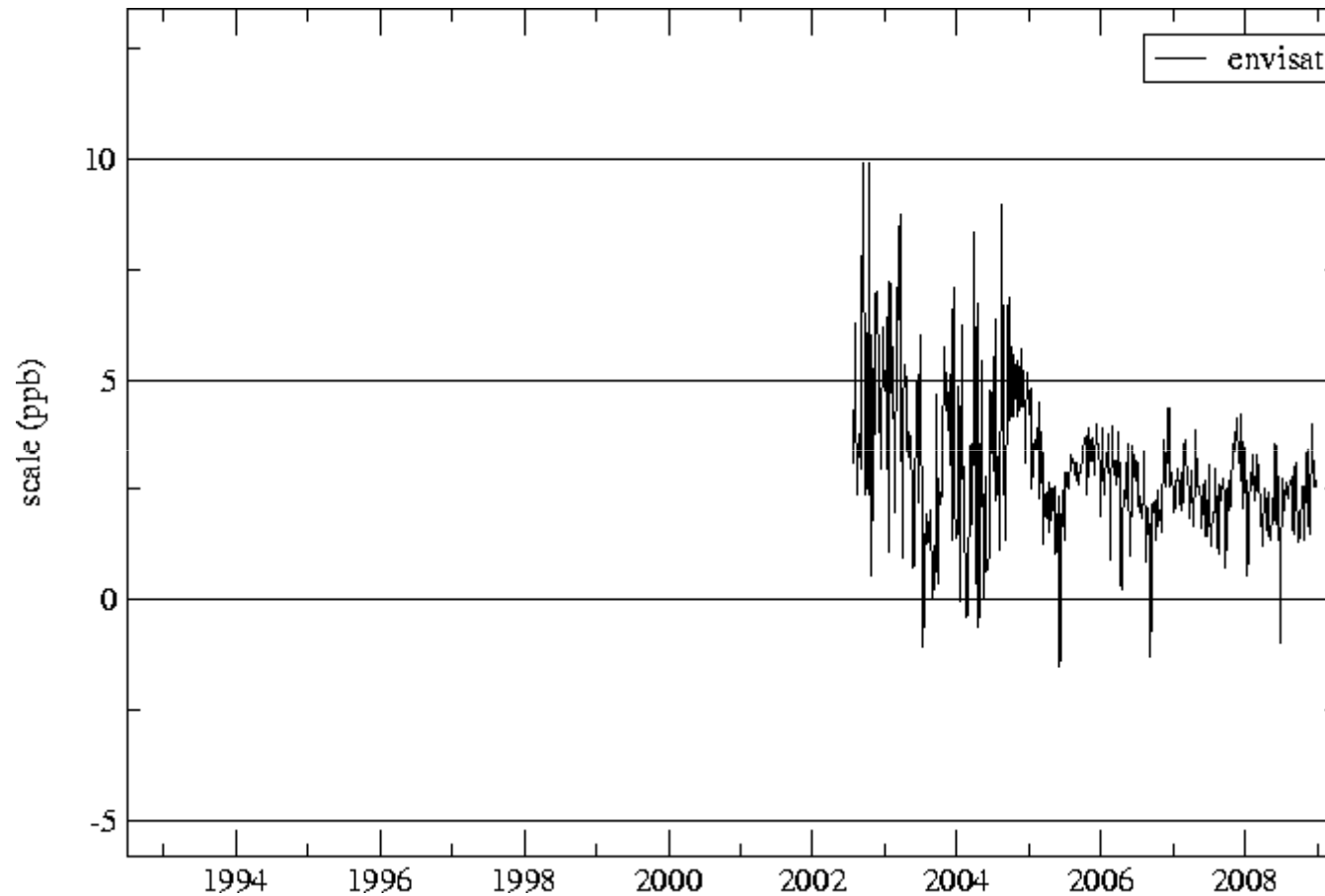
Scale factor vs DPOD2005



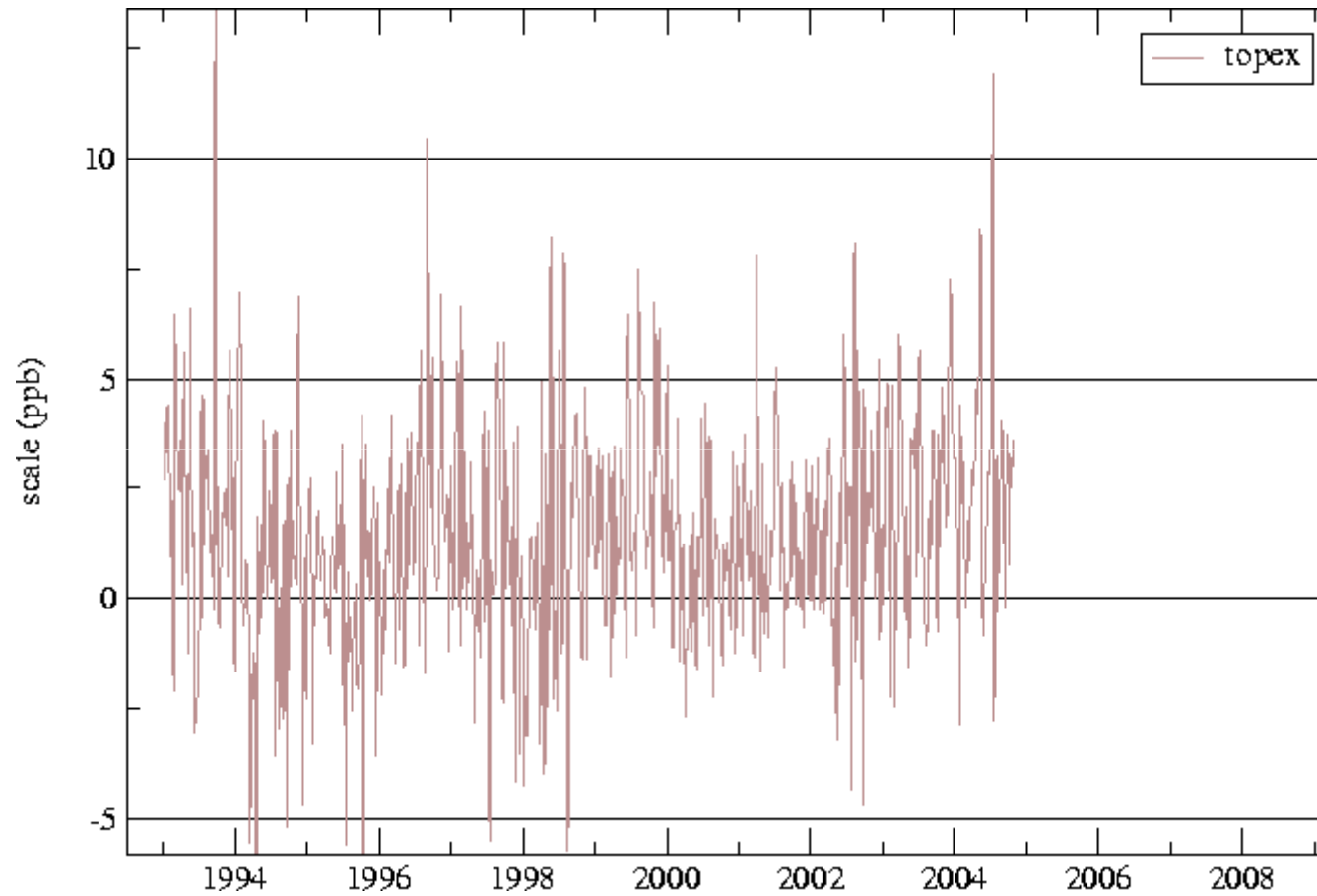
Scale factor vs DPOD2005



