



IDS REPORT 2016

IERS Directing Board Meeting

Vienna, AUSTRIA

April 17, 2016

IDS IERS members:

Hugues Capdeville (CLS),
Jean-Michel Lemoine (CNES)
Jérôme Saunier (IGN)

Guilhem Moreaux (CLS)
Pascale Ferrage (CNES)



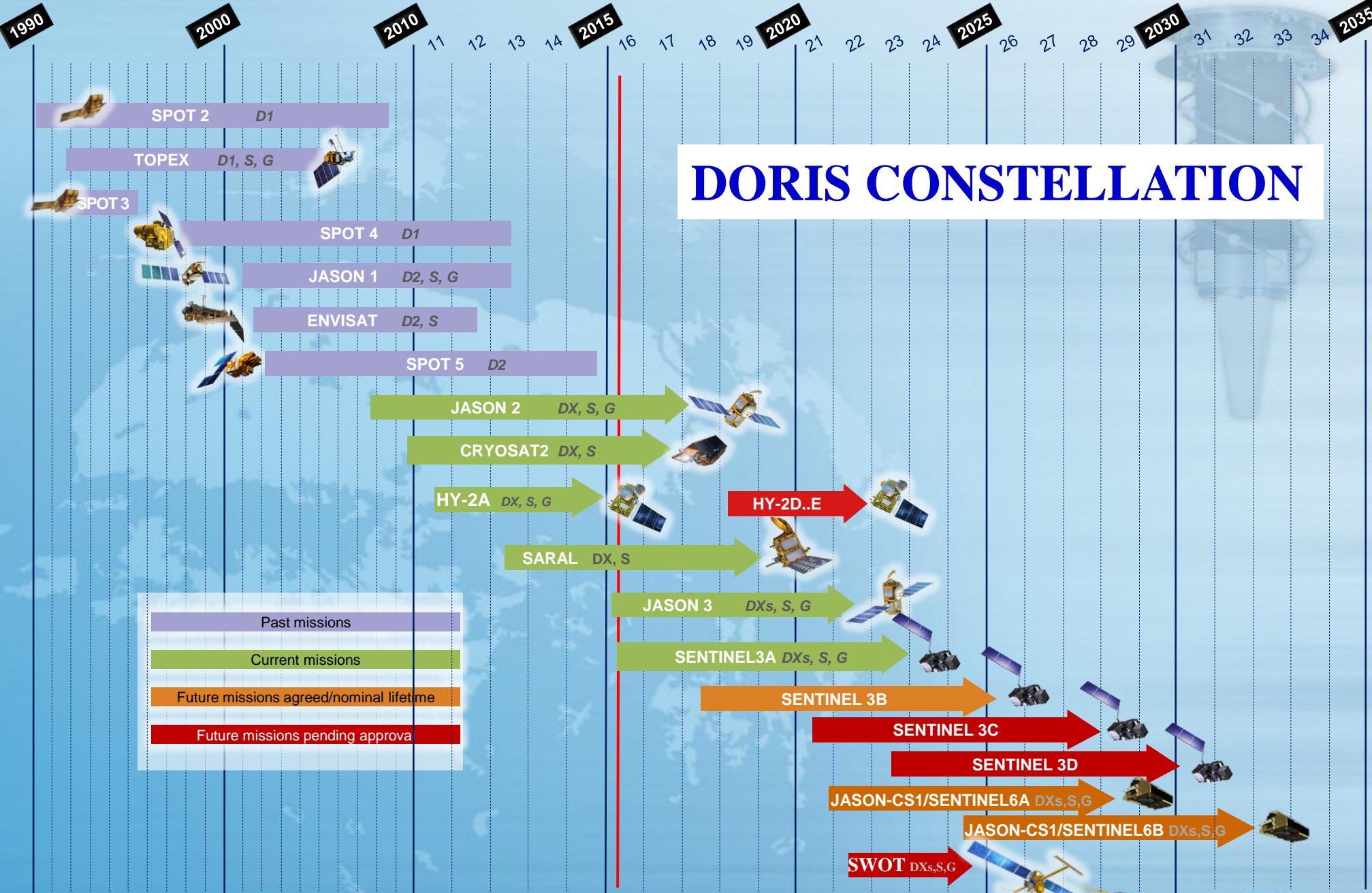
DORIS Constellation Status - Current Missions (6)

