EGU2016-3240 - IDS evaluation of the DORIS versions of the DTRF2014, ITRF2014 and JTRF2014 solutions

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Outline

- **DTRF2014, ITRF2014 and JTRF2014 by numbers.**
- **Evaluation of IDS 09 series wrt DTRF2014, ITRF2014 and JTRF2014.**
  - ➔ **Comparison of Helmert parameters (scale, translations).**
  - ➔ **Assess of positioning performances.**
- **POD evaluation of DTRF2014, ITRF2014 and JTRF2014.**
- **Conclusions**
- **IDS News**

DTRF2014, ITRF2014 and JTRF2014 by numbers

Solution	DTRF2014	ITRF2014	JTRF2014
Producer	DGFI	IGN	JPL
Nb of files	1	1	1838
Nb of DORIS sites	71	71	71
Nb of DORIS stations	153	160	159
Nb of discontinuities	46	62	24*
Nb of epochs	199	222	
Nb of distinguishable velocities	148	127	
Nb of vertical velocities with $\sigma \leq 1$ mm/yr	123	196	
Nb of horizontal velocities with $\sigma \leq 1$ mm/yr	106	160	
Post-seismic deformation	No	Yes (7sites; 13 stations)	No
Velocity constraints over successive epochs	No	Yes	Yes

No velocity

- DGFI stations = IGN stations – {BELB, GR4B, MAUB, MOSB, NOUB, SOEB, SYQB}, i.e. stations with less than 300 days of observations.
- JPL stations = IGN stations - BELB

- Nb of epochs: 151 in common between DGFI and IGN.

Horizontal & Vertical Velocities

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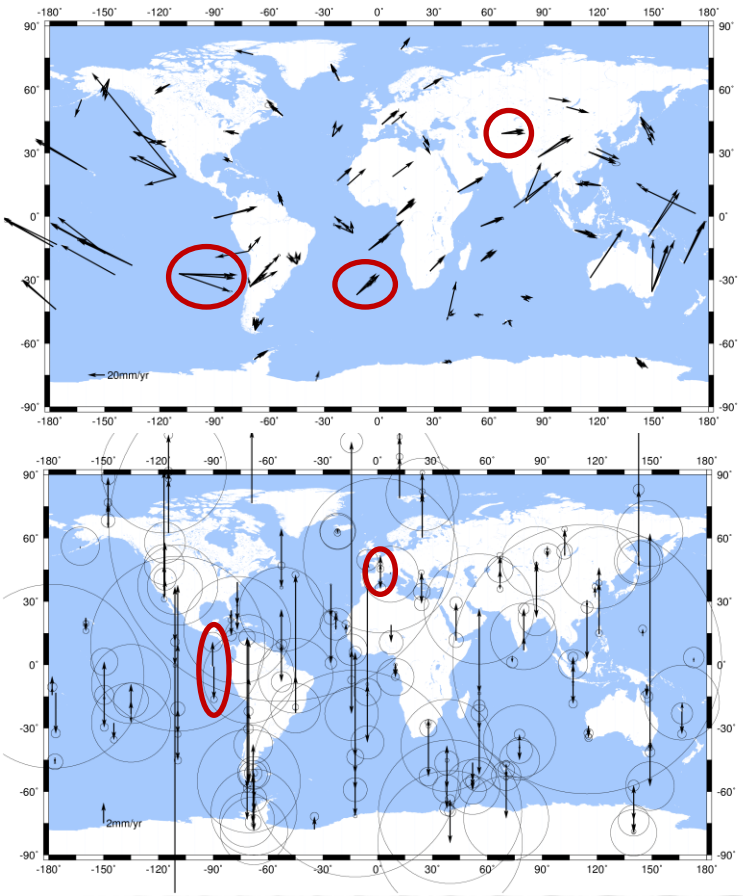
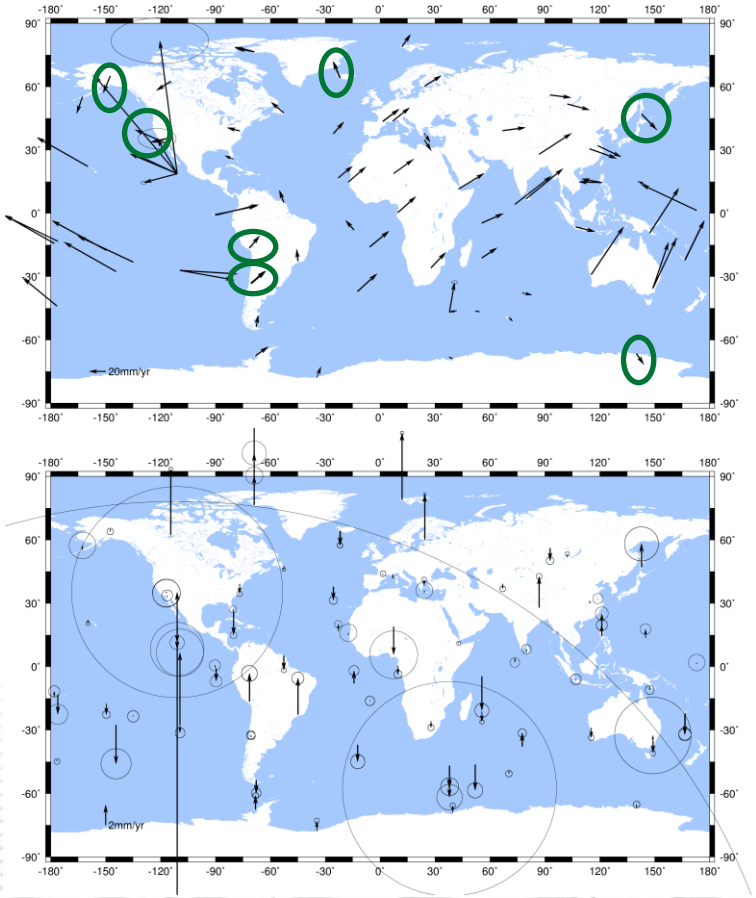
DTRF2014



