

Analysis of DORIS stations coordinates long time series with CATREF software

JJ. Valette¹, Z. Altamimi²

¹ CLS, Collecte Localisation Satellites, France

² Institut Géographique National, Marne-La-Vallée, France



Summary

IDS station coordinates time series

CATREF software for TRF analysis

Weekly series cumulative combination per Analysis Center

**First combination of 2004 weekly solutions
(after station events filtering)**

Perspectives

IDS station coordinates time series

Analysis Center (AC)	AC abbrev	Team-Contact	Software	Data span	Constraints
IGN-JPL (France-US)	ign	P. Willis Y Bar-Sever	GIPSY	Since 1993	Loose (10 m)
INASAN (Russia)	ina	S. Tatevian S. Kuzin	GIPSY	1993-2005	Loose
LEGOS/CLS (France)	lca	J.F. Cretaux L. Soudarin	GINS/DYNAMO	1993-2005	Loose (10 m)
Geoscience Australia NASA/GSFC (Australia-USA)	gsc	R. Govind F. Lemoine	GEODYN	2004	Loose (5m)

(weekly series - sinex)

CATREF software for TRF

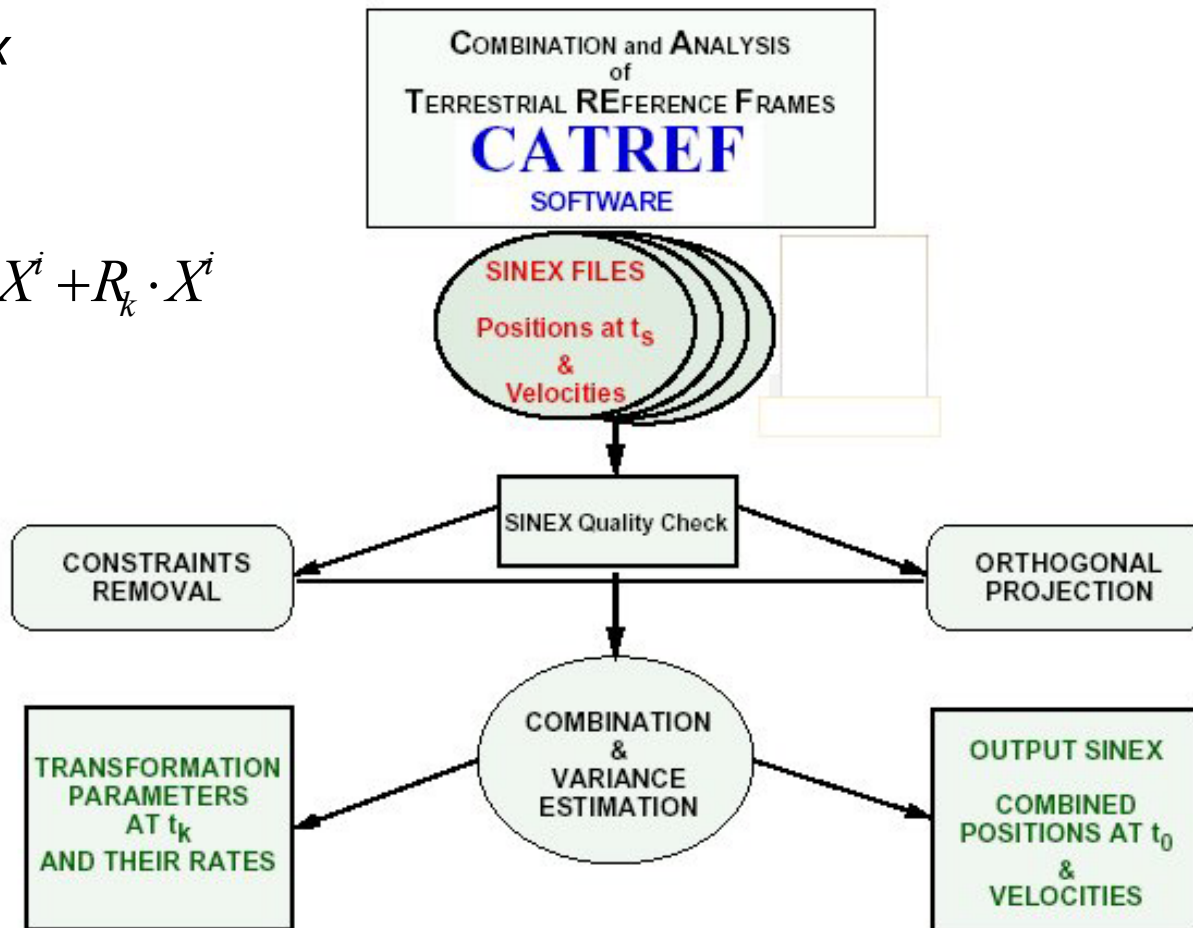
Positions + (var-cov) matrix

$$X_s^i, \Sigma_s^i$$

$$X_s^i = X^i + (t_s^i - t_0) \cdot \dot{X}^i + T_k + D_k \cdot X^i + R_k \cdot \dot{X}^i$$

Geocenter (TRF origin)

Scale



Weekly time series cumulative combination

Period: 1993-2005

Satellites:

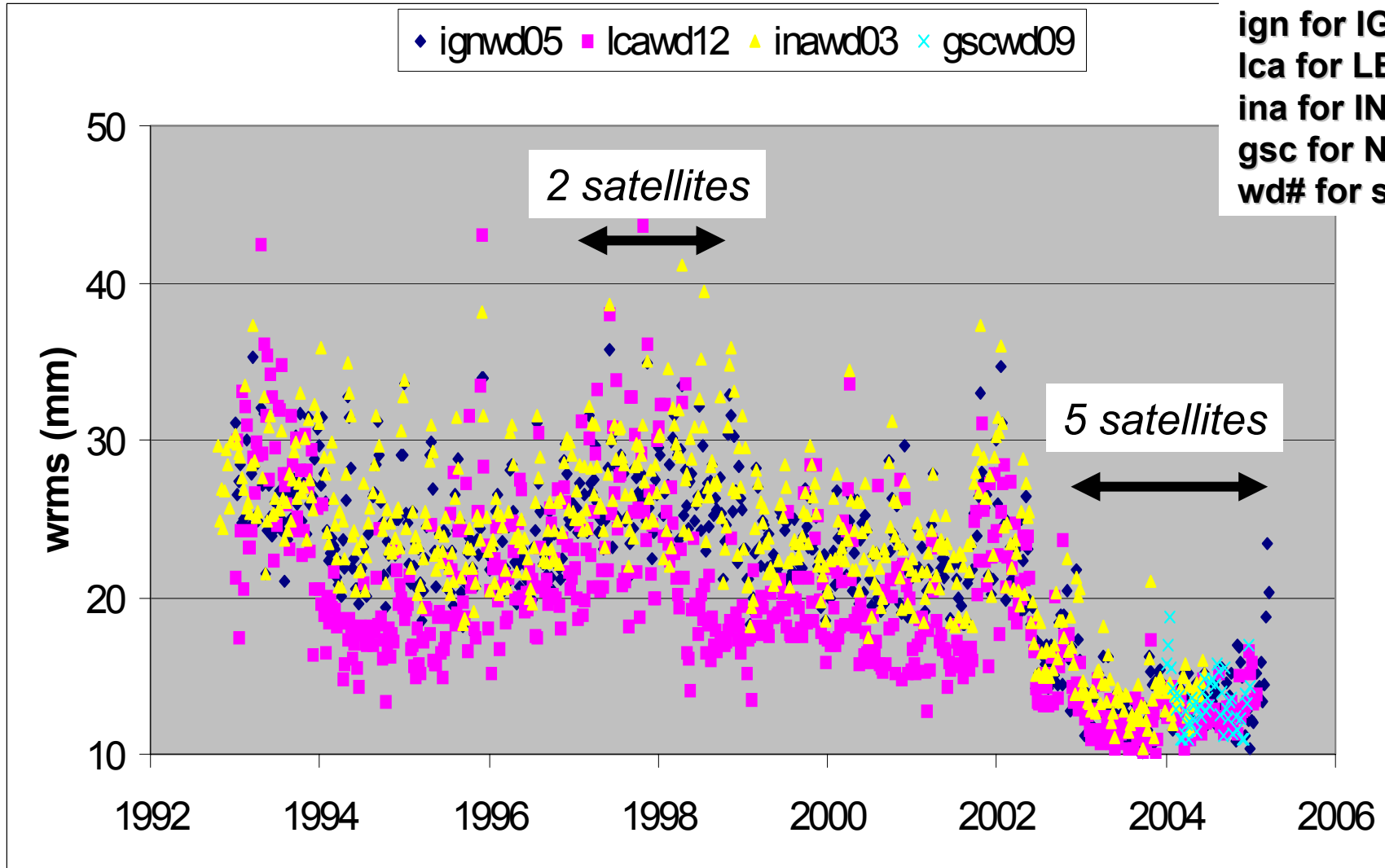
- Spot 2-3-4-5*
- Topex/Poseidon*
- Envisat*

