1st weekly combination for ITRF2008

JJ. Valette [1], Z. Altamimi[2], P. Yaya [1]

[1] *CLS, Collecte Localisation Satellites, France*
[2] *Institut Géographique National, Marne-La-Vallée, France*

&

all IDS ACs

Summary

IERS call for ITRF2008

Contributions from Analysis Centers & series evaluation

IDS Combination strategy & IDS-1 weekly combined solutions

IDS-1 analysis

- **Per AC contribution**
- **Satellite constellation & station network dependency**
- **Open points**

IDS-2 ?

- **Jason-2**
- **Ica without atm. Loading**
- **…**

ITRF2008 call: recom' & IDS compliancy

Recommendations

Contributed time series (**weekly/**daily) solutions to be included in the ITRF2008 should be provided in SINEX format &

- Solutions with removable constraints
- **Loosely constrained solutions** (constraint level: Sigma > 1 m)
- Solutions with TRF minimum/inner constraints
- Free singular normal equations

The SINEX files have to follow the **SINEX Version 2.0** format standard and should contain for one week (Sunday to Saturday) **station positions**, a set of **EOPs for each day** (offsets and rates fitted over 24-hr intervals for polar motion, UT1 and LOD, where only VLBI provides UT1). ..

…

It is requested **NOT to correct for any geophysical fluid loading effects**, except for tidal ocean loading

Non compliancy

4 ACs (ina, ign, gau, gsc) provide UT1 reserved to VLBI

atmosph loading antenna displacement in lca solutions

(acceptable in a first version, atmosph loading to be corrected in a final version)

Deadline : 10 fev 2009

SINEX series preparation/evaluation

SINEX preprocessing

The preprocessing of the SINEX solutions is realized per AC series and includes the following steps:
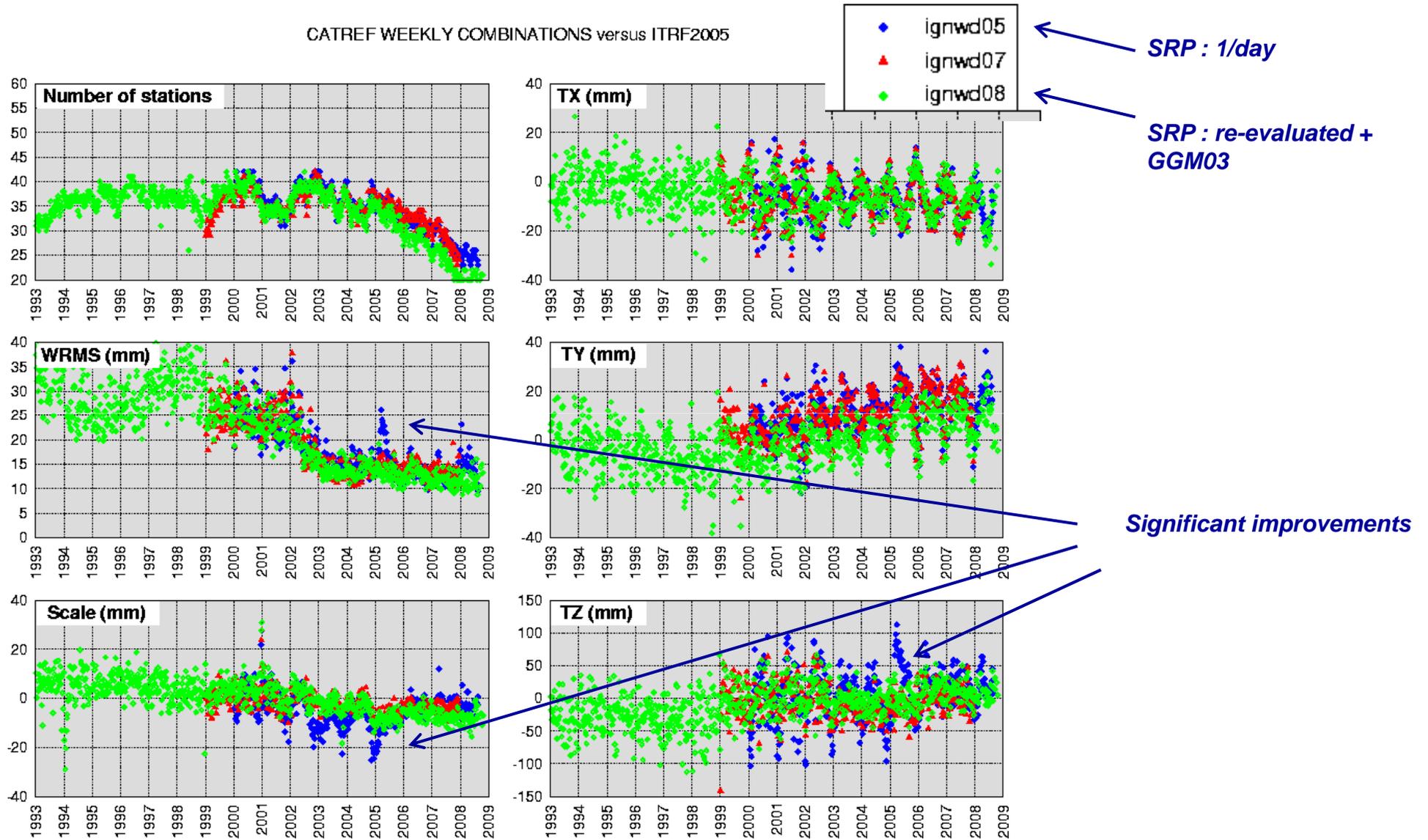
- verification of DORIS station identification (dome #, mnemo)
- rejection of stations over the whole time period (never used),
- rejection of stations over specific periods (partially used),
- verification of solution number and discontinuities (breaks - to be consolidated before weekly combination by analysis of all AC stations times series -),
- when NEQ provided, inversion of free singular equations,
- projection using minimal constraints and rejection of perturbating stations,
- weekly comparison with ITRF2005 at epoch of each solution,
- analysis and rejection of high residual stations.

	gop	ina	lca	ign	esa	gau	gsc	ncl
vs ITRF2005	t7p-l05	t7p-l05	t7p-l05	t7p-l05	t7p-l05	t7p-l05	t7p-l05	
Internal Coherency	T7p-IC	T7p-IC	T7p-IC	T7p-IC	T7p-IC	T7p-IC		
Report	sum	sum	sum	sum	sum	sum	sum	sum
Residuals								

