



Research activities for continued improvement in the DORIS contribution to the reference frame

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- **IDS Combination Center**
- **IDS 2010 campaign**
 - Genesis
 - First results
- **Routine combination**
 - Context
 - Status
 - First results



- **IDS contribution to ITRF2008**

In line with the efforts from all the 7 IDS Analysis Centers which were successfully finalised by the first contribution of DORIS to an ITRF realization, IDS has decided to **move the Combination Center to an operational service.**

- **Missions of the Combination Center**

Support the ACs in the continued improvements of the DORIS products
Routine evaluation and combination

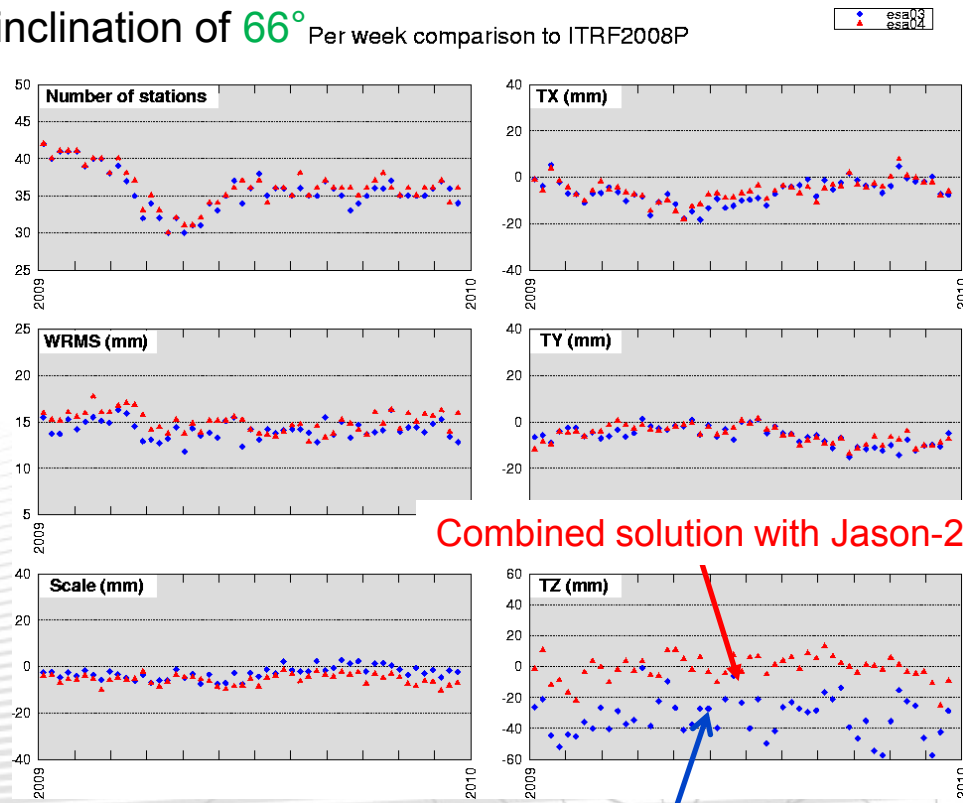
All these missions are carried out with the CATREF Software from IGN



Genesis of the IDS 2010 Campaign

- June 2008, launch of Jason-2
 - First mission with on board the latest DORIS receiver evolution (DGXX type)
 - DORIS USO has been developed to be not perturbed by the SAA (unlike Jason-1)
 - Receiver can track up to 7 beacons at the same time (before max = 2)
 - DORIS daily observations number: Jason-2 ~ Spot4 + Spot5 + Envisat
 - First mission since Topex with orbit inclination of 66° Per week comparison to ITRF2008P

- At the end of 2009, most of all ACs have delivered solutions with and without Jason-2
- Evaluation of solutions with and without Jason-2 shown a positive impact in the Tz of adding Jason-2





Scope of the IDS 2010 Campaign

→ Questions

Is the positive effect due to Jason-2 ?