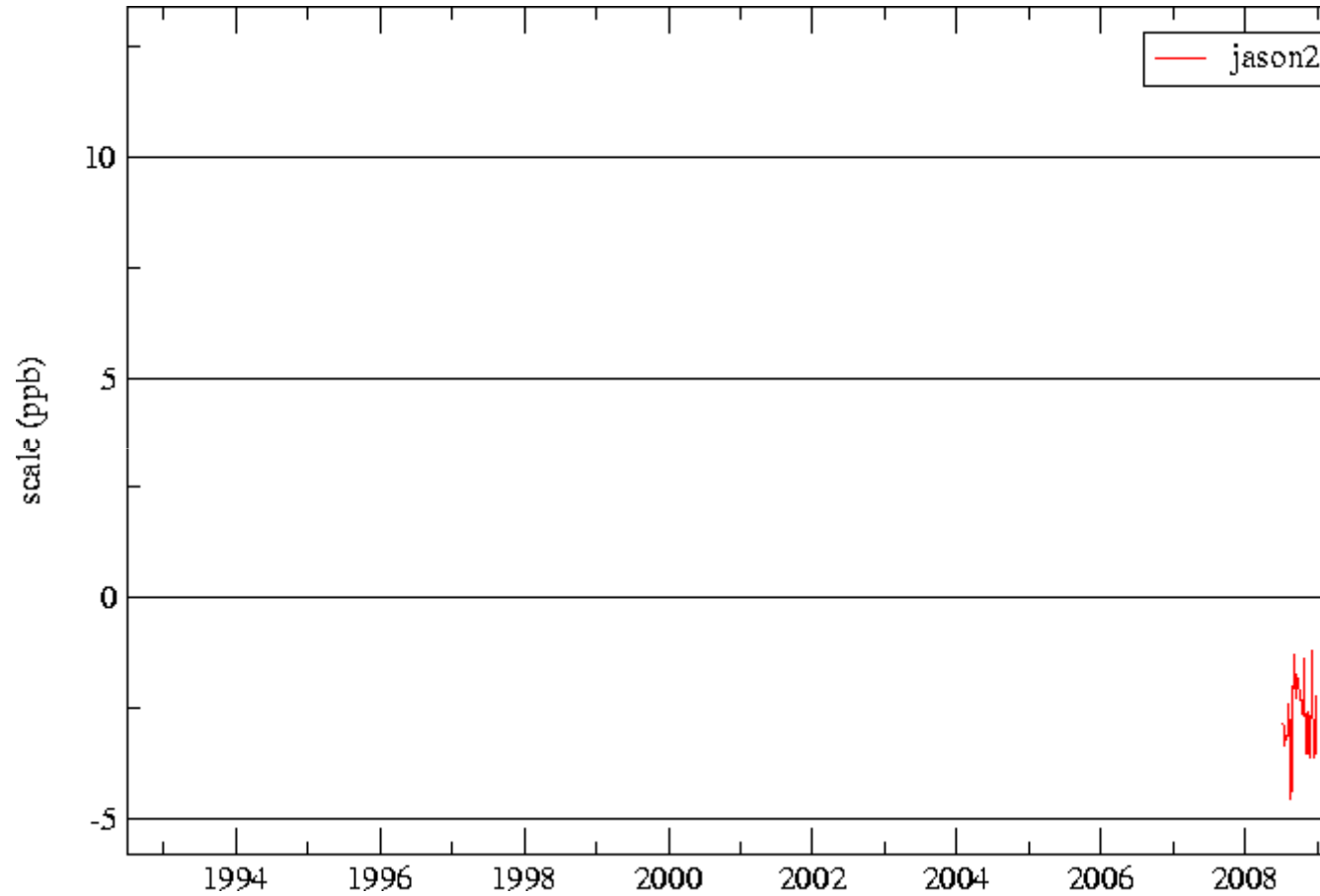
Scale factor vs DPOD2005



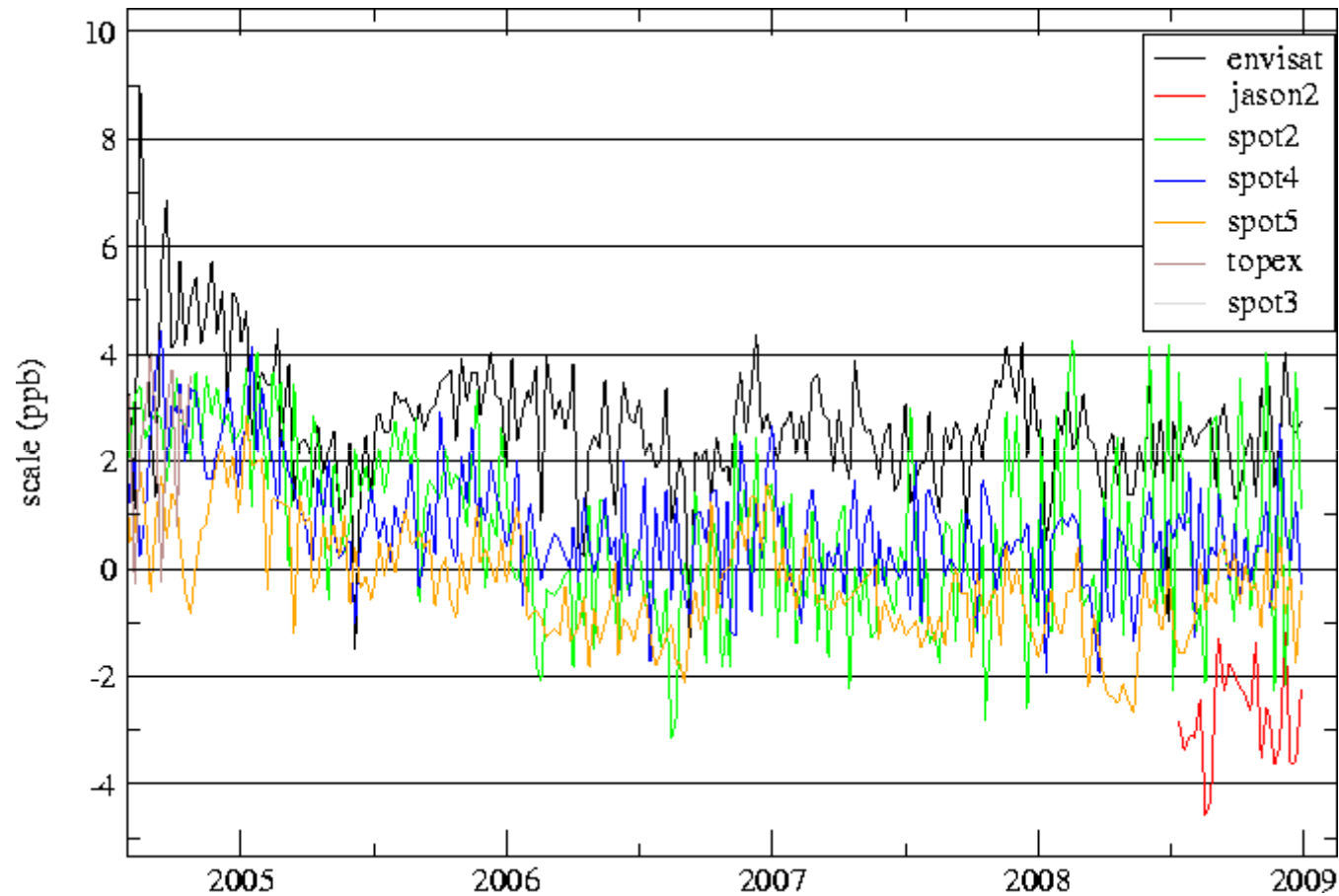
Scale factor vs DPOD2005