Remarquable active participation of all the analysts
difficult to maintain the combination ids web site up to date (!)
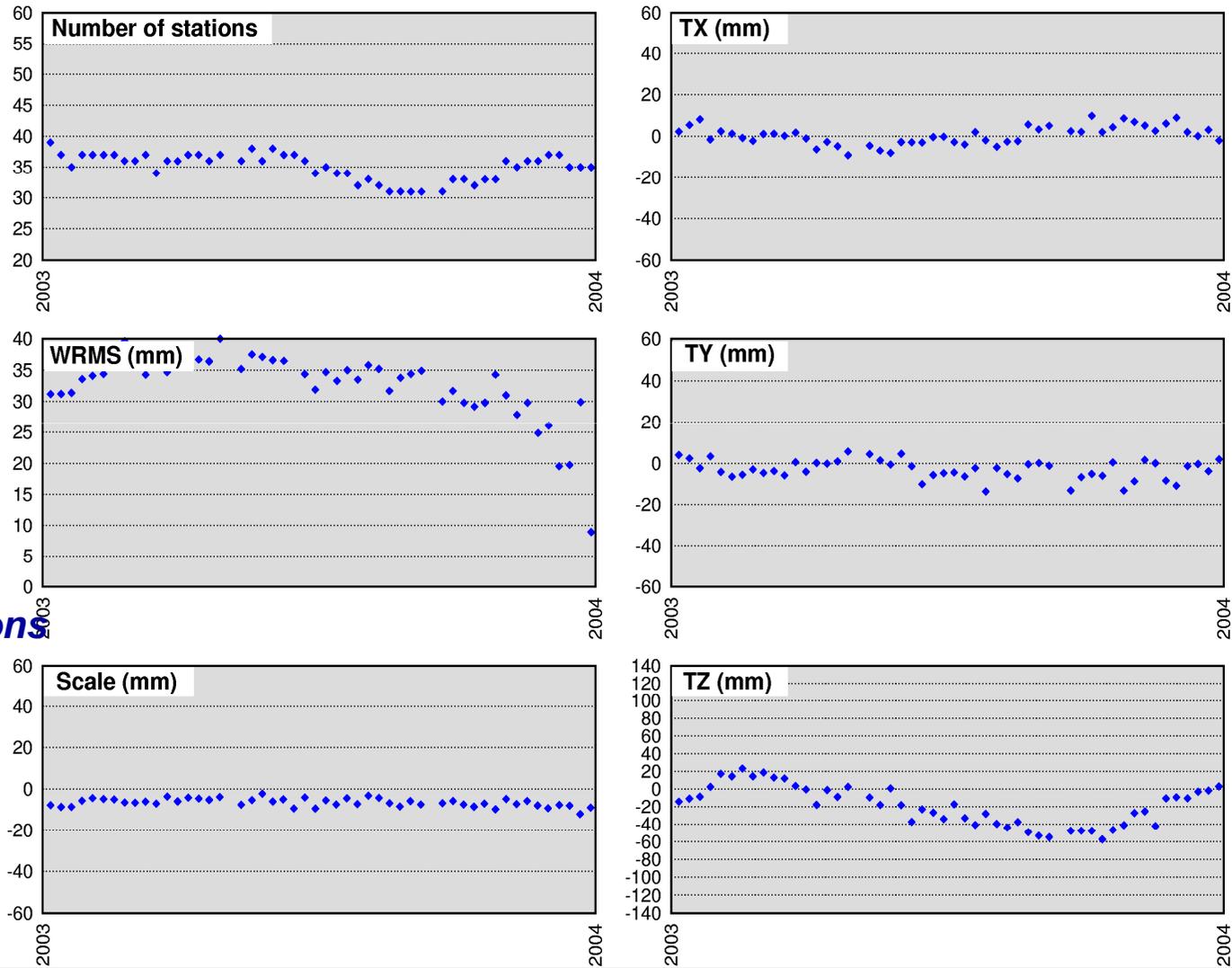
Ex of series validation : ign

CATREF WEEKLY COMBINATIONS versus ITRF2005

Legend:
- ignwd05
- ignwd07
- ignwd08

SRP : 1/day

SRP : re-evaluated + GGM03

Significant improvements

IDS AWG, Paris 23-24 March 2009

EX of validation : ncl series (not considered in the combination)

Per week comparison to ITRF2005

◆ nclwd01v04

Number of stations

TX (mm)

WRMS (mm)

TY (mm)

High residuals
Constrained solutions

Scale (mm)

TZ (mm)

IDS AWG, Paris 23-24 March 2009

IDS selected solutions

AC	Software	Sol. Id.	Type (1)	Data span	Satellites (2)	Earth Gravity Field	Constraint	EOPs
gop	BERNESE 5.0	wd31	var-cov	1999.0-2006.9	Spot 2/4/5 Topex Envisat Jason-1 in 2002	EIGEN-GL04S annual, 100X100	loose	motion, rate
ina	GYPSY/OASIS 4.03	wd03	var-cov	1997.0-2008.8	Spot 2/5 Spot 4 (except 05/98-01/99) Topex Envisat	GGM01C fixed, 120x120	loose	motion rate (constrained) LOD, UT1
lca	GINS/DYNAMO	wd20	var-cov	1993.0-1998.4 1999.4-2002.0 2002.0-2008.8	Spot 2/3/4/5 Topex & Envisat (Topex/Envisat orbits with SLR)	EIGEN_GL04S drift, annual semi-annual 95x95	loose	motion
ign	GYPSY/OASIS 5.0	wd08	var-cov	1993.0-2008.8	Spot 2/3/4/5 Topex Envisat	GGM03S fixed, 120x120	loose	motion rate (constrained) LOD, UT1
gau	GEODYN	wd06	var-cov	2003.0-2008.8	Spot 2/4/5 Envisat	GGM02C annual, 160x160	loose	motion UT1
esa	NAPEOS	wd01	NEQ	1998.0-2008.0	Spot 2/4/5 Envisat (Envisat orbits with SLR)	EIGEN-GL05C	loose	motion, rate LOD
gsc	GEODYN	wd06	NEQ	2003.0-2008.0	Spot 2/4/5 Envisat	grvfld.eigen. gl04s1.ierscs21	loose	motion UT1

IDS AWG, Paris 23-24 March 2009

Combination strategy

- **Objective : to preserve DORIS info contained in the SINEX**

- **IDS-1 combination strategy : Internal Constraint**

    1993.0-2003.0: Internal constraints (lca, gop, ina, ign, esa)

    2003.0-2008.0:

        Internal constraints on translation (lca, gop, ina, ign, esa, gau, gsc)

        Internal constraints on scale (lca, gop, ina, ign, esa)

        Scale estimated for (gau, gsc) ⟵———————— *> + 20 mm discrepancy*

    2008.0-2009.0: Internal constraints (lca, gop, ina, ign, esa)

- **IDS-0 delivery on 10/02/09 (6 ACs without gsc)**
- **IDS-1 delivery on 27/02/09 (7 ACs: lca, gop, ina, ign, esa, gau, gsc)**

IDS-1 Combined solutions (Intrinsic Trans/Scale)