If so, what is the origin ?

Orbit ?

Benefit of 7 dual frequency measurement channels ?

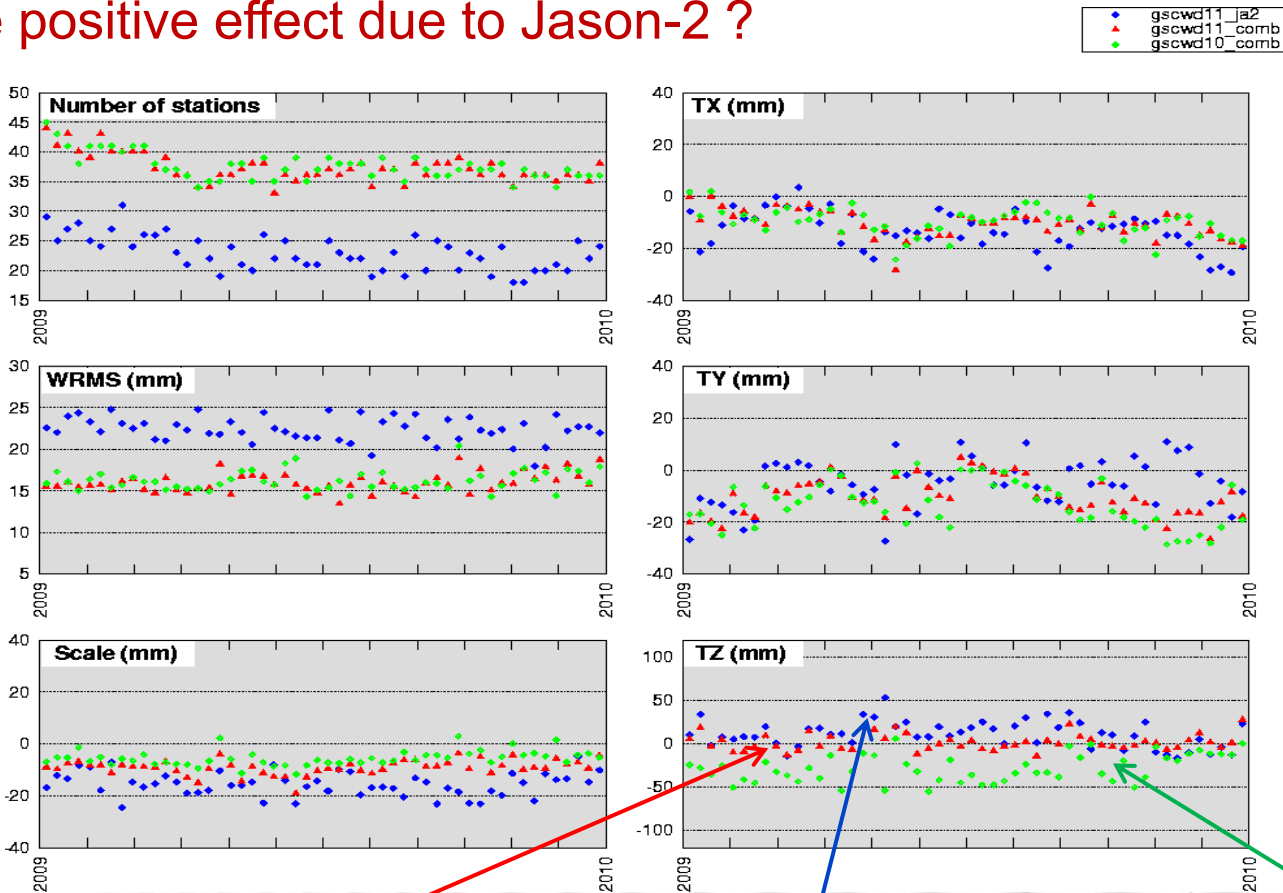
→ IDS 2010 campaign

Single satellite (Envisat, Jason-2, Spot2, Spot4 and Spot5) solutions over 2009 from IDS Analysis Centers (ESA, GAU, GOP, GSC, IGN and LCA)



First results of IDS 2010 campaign...