Scale factor vs DPOD2005



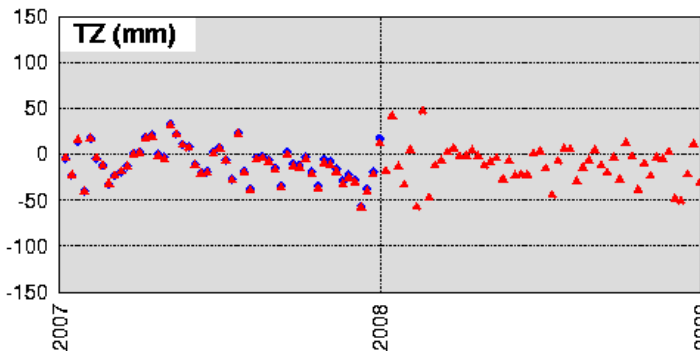
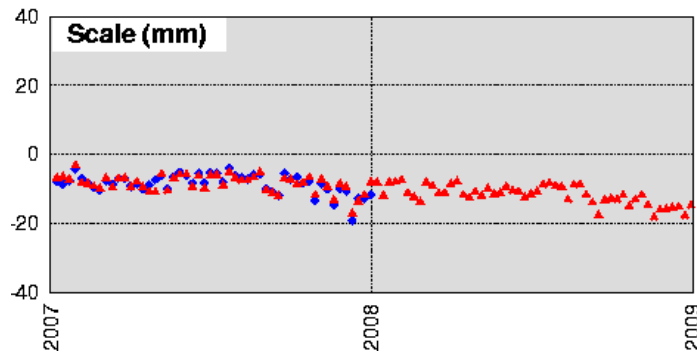
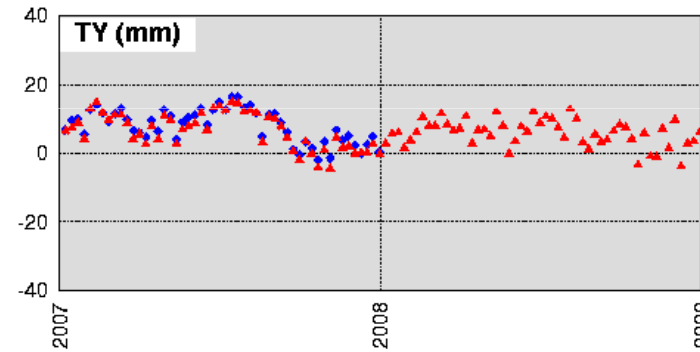