IDS AWG, Paris 23-24 March 2009
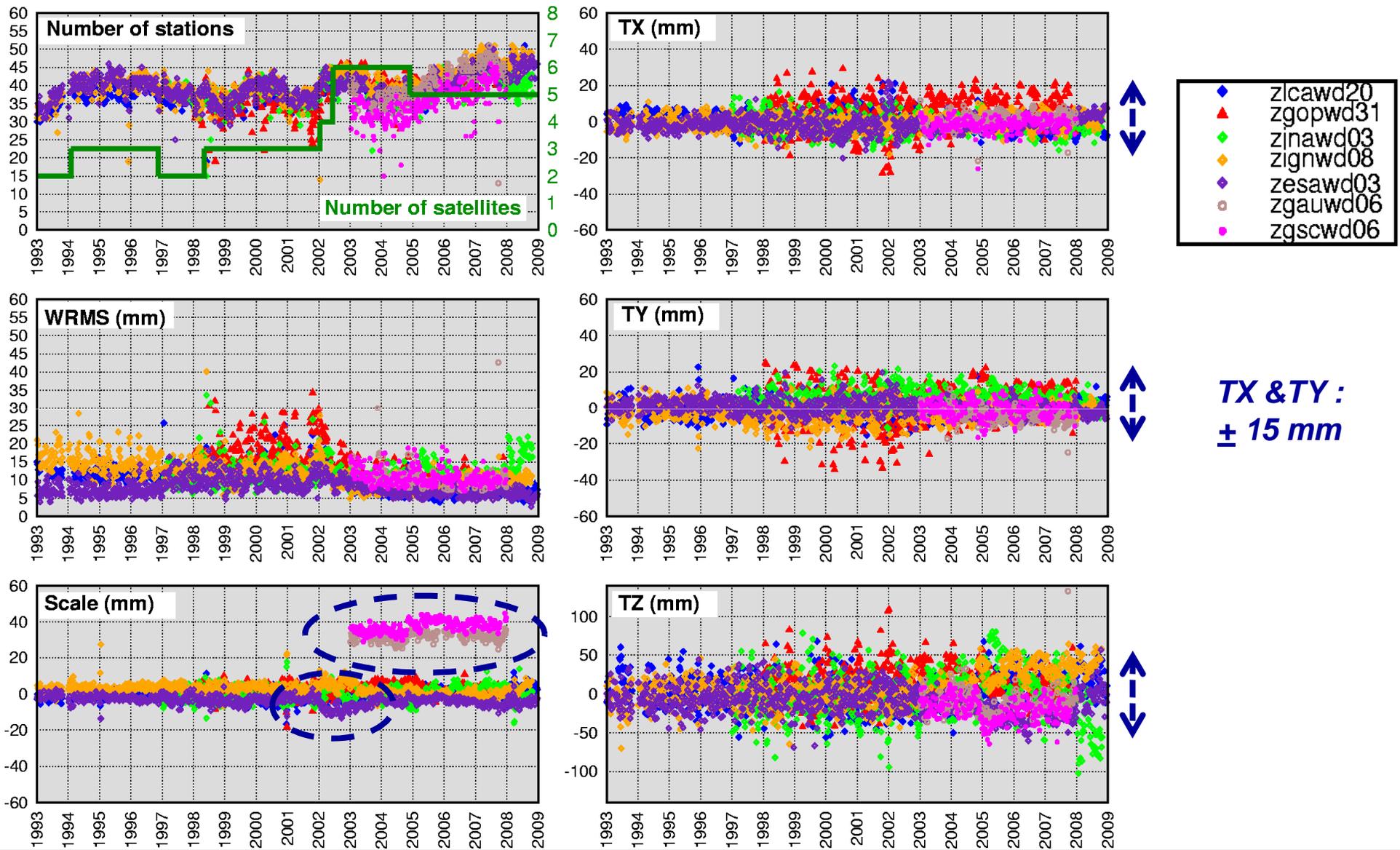
Per AC contribution: high from esawd04

IDS-1 Weekly Comb. (Intr. constr. except for gau-gsc scale)
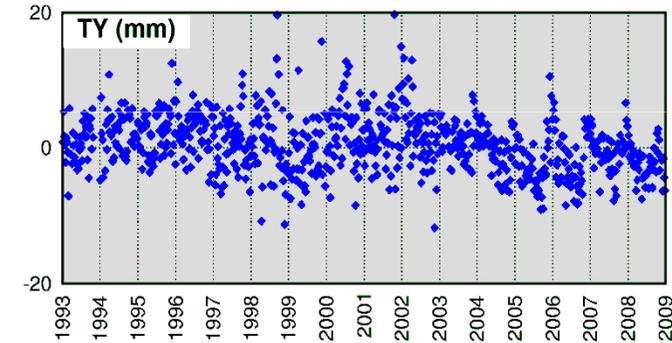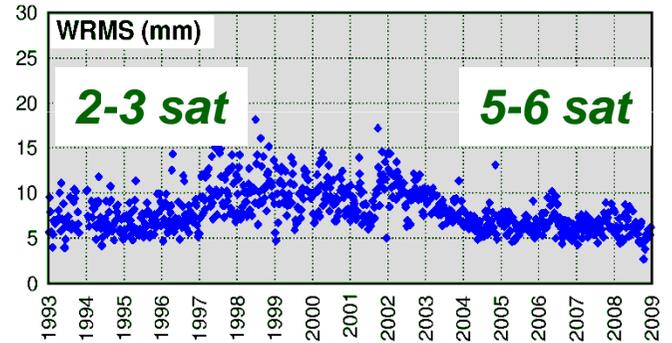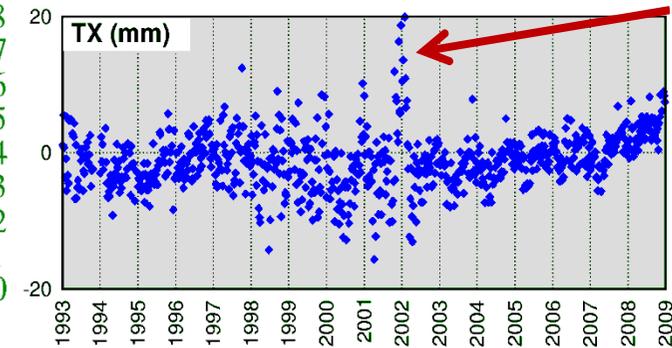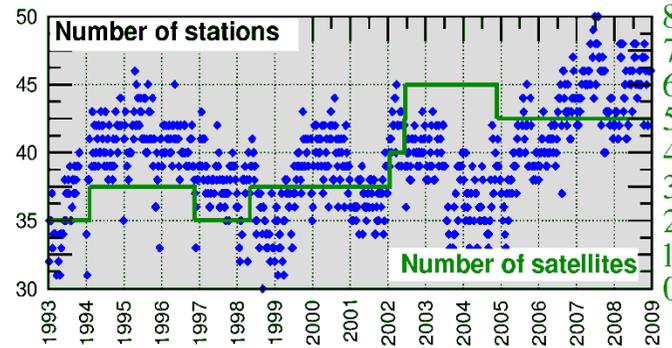
Lowest rms but not sensitive to sat # (?)