Jason not considered (SAA)

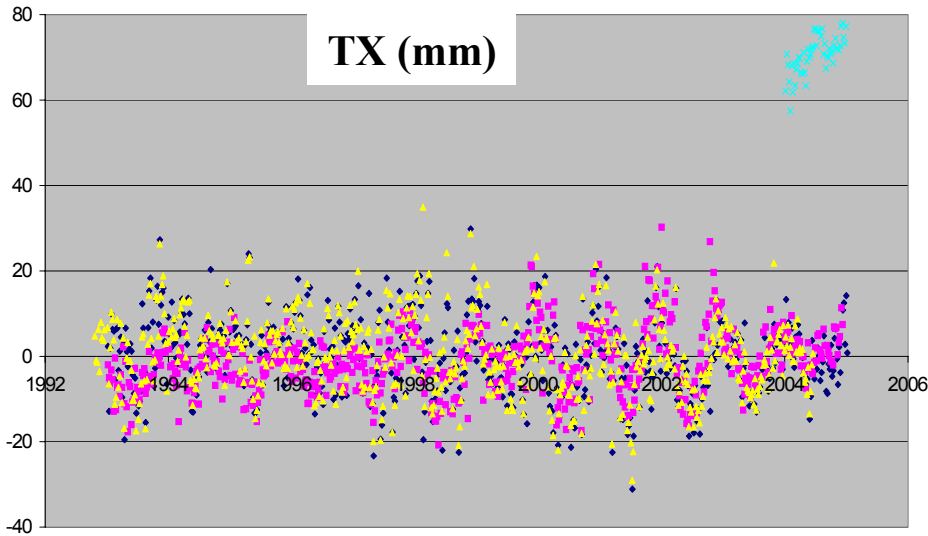
CATREF without EOPs

Combination per Analysis Center

Weekly cumulative combination – weighted rms



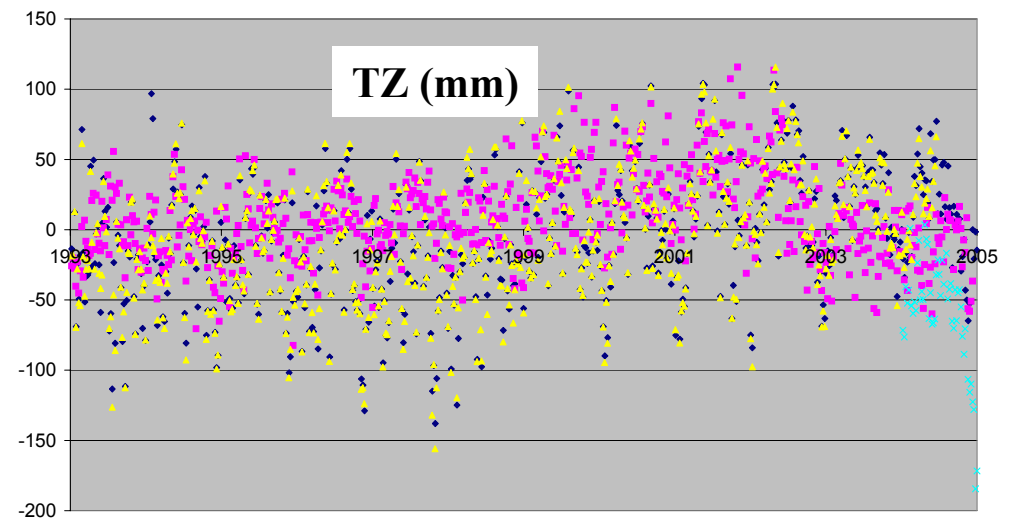
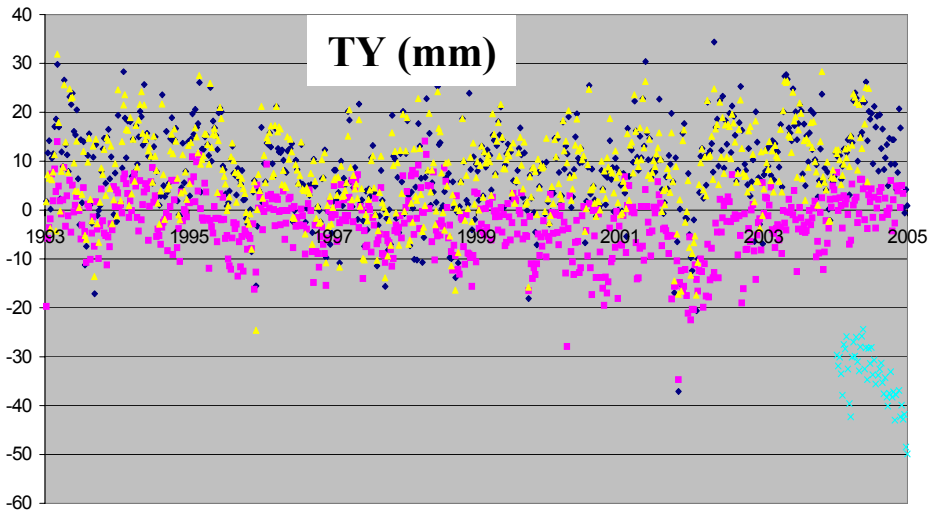
Weekly cumulative combination - Translations