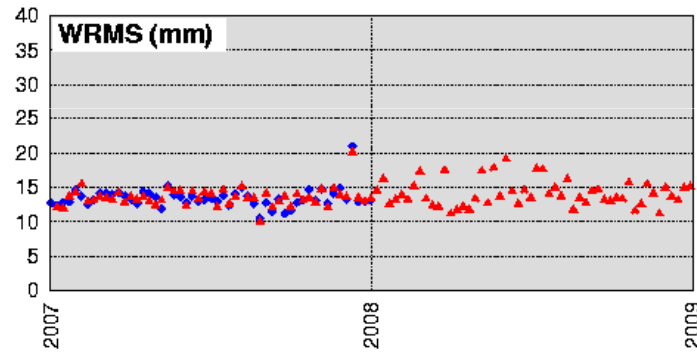
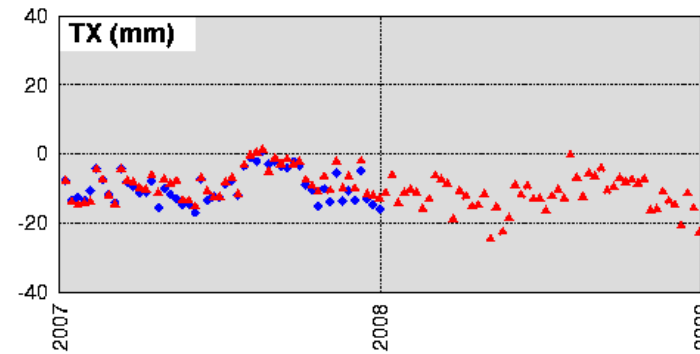
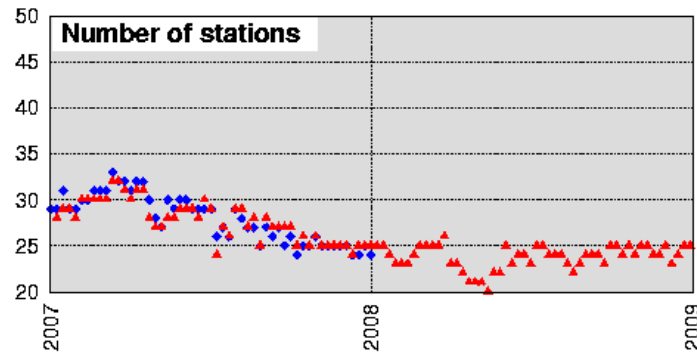
Scale factor vs DPOD2005