ITRF2014

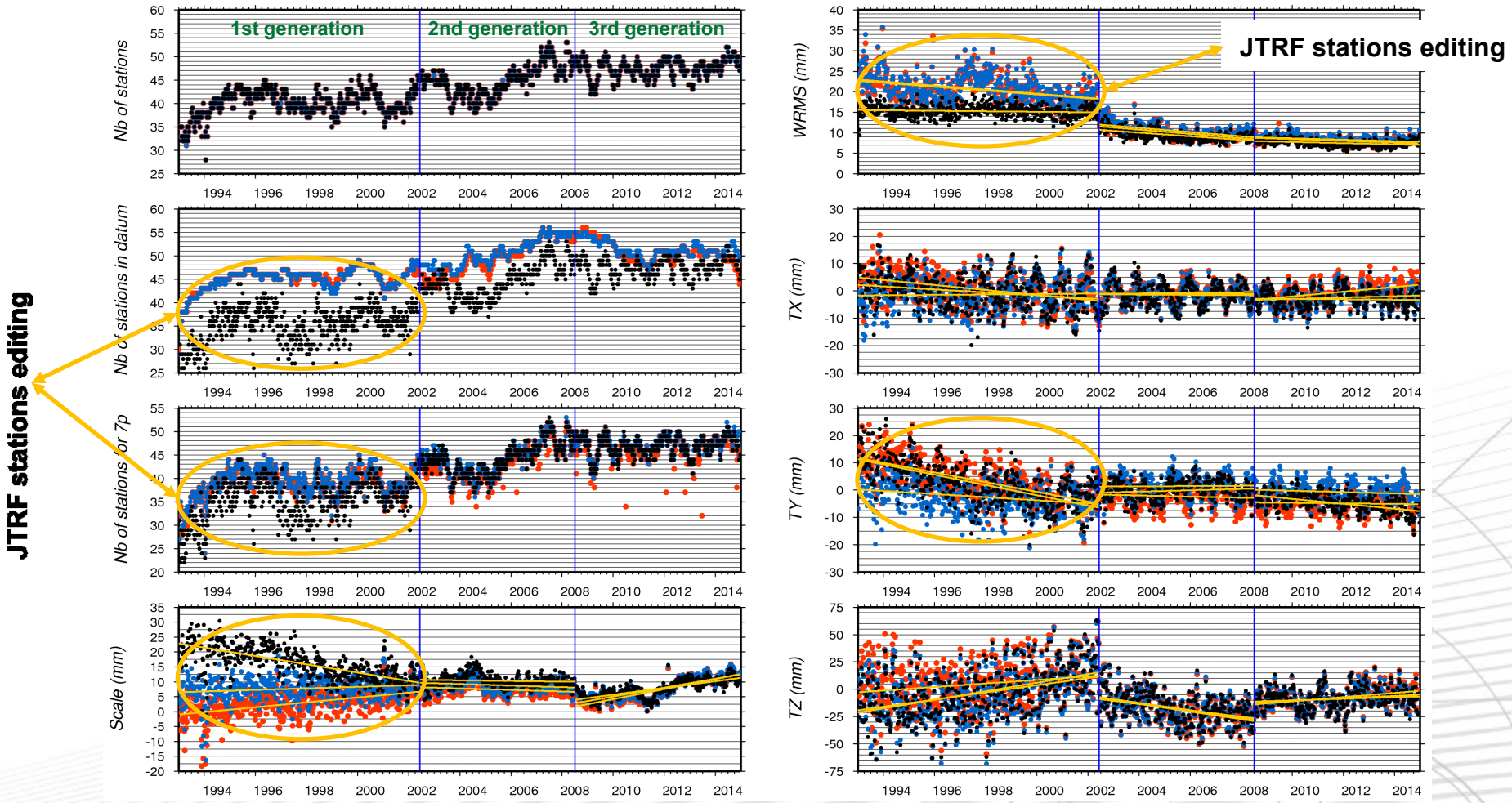


No velocity constraints over successive epochs
➔Sites with similar velocities.
➔ Larger formal errors.
➔ Sites with vertical opposite velocities (ex: Galapagos, Toulouse…)

Uncomplete representation by linear model of velocities at sites with Post-Seismic Deformation:
Arequipa,
Fairbanks,
Goldstone,
Reykjavik,
Santiago,
Terre-Adélie,
Yuzhno-Sakhalinsk

Helmert Parameters as seen through IDS 09