6 DORIS missions in flight with DGXX(S) Receiver (7 channels)

- NEW → SENTINEL3A (ESA): 814km, 98.65°** February 16, 2016 → 2023 (+LR)
- NEW → JASON3 (NASA/CNES): 1336km, 66°** January 17, 2016 → 2021 (+LR)
- SARAL (CNES/ISRO): 800km, 98.5°** February 2013 → 2018 (+LR)
- HY2-A (CNSA, NSOAS): 960km, 99°** August 2011 → as long as possible (+LRA+GPS)
- CRYOSAT-2 (ESA): 717 km, 92°** April 2010 → end 2017 (+ LRA)
- JASON2 (NASA/CNES): 1336 km, 66°** June 2008 → 2017 (+LRA+GPS)

DORIS Constellation Status - Future Missions

- SENTINEL3B (ESA)** 2018 (7 years + 3)
- JASON-CS1/SENTINEL6A (Eumetsat/NOAA) : 1336 km, 66°** 2020 (7 years)
- Jason-CSB/SENTINEL6B:*** 2022 (7 years)
- SWOT (NASA/CNES) : 970km, 78°** post 2021 (3 years)



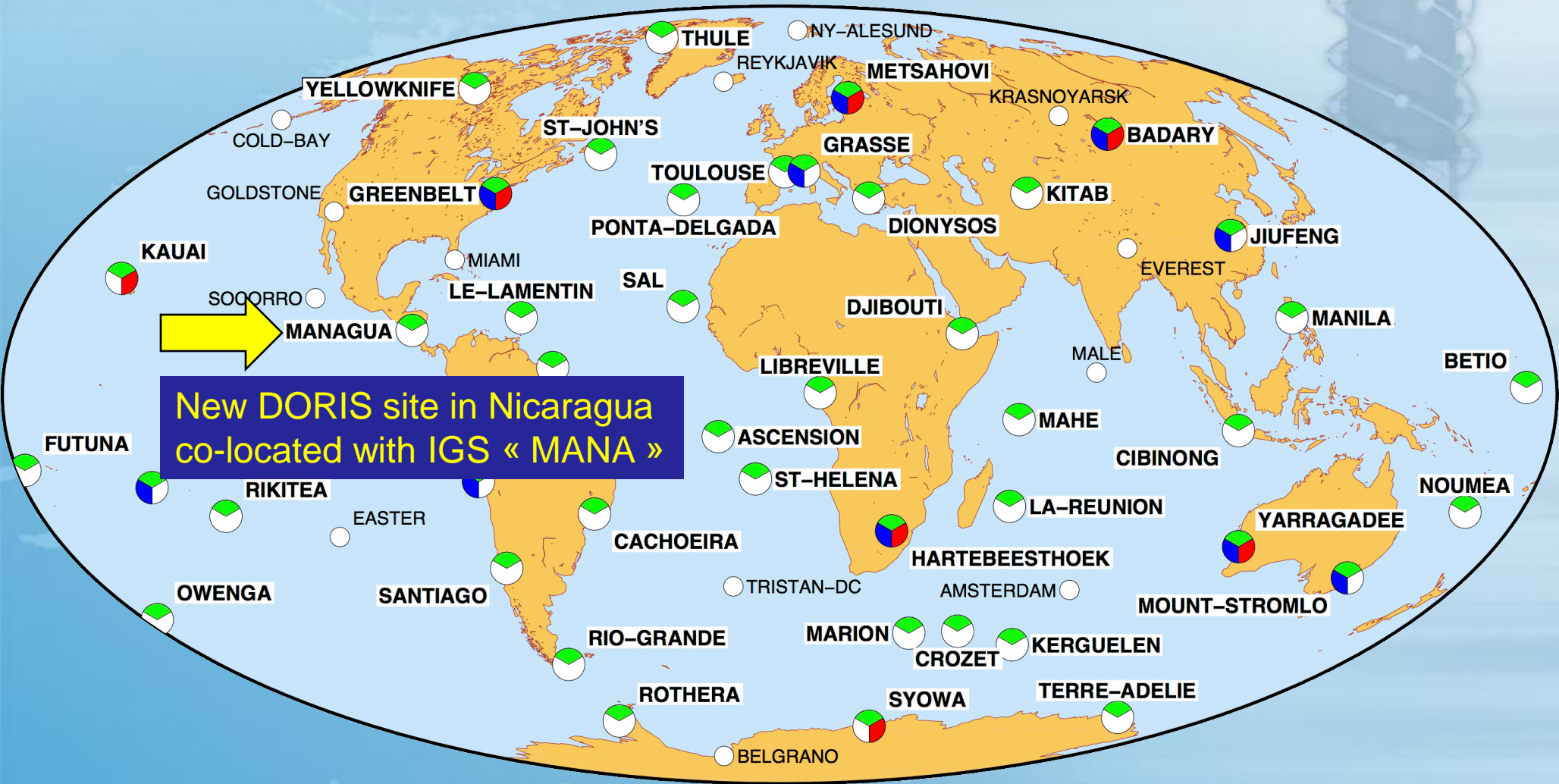
DORIS CONSTELLATION

Past missions
Current missions
Future missions agreed/nominal lifetime
Future missions pending approval

On board instruments:
D1, D2, DX, DXs: DORIS/versions, **S:**SLR, **G:**GNSS



Current DORIS tracking network (Apr. 2016)