Atmospheric loading effect

Per week comparison to ITRF2005

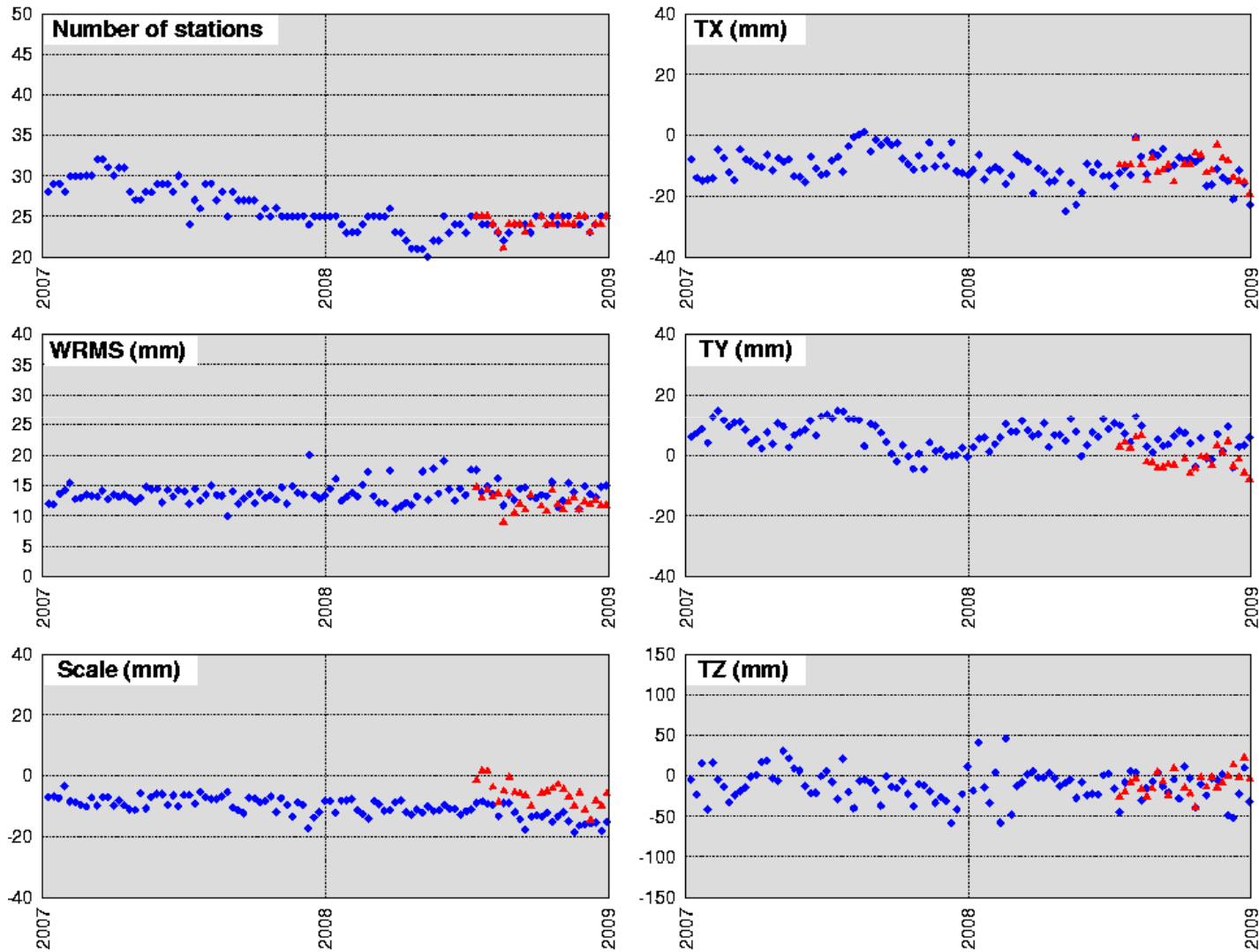
◆ cawd20 with atm load
▲ cawd21 without atm load