IDS 09 vs DTRF2014 / ITRF2014 / JTRF2014



- **Main differences on the scale and Ty between 1993 and mid 2002, i.e. with 1st generation of DORIS receivers.**
- **ITRF2014 gives lower trends and lower stds of transformation parameters.**

Positioning Performances as seen through IDS 09

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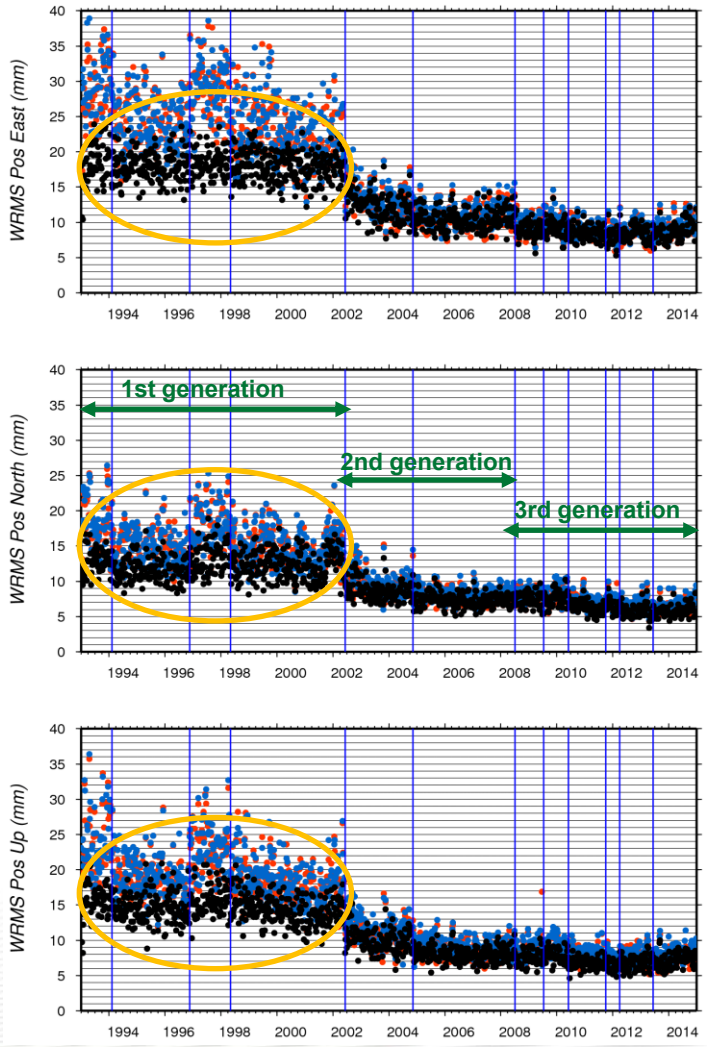
IDS 09 vs DTRF2014 / ITRF2014 / JTRF2014