End of 2001

IDS AWG, Paris 23-24 March 2009
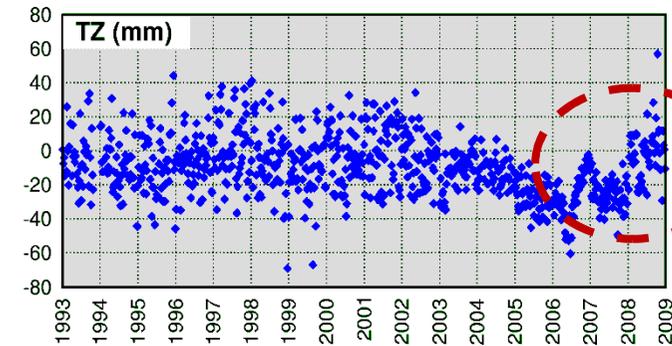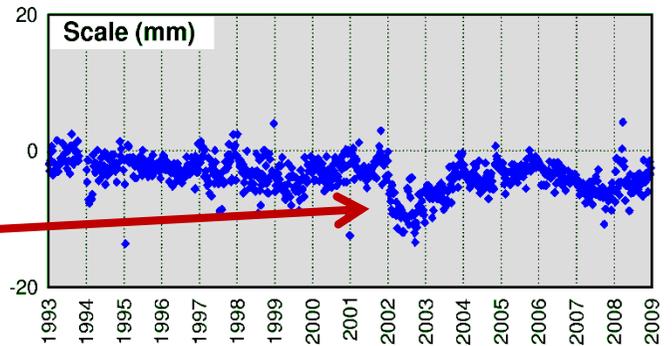
Per AC contribution: ignwd08
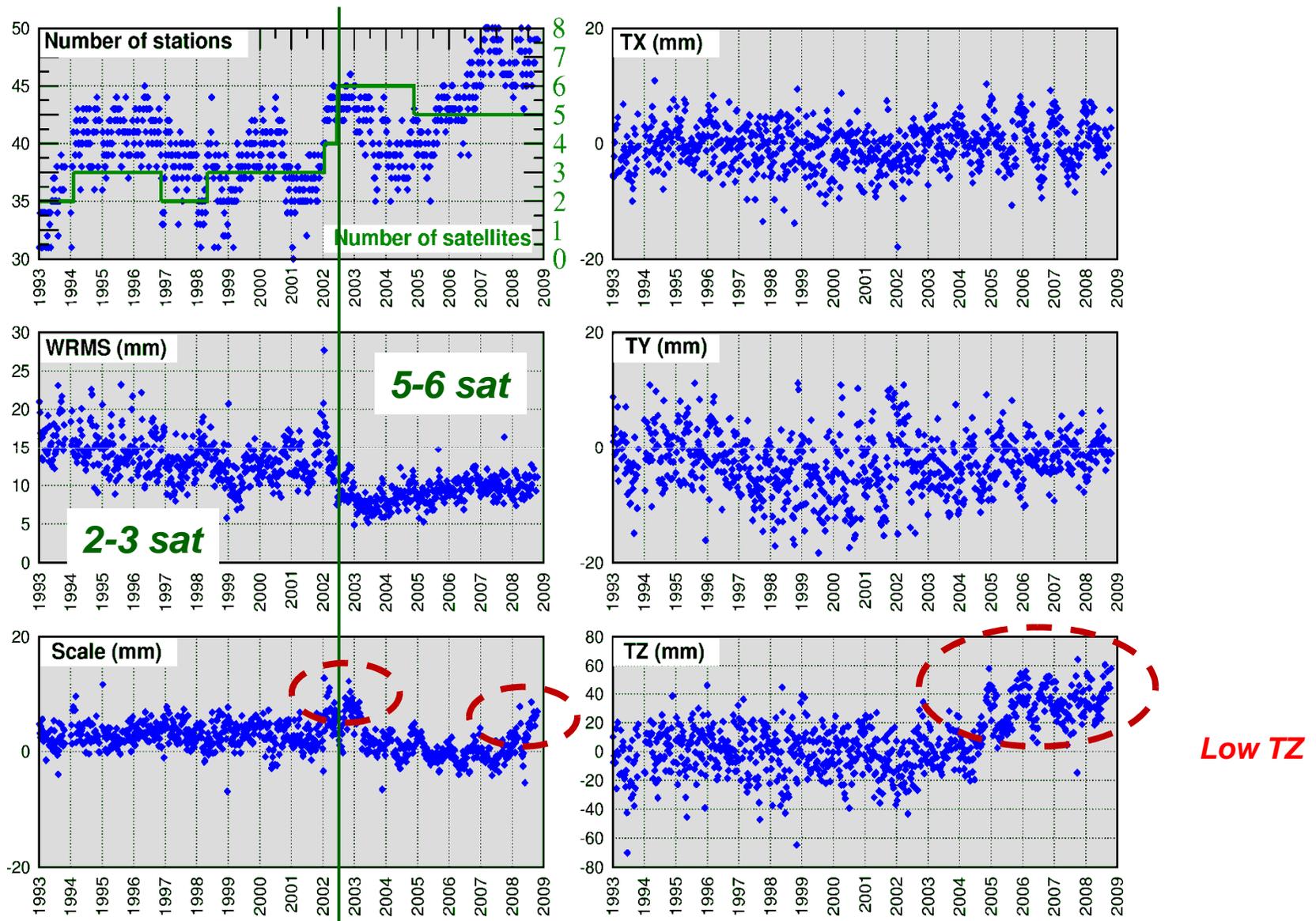
Per AC contribution: lcawd20
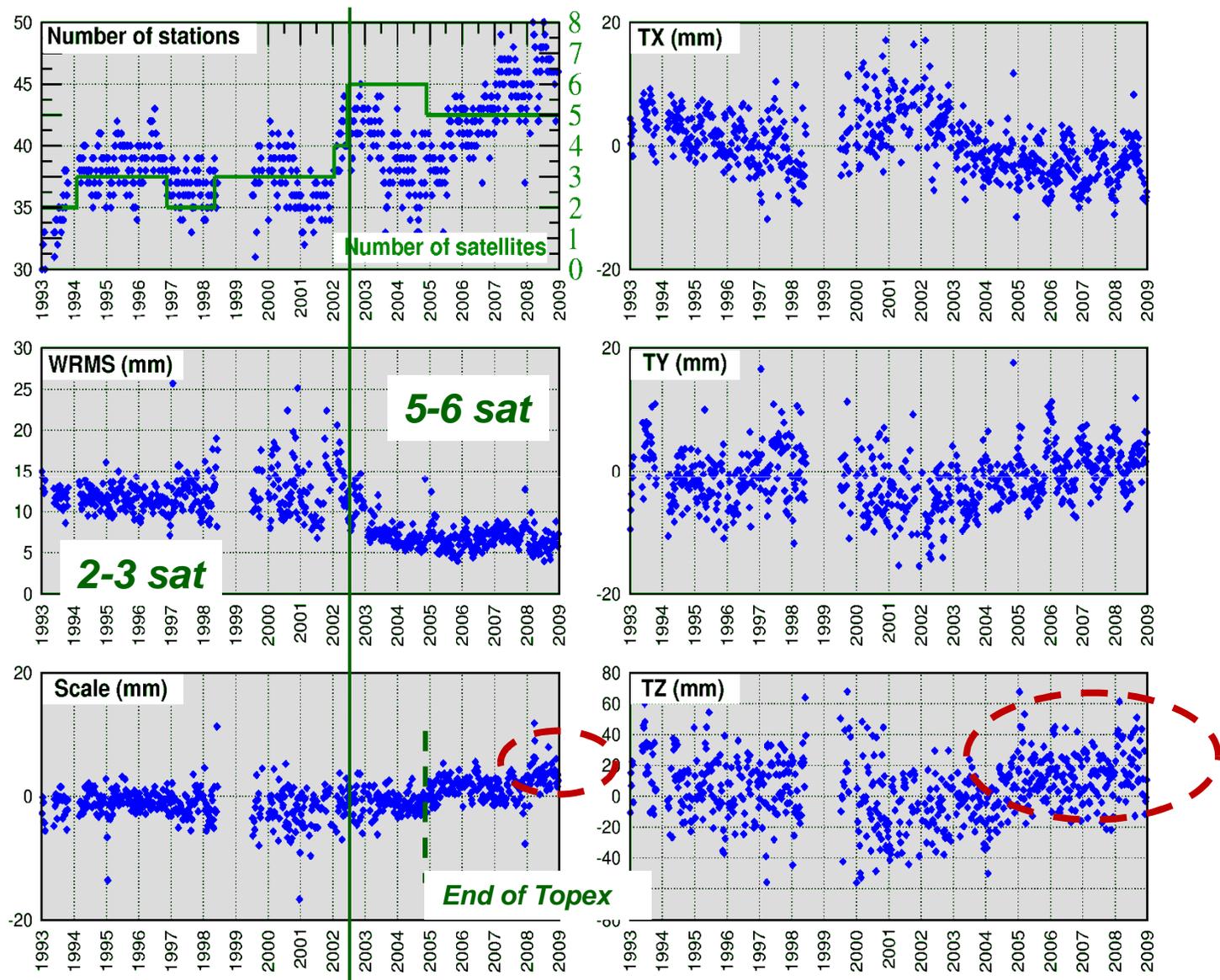
Per AC contribution: inawd03