Is the positive effect due to Jason-2 ?



Combined solution with Jason-2 Jason-2 solution only Combined solution without Jason-2

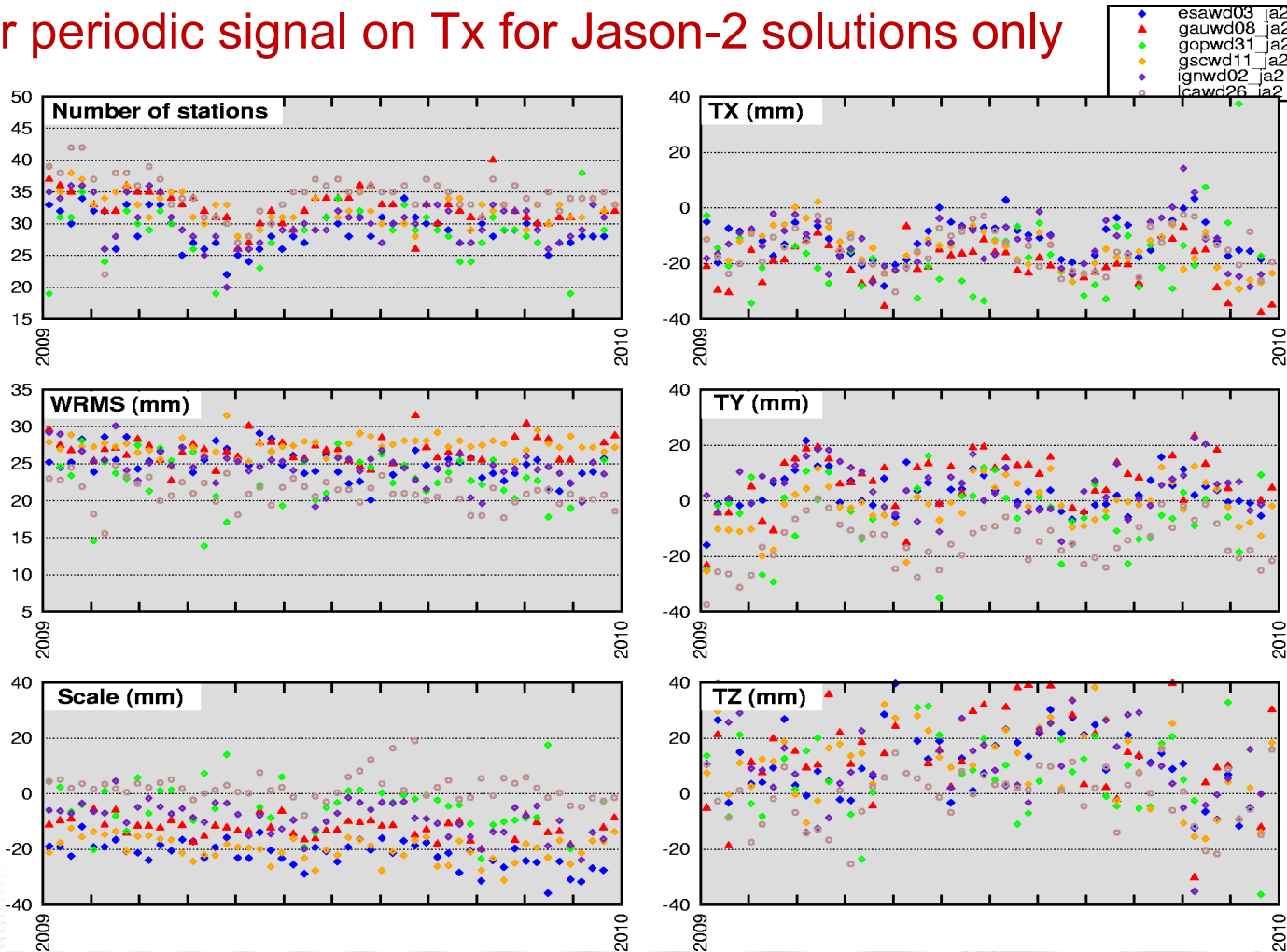
YES (reason could be more observations on Jason-2 than over all the other missions)