- Similar results from DTRF2014 and ITRF2014.
- JTRF2014 gives lower WRMS, especially between 1993 and mi-2008 (1st generation of DORIS receivers). Must be the consequences of
  i) a more aggressive data editing,
  ii) capturing more than secular variations.
- Performances in North are the best due to the geometry of the orbits.
- WRMS are correlated with the DORIS receiver generations.

		DTRF2014	ITRF2014	JTRF2014
1993.0-2002.5	North	15.5 ± 3.1	15.7 ± 3.2	12.3 ± 1.9
	East	24.9 ± 4.8	25.1 ± 4.8	18.0 ± 2.2
	Up	19.7 ± 3.8	20.0 ± 3.9	14.7 ± 2.1
2002.5-2008.5	North	8.5 ± 1.5	8.8 ± 1.5	7.9 ± 1.3
	East	11.5 ± 2.0	12.0 ± 2.1	11.1 ± 1.8
	Up	9.6 ± 1.8	10.2 ± 1.9	8.8 ± 1.6
2008.5-2015.0	North	7.0 ± 1.2	7.3 ± 1.2	6.5 ± 1.1
	East	9.0 ± 1.3	9.3 ± 1.2	8.7 ± 1.2
	Up	8.0 ± 1.3	8.3 ± 1.2	7.1 ± 1.0
Tie RMS [mm]	#64	28	23	