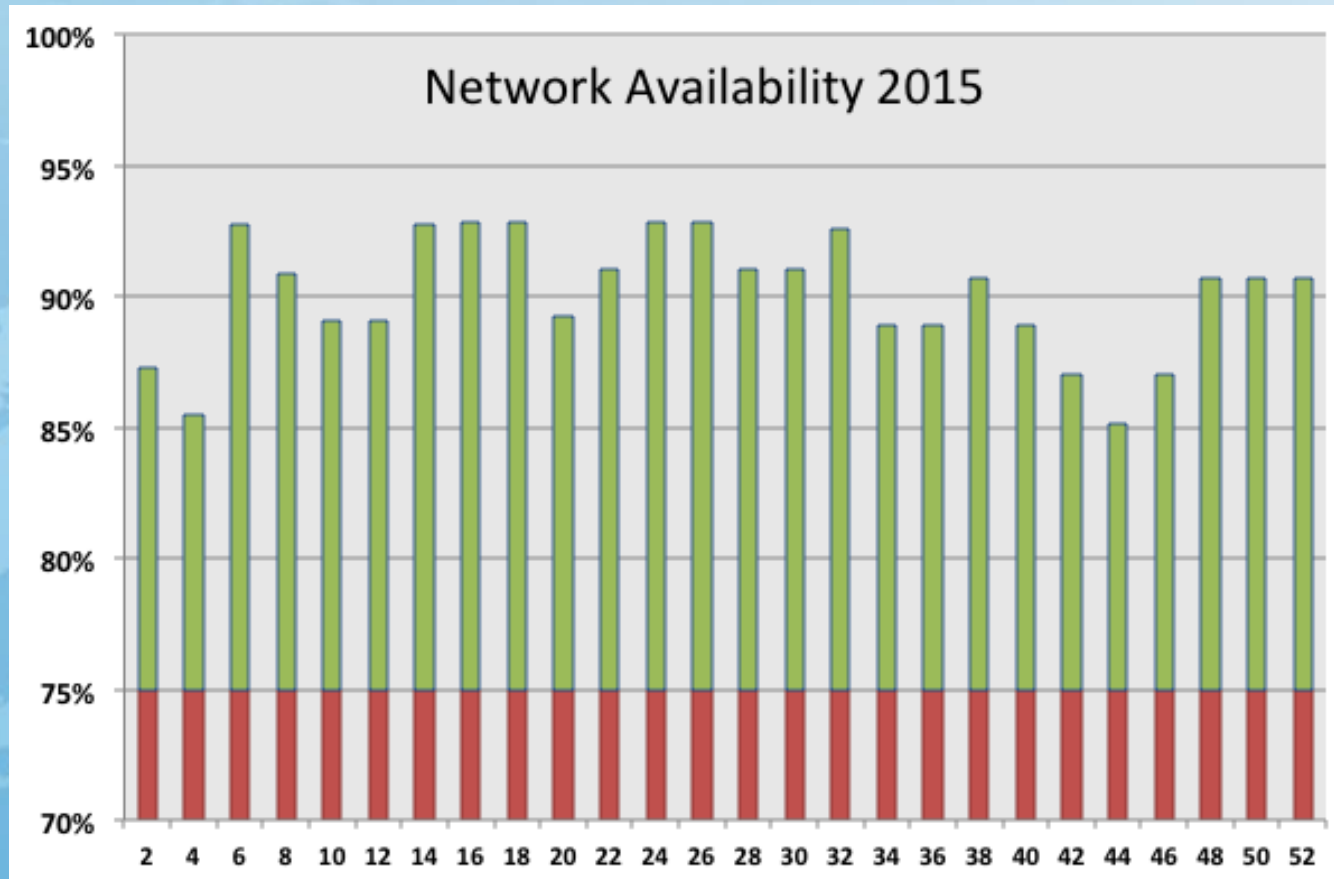


**New DORIS site in Nicaragua
co-located with IGS « MANA »**

- GNSS (IGS)
- SLR
- VLBI
- No active co-location < 1 km



Network Operational Status



Currently, 59 stations of which: 9 beacons are out of order (4 for over a year)

Out of order for over a year:

Yuzhno-Sakhalinsk (11/2005); Santa Cruz (06/2009); Santiago (05/2013); Port-Moresby (06/2013)

Network Evolution

- **RECENT Network EVENTS**

- Nov. 2015: antenna change at Jiufeng (China)
- Dec. 2015: antenna change at Ponta Delgada (Azores Islands, Portugal)
- Mar. 2016: station re-location at Owenga (Chatham Island, New-Zealand)
- Apr. 2016: new station installing at Managua (Nicaragua)

- **SHORT TERM (Next 6 Months):**

- Kitab, UZ: major renovation (station re-location to get better visibility)