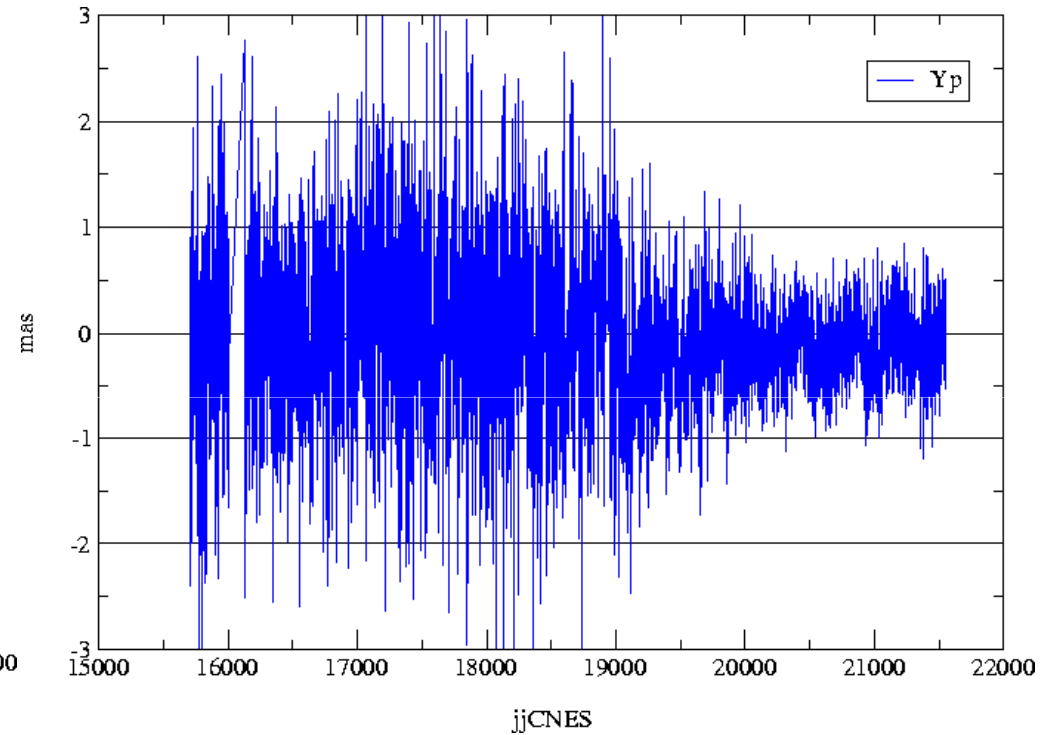
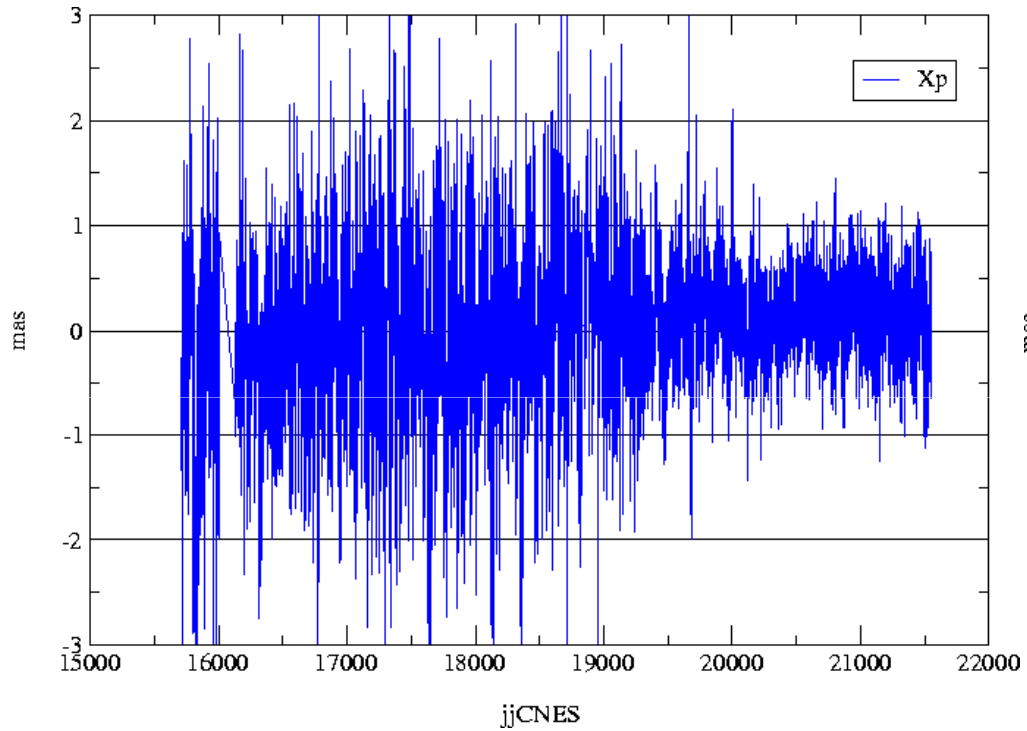
Jason-2 contribution