Still to come: test for Jason-2 with 2 channels only (Jason-1 like)



First results of IDS 2010 campaign...

Clear periodic signal on Tx for Jason-2 solutions only



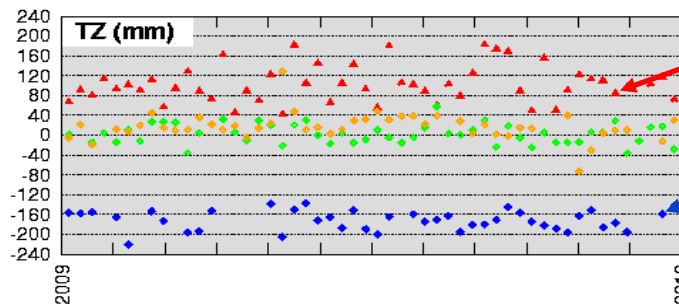
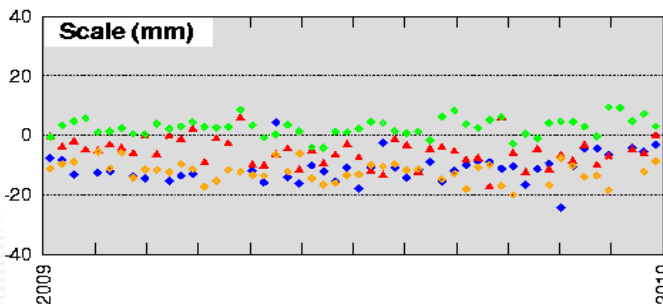
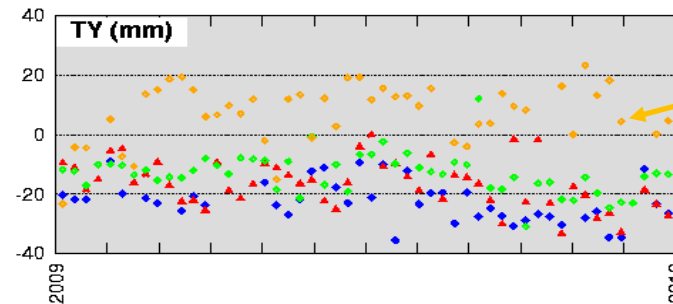
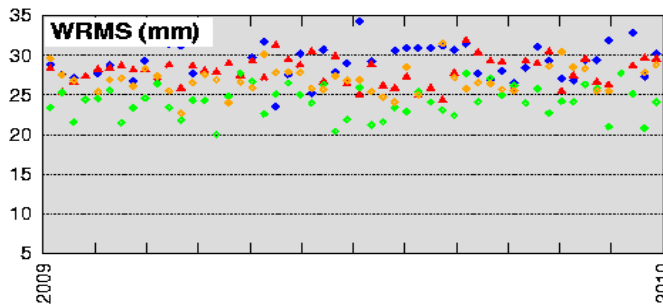
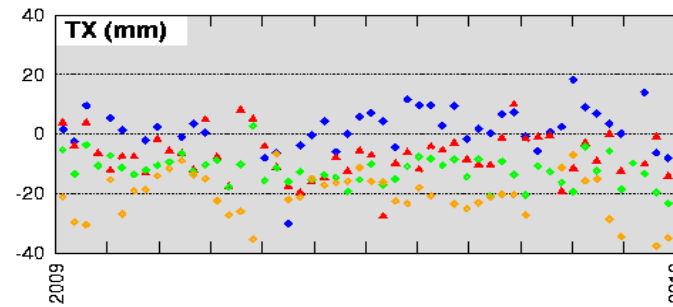
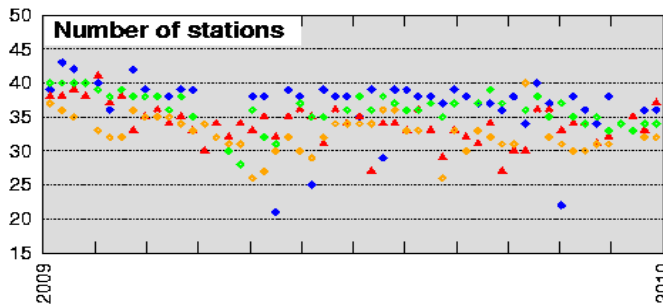
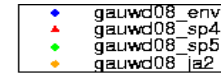
period = 120 days
(solar beta prime
period for Jason-2)