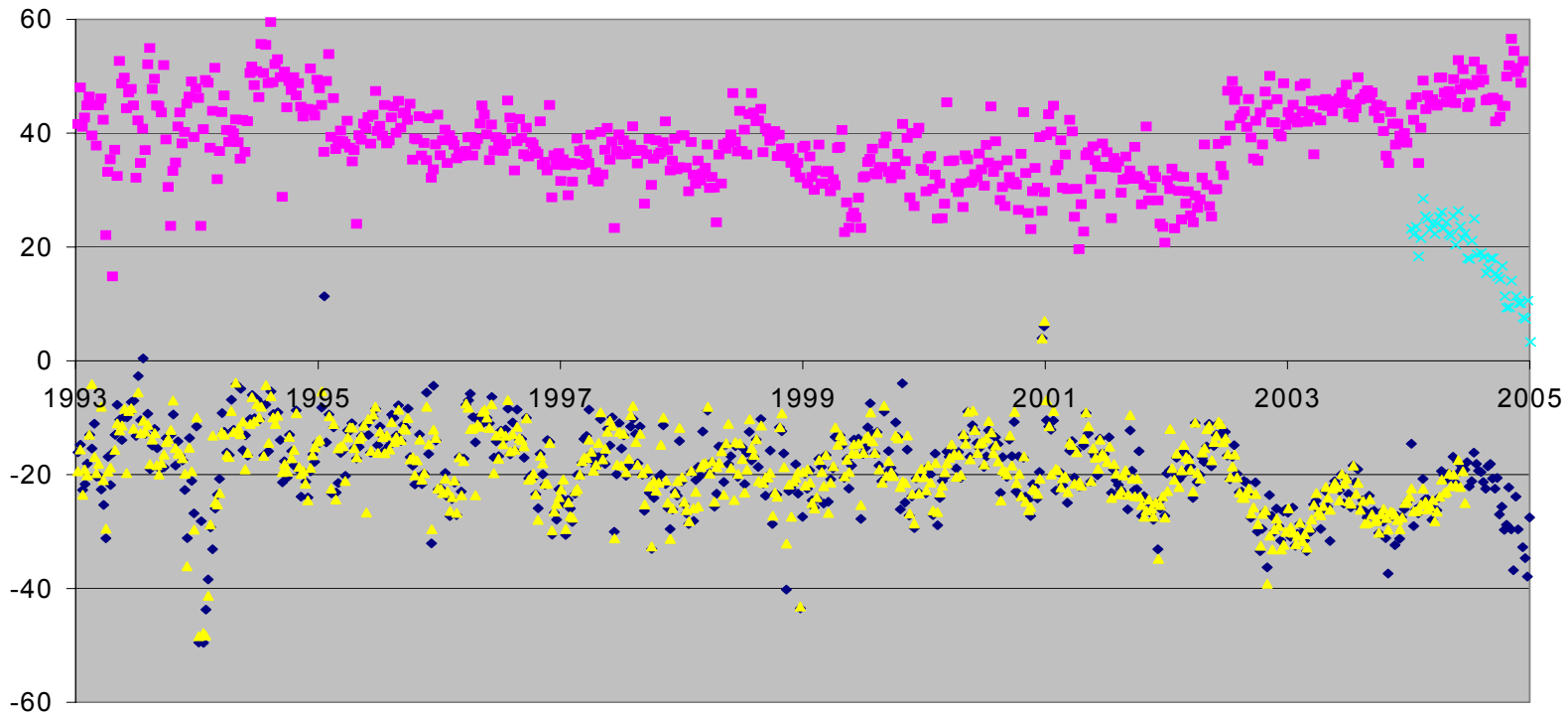
TX +/- 20 mm, annual signal after 1997
remaining reference system effect with gsc