IDS AWG, Paris 23-24 March 2009
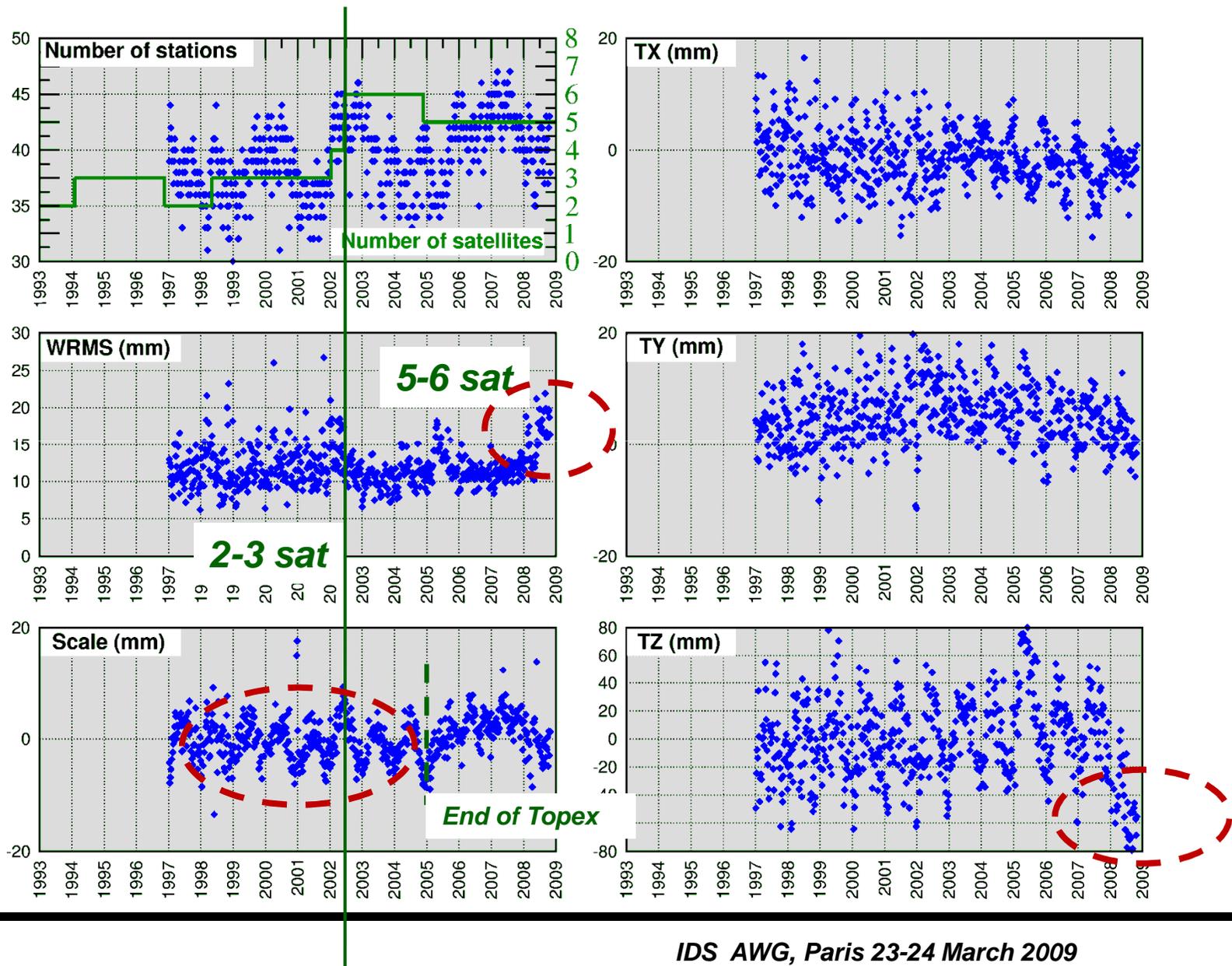
Per AC contribution: gopwd31

Higher TX&TY

5-6 sat

3 sat

End of Topex

IDS AWG, Paris 23-24 March 2009
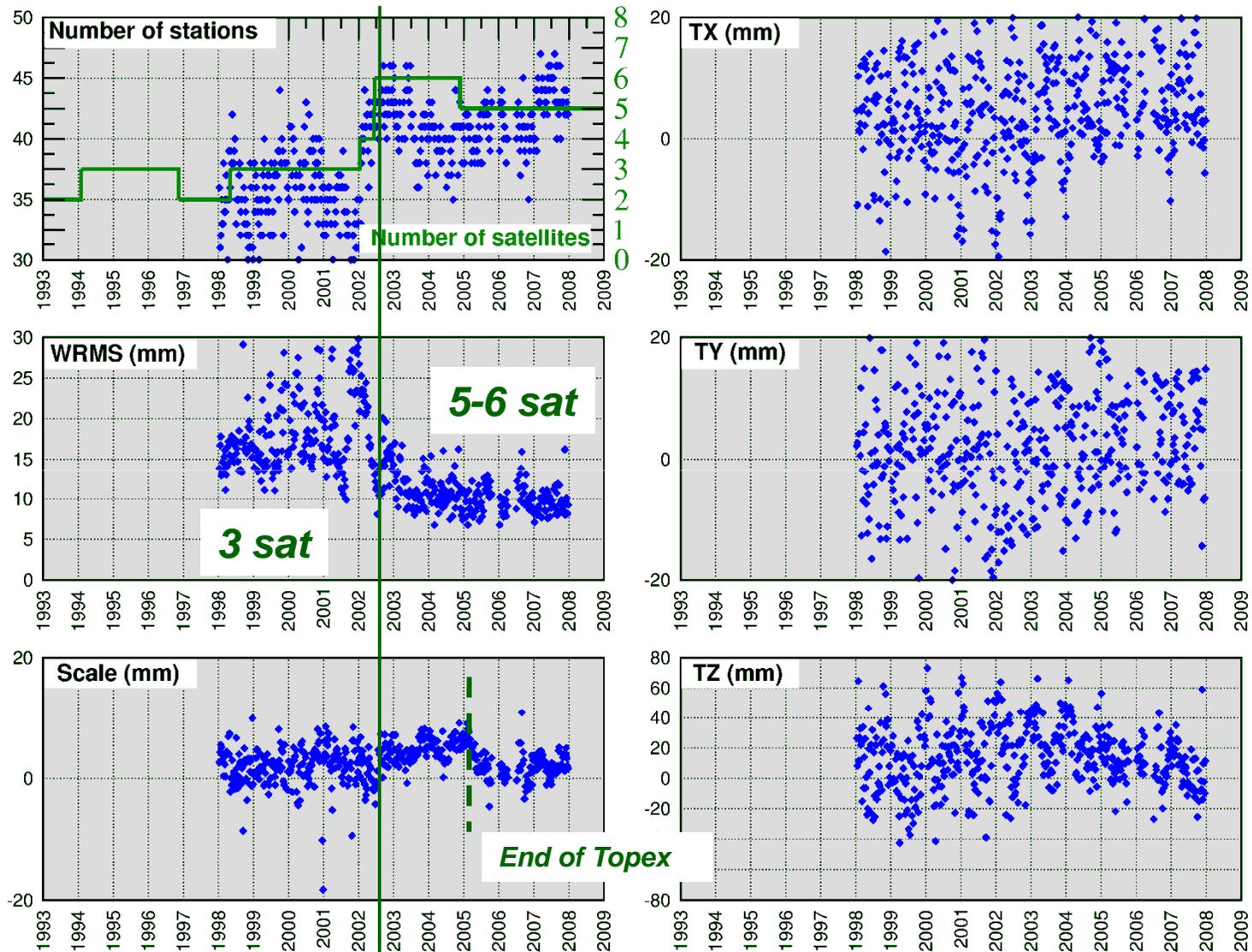
Per AC contribution: gauwd06 & gscwd06