Nonconservative force mismodelling is affecting the Tx and Tz geocentr recovery



First results of IDS 2010 campaign...

Two satellites (Spot4 and Envisat) are Tz outliers



→ Ongoing studies on COM, macromodel and attitude



- **Functional scheme**

- Each three months, all the ACs deliver three months of weekly SINEX solutions
 - ex: at the end of march 2011, delivery of latest 13 weeks of 2010
- Evaluation step of all individual combined solutions
 - Can require some iterations with some of the Acs
- Weekly combination
- Evaluation of the combination
 - Can initialize some new campaigns

- **Status of the routine combination**

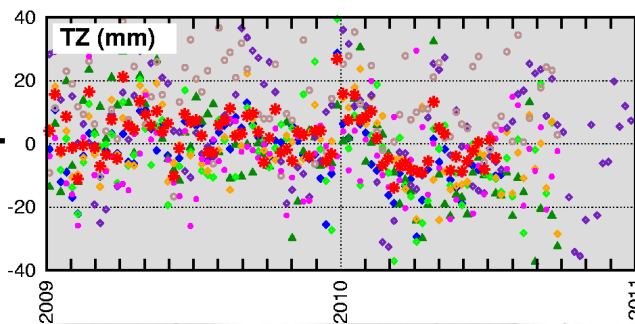
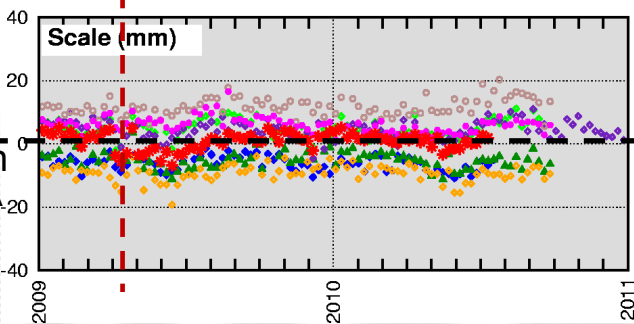