Per week comparison to ITRF2005

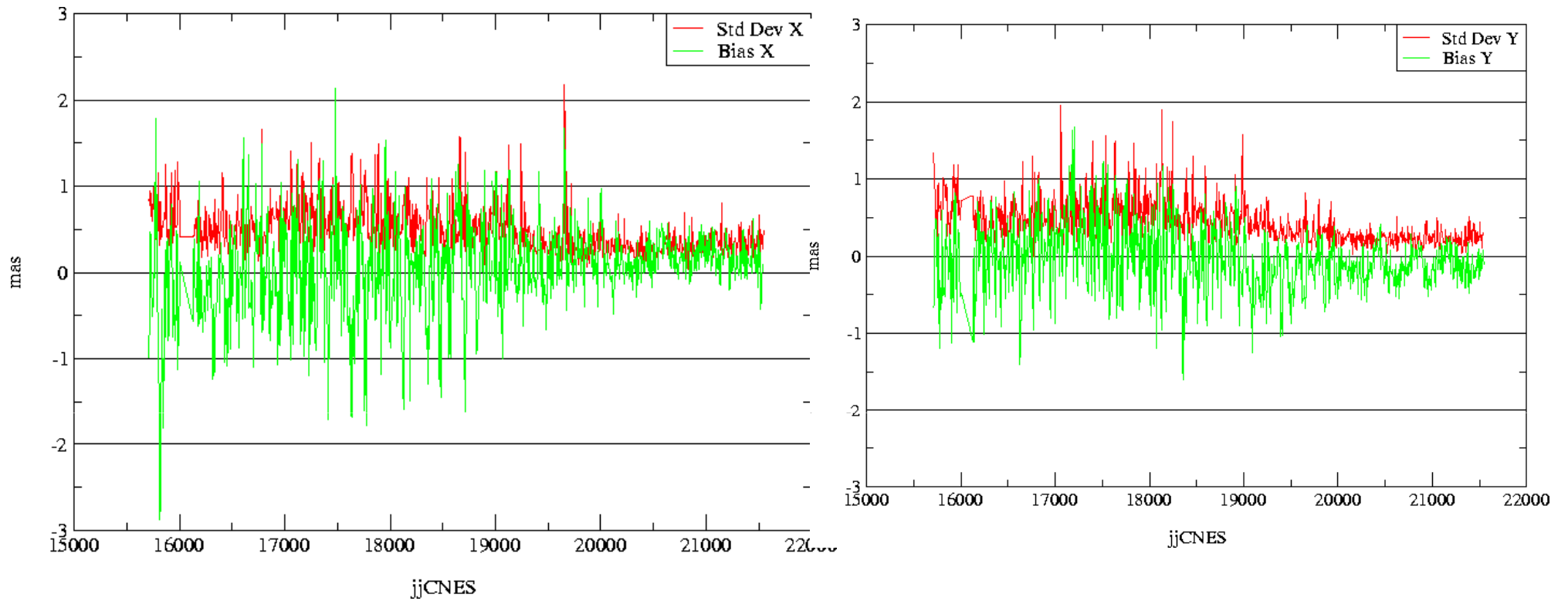
◆ CAWC21
▲ CAWC22 with J2



Polar motion: daily values



Polar motion: Bias and WRMS



1993-2008	Total	Bias	Wrms
X (mas)	5633	0,097	0,646
Y (mas)	5633	-0,090	0,553

Issues

From existing matrices:

Solar Radiation Pressure:
Fix SRP values?