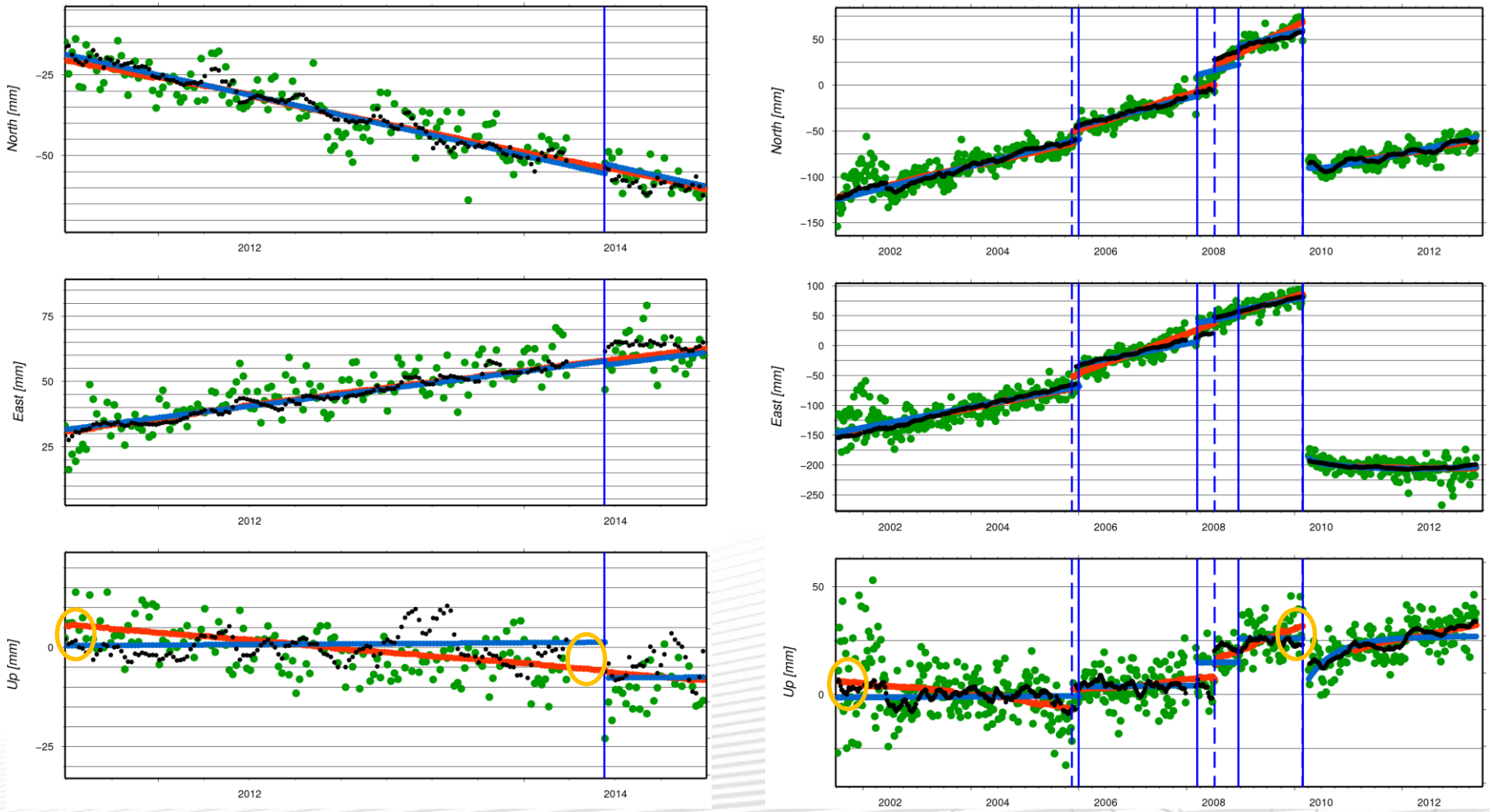
Coordinate Time Series – Terre Adélie, Santiago

IDS 09 vs DTRF2014 / ITRF2014 / JTRF2014 in ITRF2014

Terre-Adélie (ADGB – Antarctica)

ITRF2014 discontinuity
DTRF2014/JTRF2014 discontinuity

Santiago (SANB – Chile)



Post-seismic corrections vs linear model ➔ differences of the order of 5 mm

POD evaluation of DTRF2014 and ITRF2014 wrt DPOD2008 v1.14

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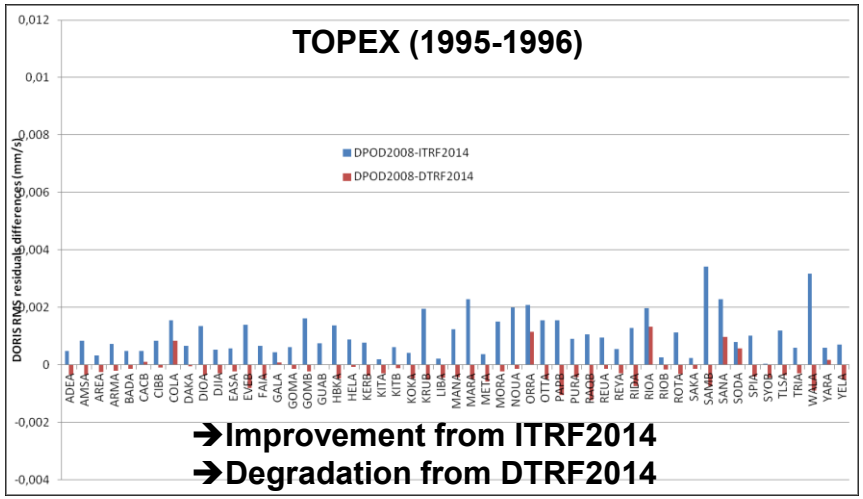