gauwd06

*gscwd06*
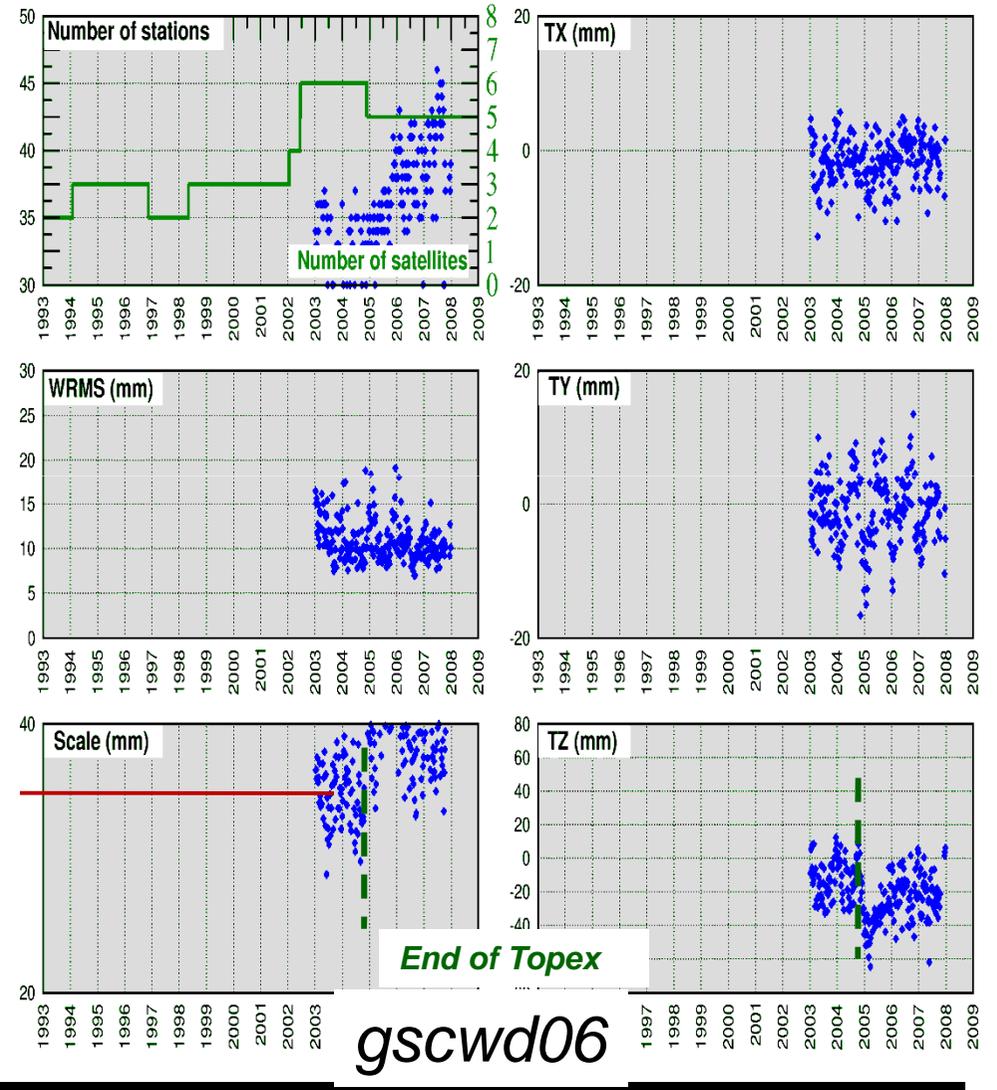
# Satellite constellation & Stations network
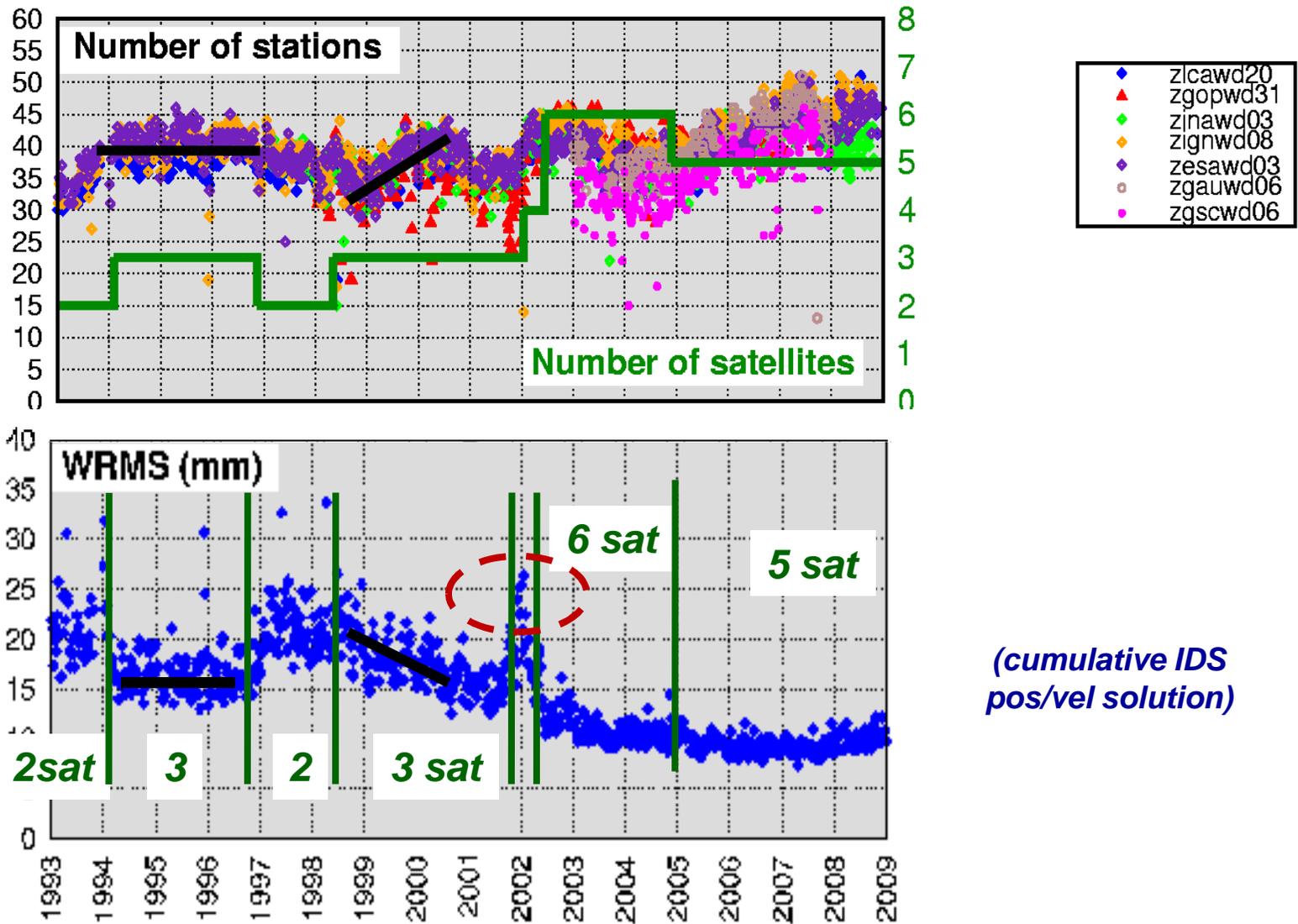
IDS-1 Analysis: open points

- Anormal wrms or Scale/TZ behaviour :

    - end of 2001 up to 1st quarter of 2002 (solar & geomagnetic activity?)
    - 2008 (Spot 5 solar panel orientation change, less Spot2 data, other?)