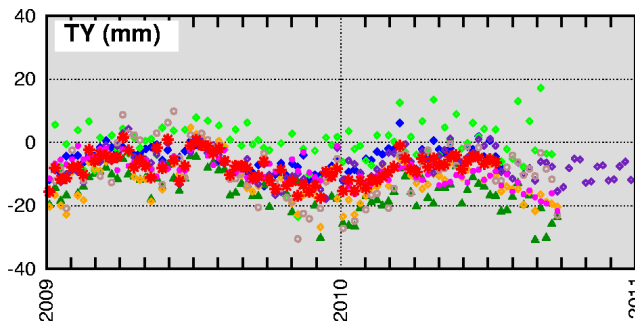
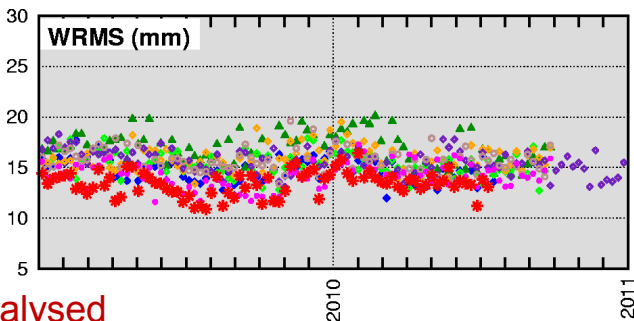
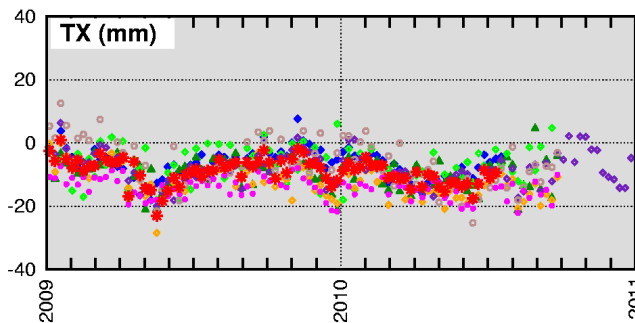
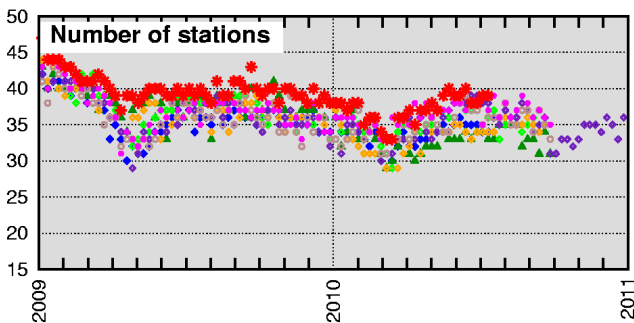
- First version of combination from begin of 2009 to middle of 2010
- Needs some functional improvements
- Some utilities have still to be developed (ex: generation of a delivery report)



Routine Combination – First results (1/2)

Per week comparison to ITRF2008P

- ◆ esawd04
- ◆ gauwd09
- ◆ gopwd32
- ◆ gscwd11
- ◆ ignwd08
- ◆ inawd07
- ◆ cawd26
- ◆ idswd01



Jump to be analysed

2 groups of Acs
wrt to scale sign
>0 GOP IGN INA LCA
<0 ESA GAU GSC

Tz	Mean	Std
ESA	-3.22	9.46
GAU	-2.61	15.27
GOP	-2.32	12.96
GSC	-0.77	10.94
IGN	5.16	18.28
INA	15.87	15.04
LCA	-4.54	10.75
IDS	2.06	8.07