Time Varying Gravity field:
Change values of C21 S21?
Fix drift terms of degrees 2 and 3?

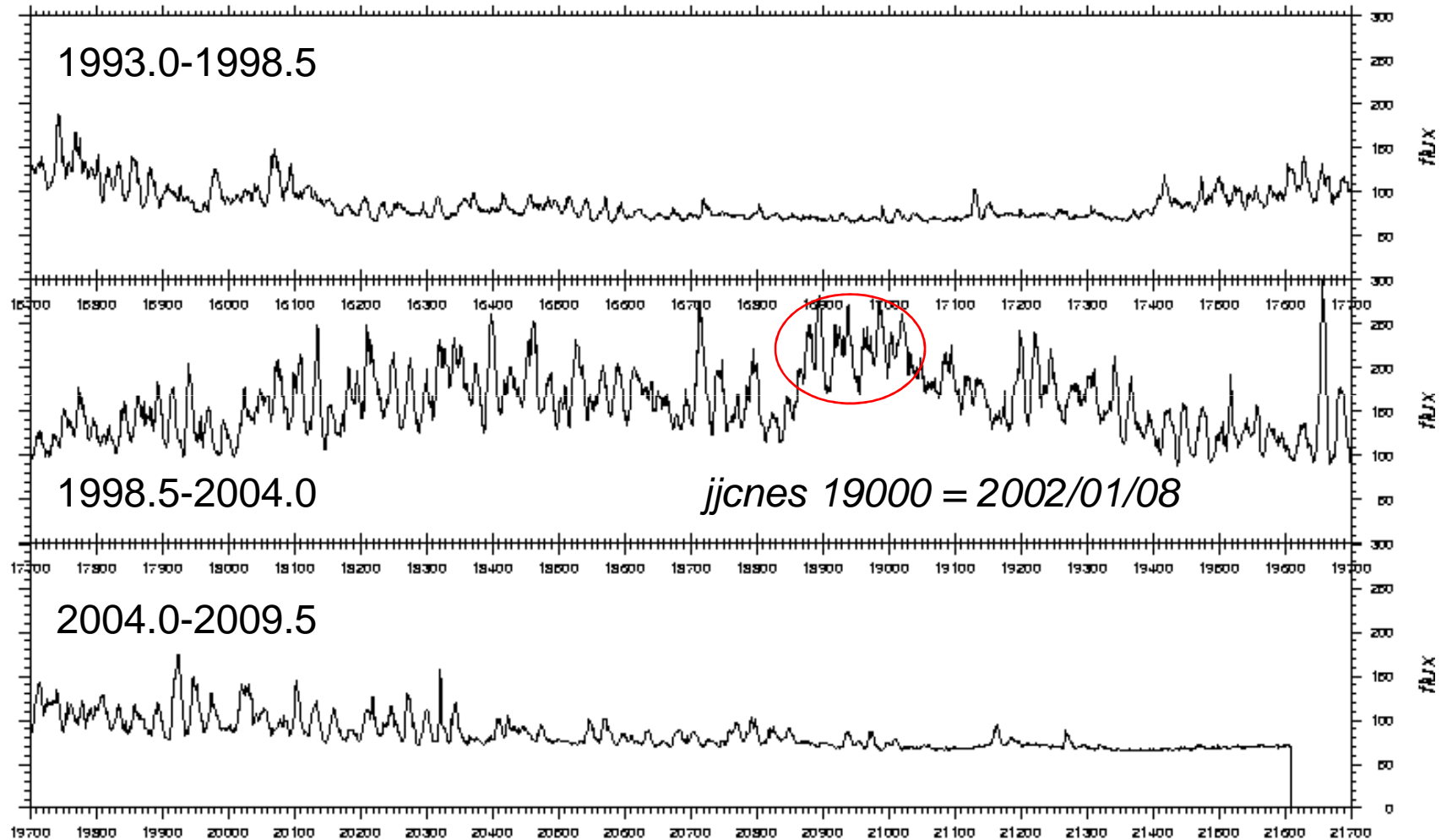
Re-processing of some arcs
1 CD/hour? /min?

Spot2/Spot3:
Use the corrected angle of the solar pannel?

Back-up slides

Solar flux (F10.7)

flux solaire (noir)



2009 Mar 9 10:37:08 Centre d'Analyse LEGOS/CLS