- Mariana Islands, US: reconnaissance with a view to installing new station
- San Juan, AR: new station installing in place of Santiago (3 techniques site)
- Wettzell, DE: new station installing (new 4 techniques site)

- **LONGER TERM:**

- Katherine, AS: new station installing in place of Port-Moresby (3 techniques site)
- Easter Island, Chile: relocating to near IGS station, ISPA.
- Ny-Ålesund, Spitzberg, Norway: relocating (new 4 techniques site)

Analysis Update

1. Six active DORIS Analysis Centers (ESA, GOP, GSC, IGN, INA, GRG)

- from 6 different institutions with 5 different software packages for orbit determination

2. Processing routine

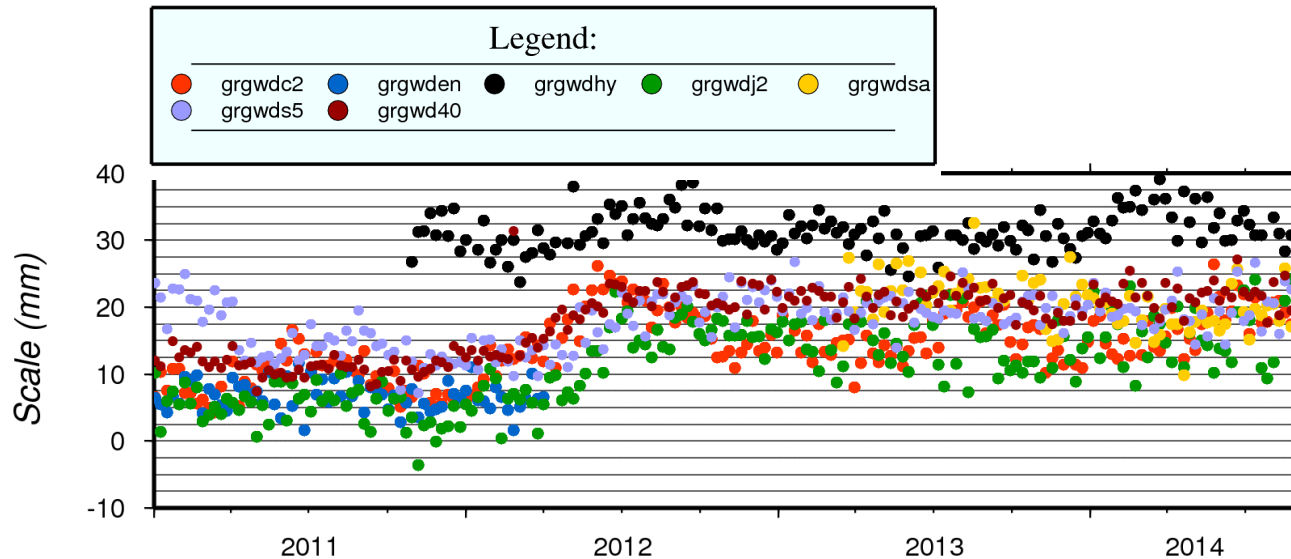
- IDS Combination Center has done the extension of combined series from 2014 doy 362 to 2015 doy 158, and is working to add data to doy 347