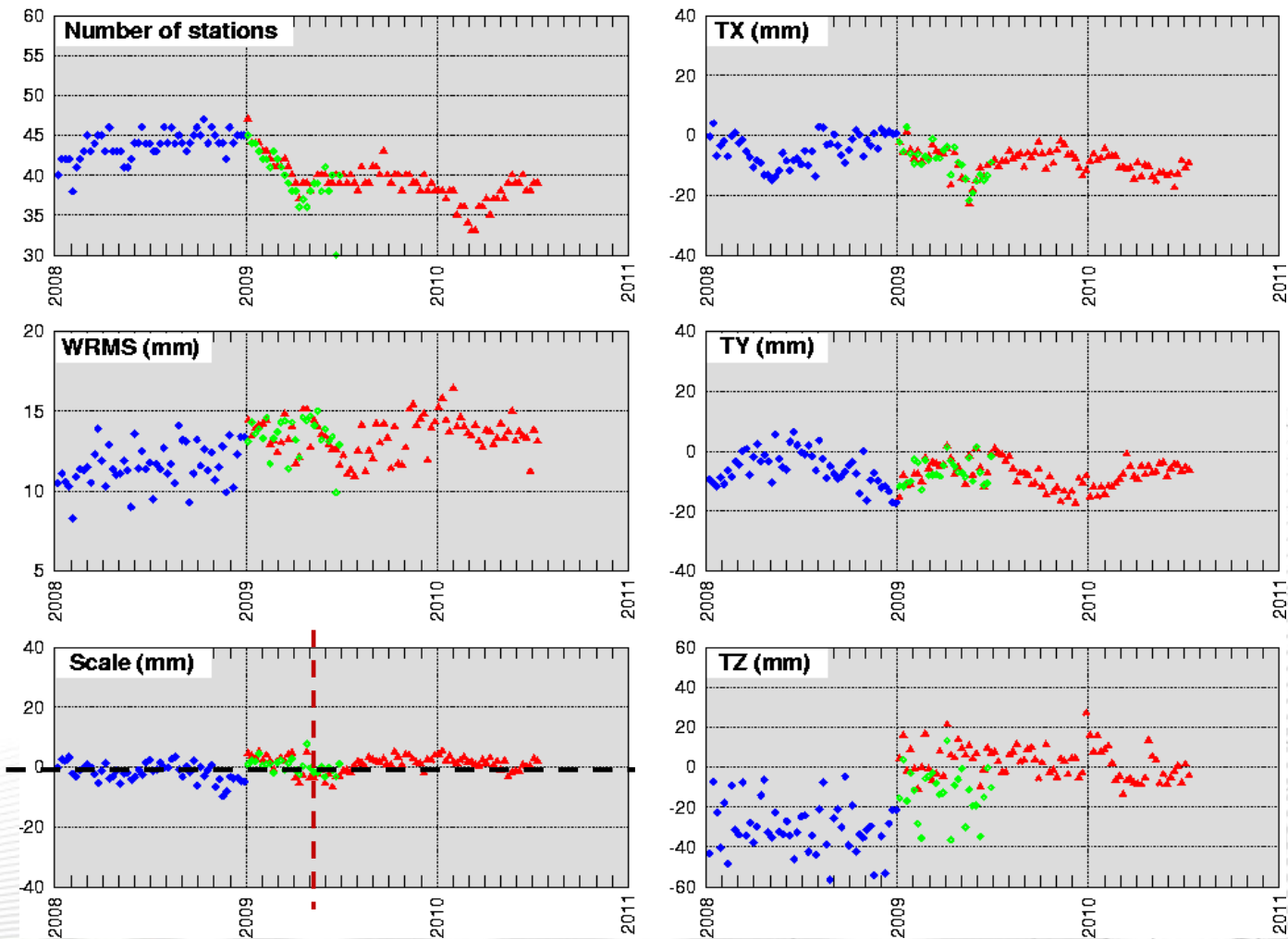
Routine Combination – First results (2/2)

Scale : jump still present in the combined solution without Jason-2 but smaller than with Jason-2 included
Tz : there is a jump due to Jason-2 – but Tz is now closer to zero

IDS-3
(ITRF2008 DORIS
contribution)

Routine
combination
without Jason-2

Routine
combination with
Jason-2





Conclusions

- Jason-2 makes big impact on solutions – but nonconservative force mismodelling affect the Tx and Tz geocentr recovery.
- Single satellite campaign shows that SPOT-4 and Envisat are outliers wrt Tz – Analysis is ongoing to determine the reason.
- IDS-3 (ITRF2008) combination has been extended to 2010
- Other satellites to consider in the future
 - Cryosat-2 – launch in april 2010 – data already analyzed by the ACs
 - SARAL/Altika – ISRO/CNES altimetry mission – launch in 2012