- Satellite constellation change impacts (scale)

- Best combination strategy, from each AC contribution?
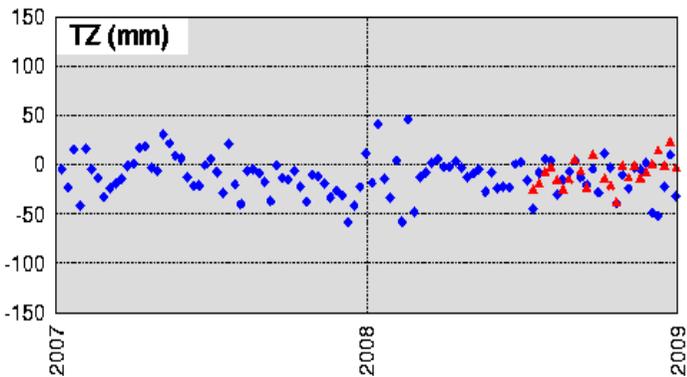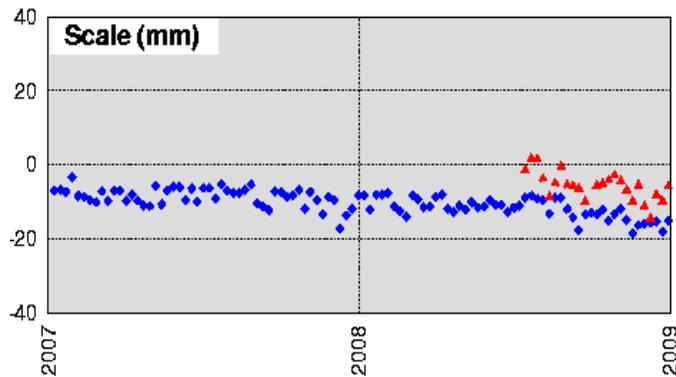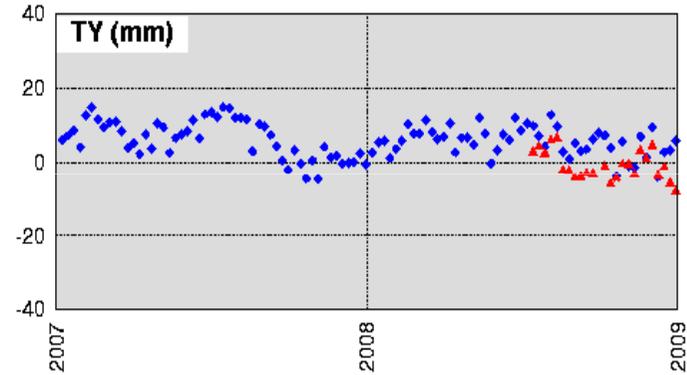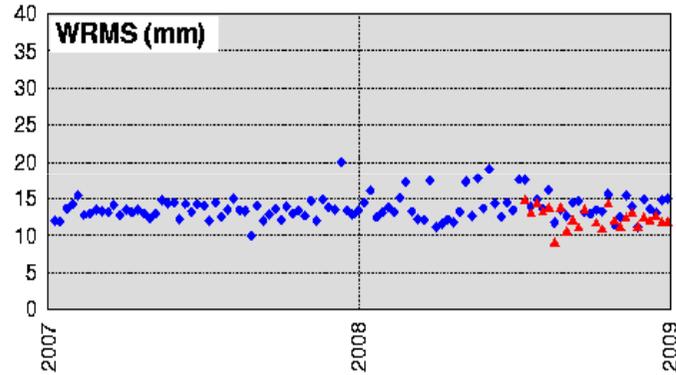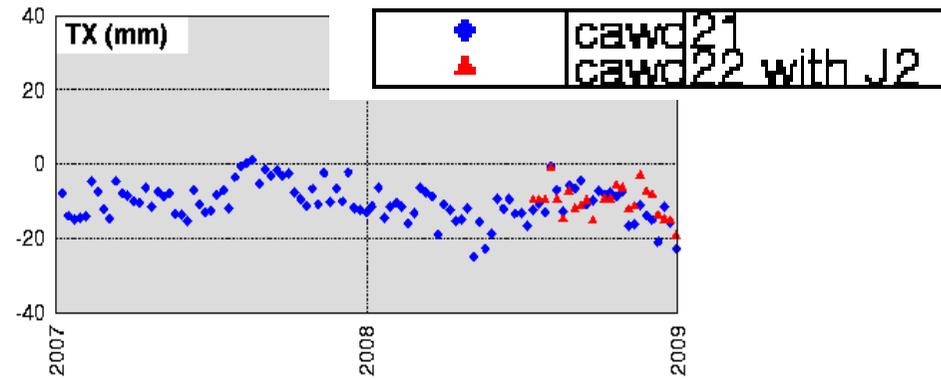
For further investigation :
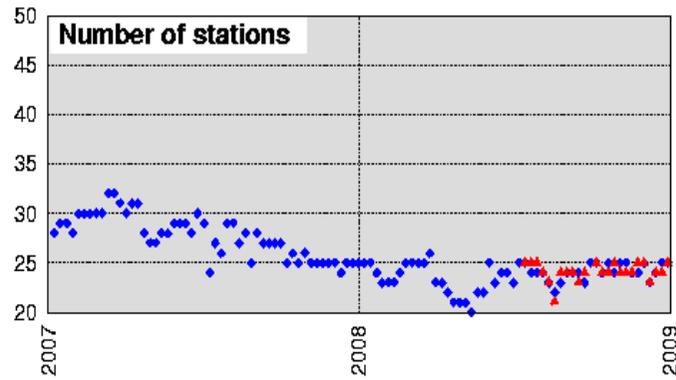
> Exhaustive DORIS system event files (SSALTO + Central Bureau)