TY more scattered from [-20,30]
a 15 mm bias in a-ign versus lca

TZ the most spread [-50,70] in 2003.
behaviour changes after 2002 for lca



Weekly cumulative combination – Scale (mm)



/ discrepancy of 60 mm nearly 10 ppb (origin?)

**/ behaviour change for all of the series after 2002
(Spot5 in May, Envisat in Jan.)**

Weekly cumulative combination per AC

Result:

The processing of the same DORIS data by different softwares show TRF discrepancies mainly in

- > scale
- > Z origin translation

Question:

What is the origin of the discrepancies?

- > model errors (measurements & estimation parameter strategy)

Comment:

ina & ign analysis centers that run the same software have the closest results

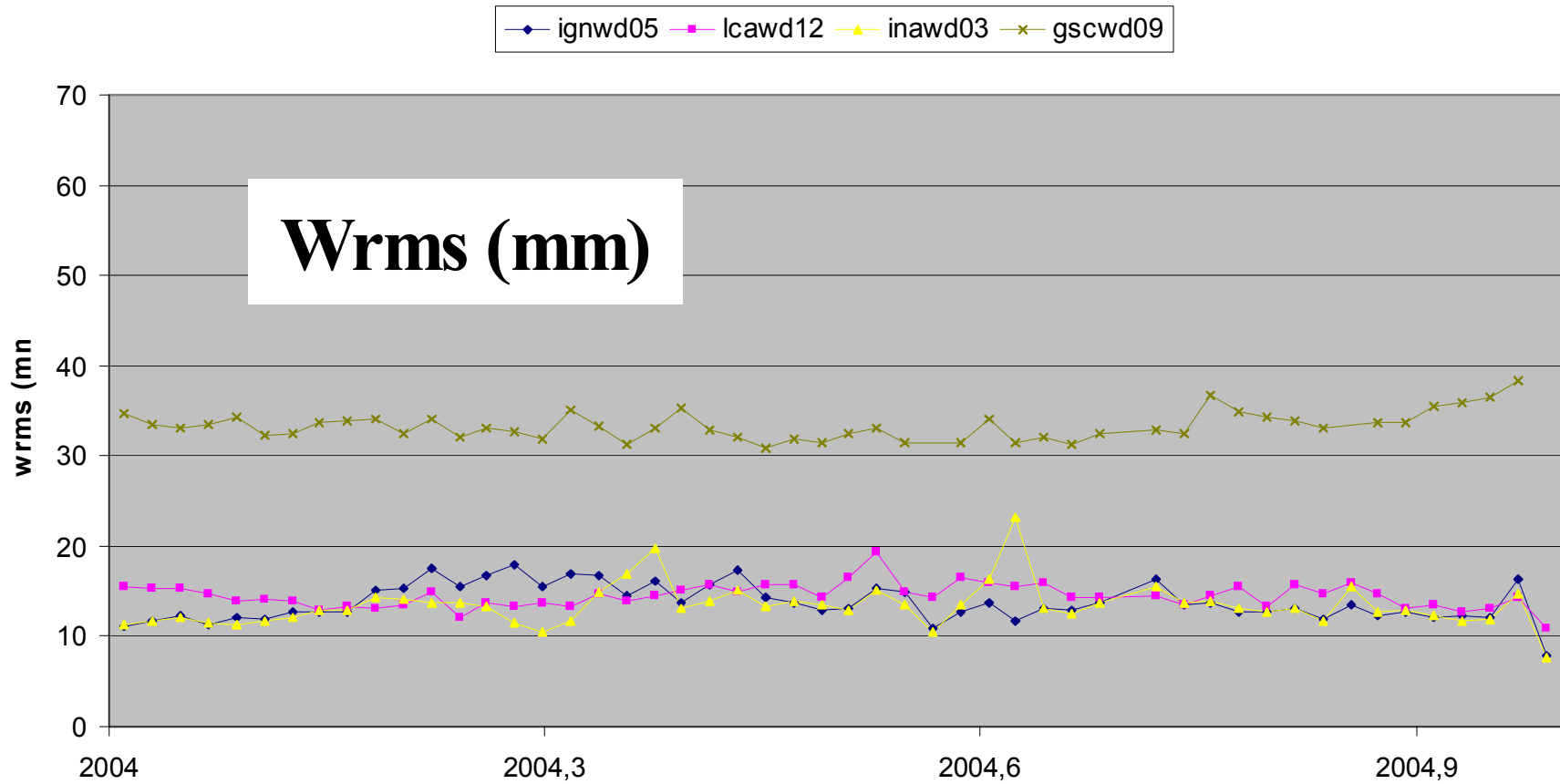
First combination of 2004 weekly solutions