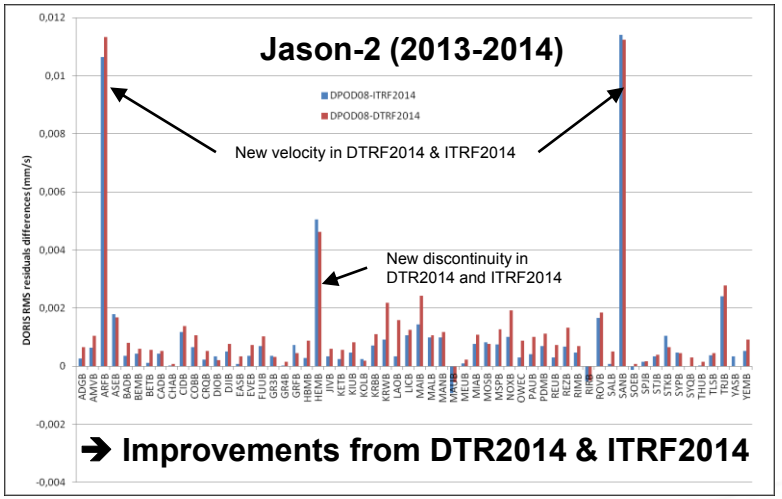

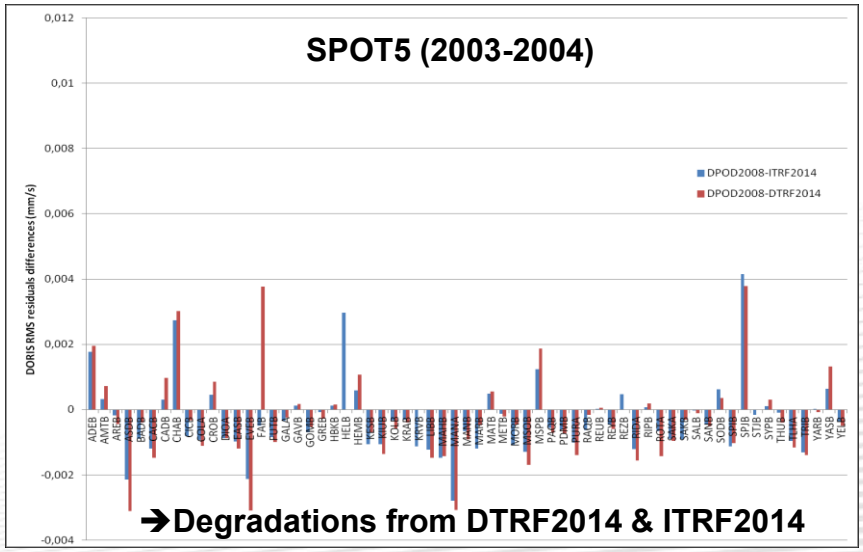

		TOPEX	SPOT5	Jason-2
DORIS RMS [mm/sec]	DPOD2008	0.481	0.342	0.322
	DTRF2014	0.482	0.345	0.320
	ITRF2014	0.478	0.344	0.321
RMS of Radial differences wrt DPOD2008 [mm]	DTRF2014	6.6 ± 0.6	1.8 ± 0.6	1.7 ± 0.3
	ITRF2014	2.8 ± 0.5	1.9 ± 0.5	1.3 ± 0.2
Mean Z-offset wrt DPOD2008 [mm]	DTRF2014	12.7 ± 1.2	-3.1 ± 1.2	-1.7 ± 0.9
	ITRF2014	-4.8 ± 0.1	-3.6 ± 0.8	0.1 ± 0.9

Radial differences are correlated to the scale differences.
Z-offset is correlated to the Tz Helmert parameter differences.