> Per AC series analysis on line
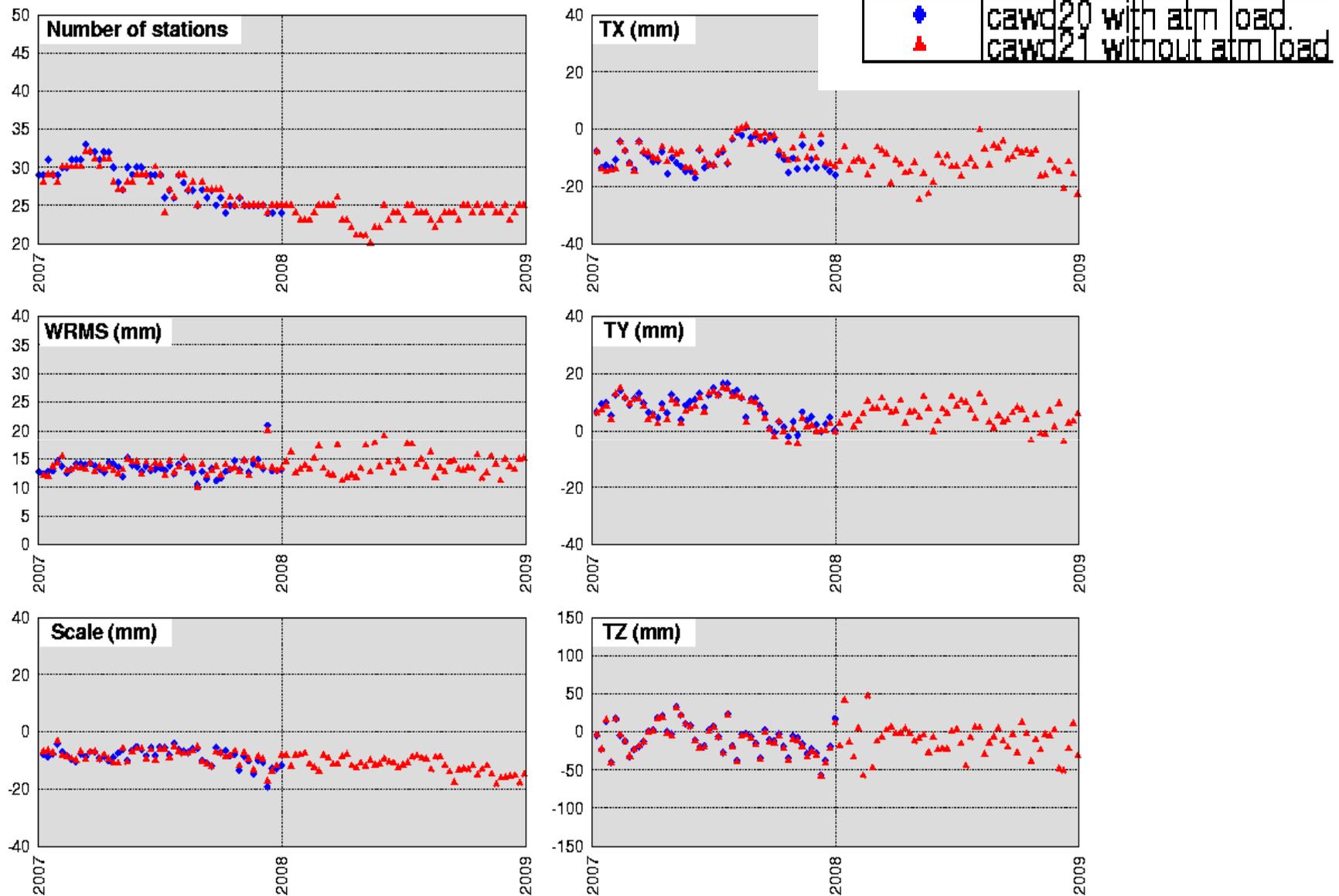
IDS-2 : esawd04 Jason-2 test (vs ITRF2005)
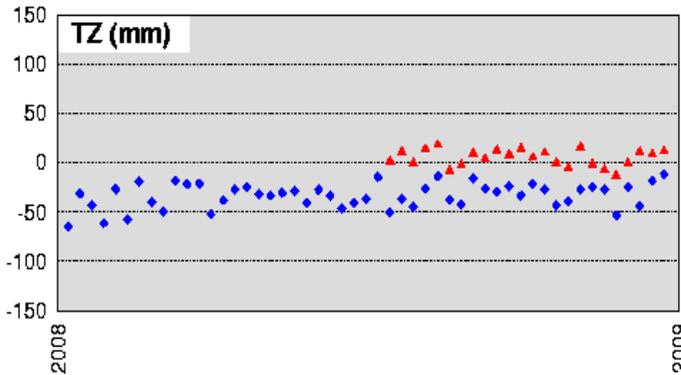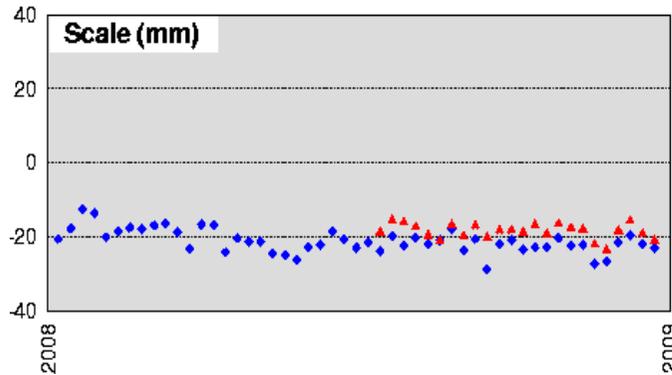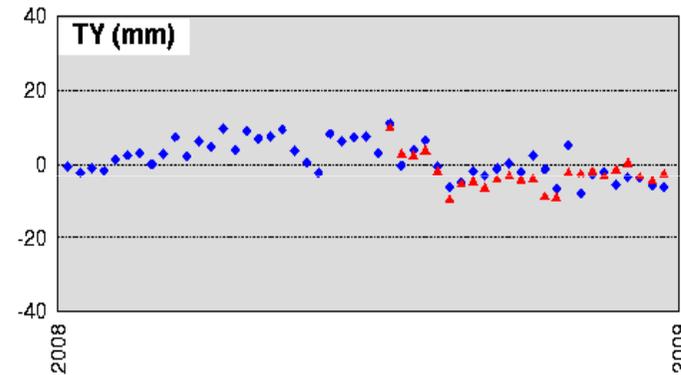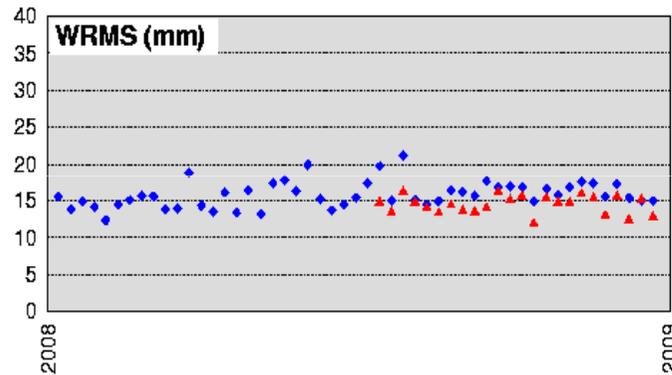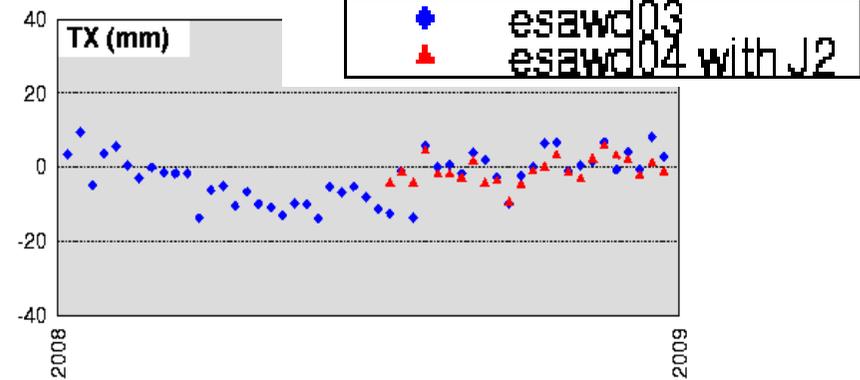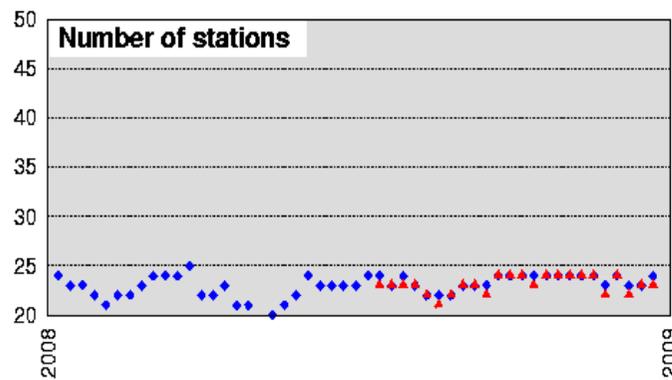
IDS-2 : lcawd22 Jason-2 test (vs ITRF2005)

10 mm

IDS-2 : lcawd21 test without atm. loading

IDS AWG, Paris 23-24 March 2009

IDS-2: …

- IDS-1
  - See also Z. Altamimi IDS-1 validation
  - See also P. Yaya IDS-1 stations analysis
  - To be done : on line stations time series & IDS discontinuities refinement

- IDS-2
  - March 2009 AWG discussions…
  - Deadline & planning for ACs test-production & Combinations