- **Objective:** to test a DORIS combined solution per week
- **Condition:** at least 3 independent ACs series (software)
- **Opportunity:** 2004
- **Method:**
 - 1/ input 2004 sinex after station high residual editing (CATREF per AC combination)
station number : 59 for ign or lca, 47 for gsfc or ina
 - 2/ sinex filtering of DORIS station events
 - 3/ per week 4 sinex combination, CATREF with positions only
datum definition:
 - 3.a) arbitrary, ign fixed (not presented here)
 - 3.b) a provisory “2005 DORIS datum” (Z. Altamimi)

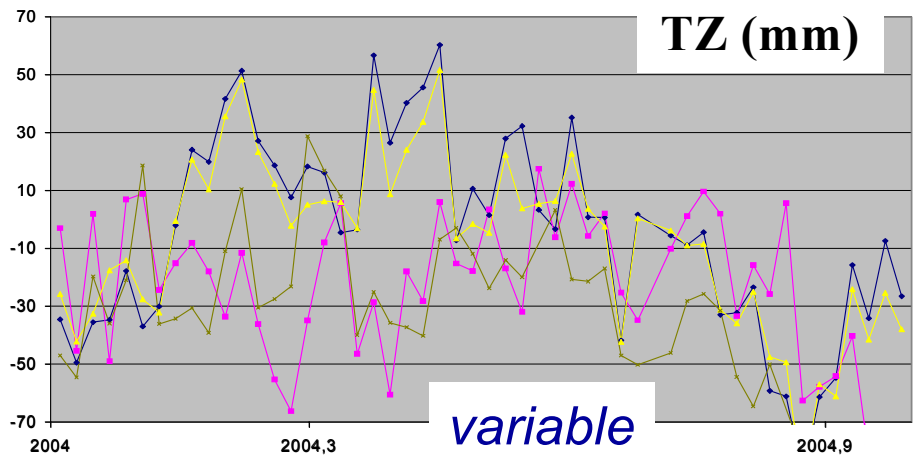
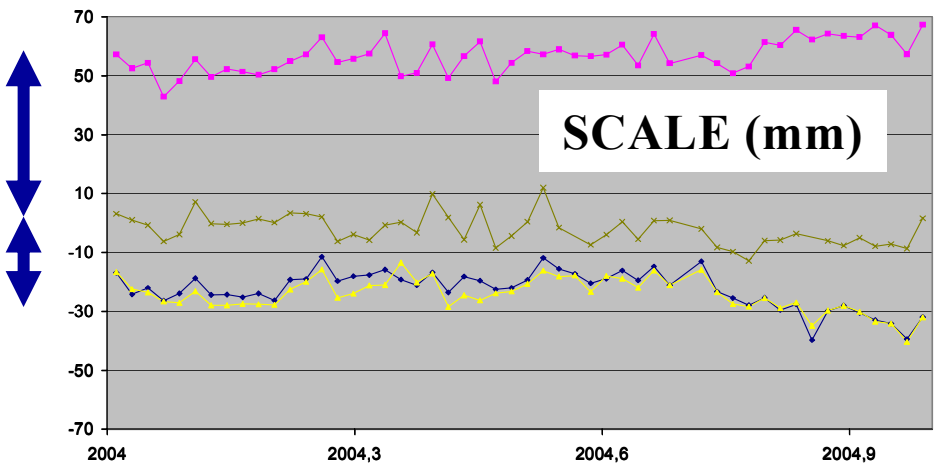
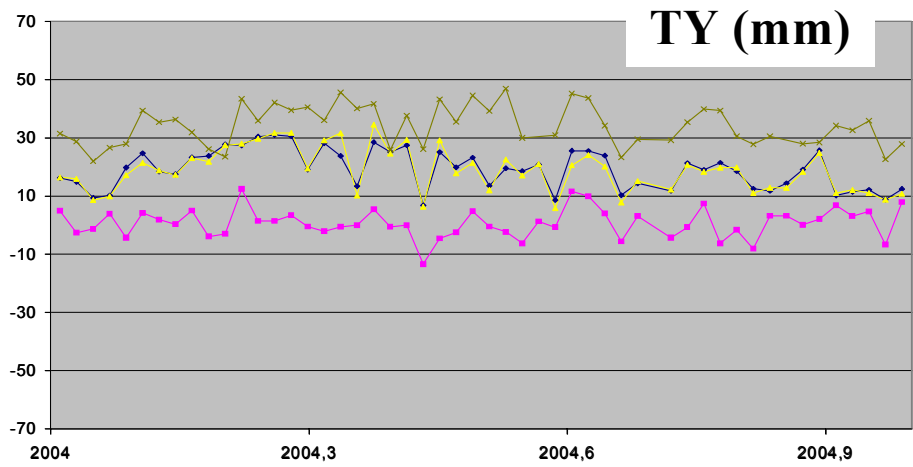
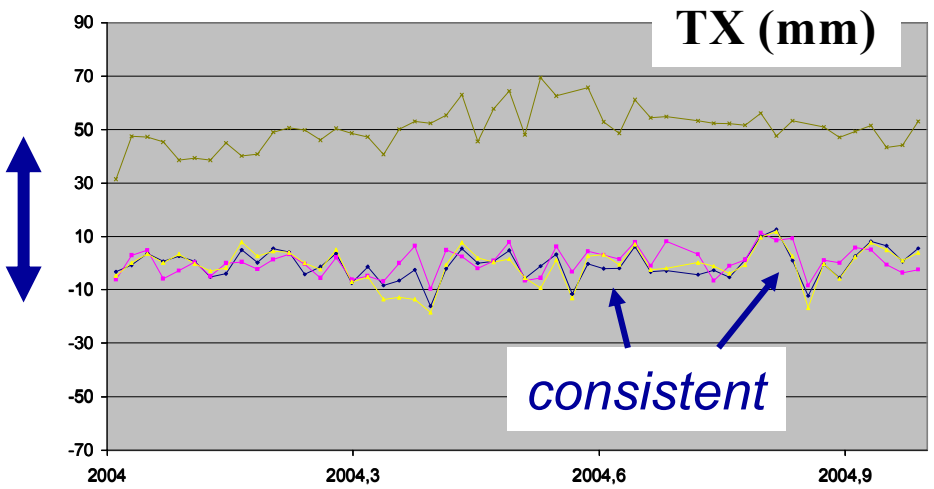
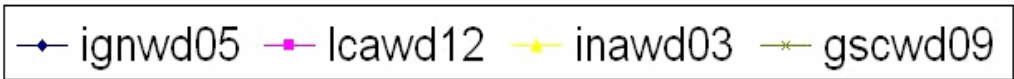
2004 weekly combinations : station filtering

- **2005 work to identify stations failures**
by M. Feissel-Vernier (coordinator) with IDS Central Bureau support
by P. Willis, J. Ries, L. Soudarin to define core networks (Jason-1
POD, ITRF2004)
- **Criteria :**
insufficient number of obs.
antenna instability or non-linear motion
discontinuities

2004 weekly combin. : wMrs (mm)



2004 weekly combin. : TRF parameters



First combination of 2004 weekly solutions

TRF discrepancies show identical features as per AC cumulative combination (scale & Z translation)

ina & ign analysis centers that run the same software have the closest results, however not strictly identical

biais with gsc

2004 weekly combin. : residuals (mm)

	EAST	NORTH	UP
gsc	49	34	30
ign	15	15	12
ina	15	15	12
lca	20	13	17

Perspectives

- **Consolidation of 2004 combination (open to discussion)**
 - | longer period?
 - | sat. by sat.?
 - | recommendations to ACs
 - | other combination approach
 - | ...
- **Ponderation of the AC solutions (ign&ina)?**
- **Combinations from other groups & softwares**
- **Wish for at least 4 ACs continuously delivered weekly solutions**

THANKS TO THE ANALYSTS!