Conclusions

- **DTRF2014**
  - + Helmert parameters(scale after 2002 only)
  - + Positioning performances similar to ITRF2014.
  - - Geophysicall meaning of some vertical velocities
  - - 7 missing stations
- **ITRF2014**
  - + Stability of the Helmert parameters
  - + Velocities
  - + PSD correction
  - - PSD correction maintenance
- **JTRF2014**
  - + Positioning performances
  - - Scale before 2002
  - - Missing stations before 2002
  - - - No velocity ➔ can not be extended after 2015.0

➔ **IDS CC will include the ITRF2014 solution as the reference.**

➔ **IDS CC will re-estimate mean position and velocity of stations with PSD corrections for its own POD needs.**

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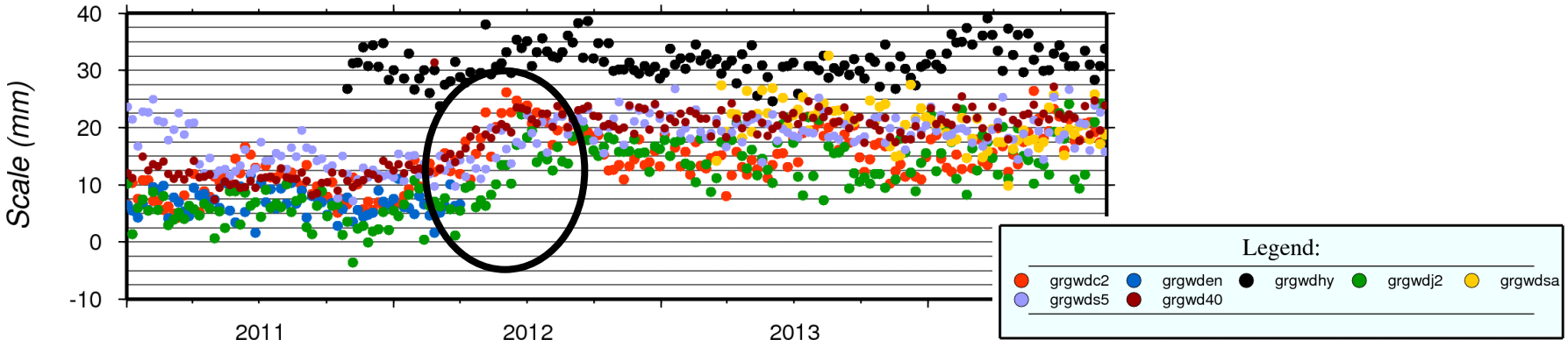
- **Scale increase 2011/2012**



  - Correlated with the change in the tropospheric modeling in the GDR standards: from CNET (GDR-C) to GPT/GMF (GRD-D).
    ➔ more « unflagged » data at lower elevations
  - Date of change is mission dependent
    ➔ Scale increase of the multi-satellite and combined solutions is not a jump.
  - IDS ACs need to do their own preprocessing.

- **New DORIS missions**
  - ✓ Jason-3 (since January 2016).
    USO may have a SAA sensibility.
  - ✓ Sentinel-3A (since February 2016).

- **Next IDS Analysis Working Group**
  - ✓ Delft, The Netherlands, May 26-27.
  - ✓ La Rochelle, France, Oct. 31/Nov. 1.

IDS NewsLetter

Editorial

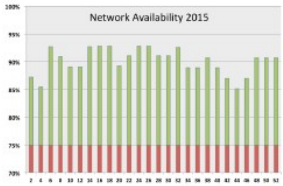
This is the first issue of the Newsletter of the International DORIS Service. The intention is to improve the flow of information within the community of providers and users of DORIS data and products, to highlight the activities of the groups participating in the IDS, and to bring the DORIS and IDS news to a wider audience, from the host agencies to the other sister services. We plan to provide regular information on the DORIS system, in particular the evolution of the space and ground segments, and the life of IDS, such as news from the service's components, meetings, analysis activities, results. Everybody is encouraged and invited to contribute to the Newsletter on any topic considered of important interest for the community. Send your material at any time to the IDS Central Bureau.

We hope you enjoy reading the IDS Newsletter and that it stimulates your interest in the data, products and applications of the DORIS system.

A high performing network

Jérôme Saunier (IGN)

DORIS provides a reliable service in 2015 with a network availability maintained over 85% of operating stations thanks to the joint effort of CNES, IGN and all agencies hosting the stations.



(Data courtesy of CNES)

The network availability rate is expressed as a percentage of operating ground network stations.

It is far above the 75% line, which is the minimum CNES target to ensuring a good performance of the DORIS system.

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