3. Work in progress

- Another requirement for IDS Analysis Centers, is to implement DORIS RINEX data processing since the launch of Jason-3, Sentinel-3A. (help of Analysis Coordinators)
DORIS data is only delivered in RINEX-like format – The ACs must all verify their processing of these observables as well as verify the content of their SINEX files.
- Work on the open points following ITRF reprocessing
DORIS scale increase in 2012 (understood)
Scale issues on SPOT-5 (sawtooth pattern)
Increase of DORIS residuals from Jan. 2013 for all missions
...
- IDS evaluation of the DORIS versions of the DTRF2014, ITRF2014 and JTRF2014 solutions
- Switch to ITRF2014 for IDS operational products
- Are the Jason-2 and Jason-3 USOs sensitive to the SAA?

DORIS Scale Increase in 2012

GRG scale from single satellite and multi-satellite solutions



Increase of the scale factor for Jason-2 and Cryosat-2 is linked to the change of tropospheric model used by CNES in its POD processing (GDR standards):
from CNET (GDR-C) to GPT/GMF (GRD-D).

→ reduction of the amount of data marked as rejected in the doris2.2 file used as input DORIS data file by ACs. Then, an increase of the data used in GRG analysis which is based only on the measurements considered to be good in CNES pre-processing. The larger number of data, especially at low elevation, could thus be the cause of the change we observe in the scale factor

Date of change is mission dependent

→ Scale increase of the multi-satellite and combined solutions is due to the jump not at the same time of the Jason-2 and Cryosat-2 solutions but also of the HY-2A high scale

So, IDS ACs need to do their own pre-processing.

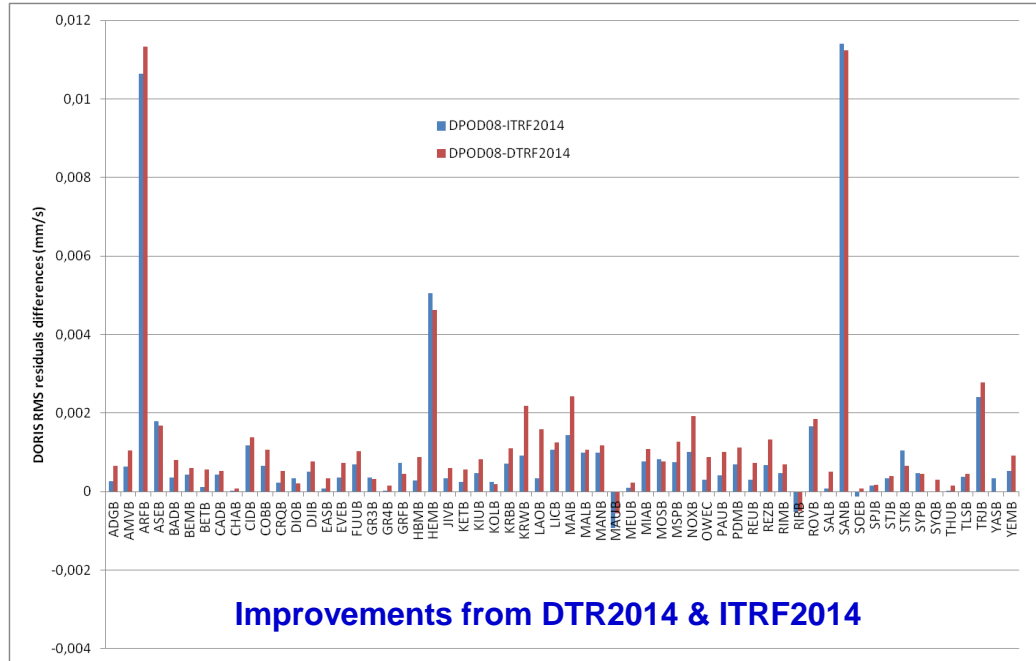
This assumption is among the ones currently being investigated within the IDS Analysis Working Group.

IDS evaluation of the DORIS versions of the DTRF2014 and ITRF2014 solutions wrt DPOD2008 v1.14



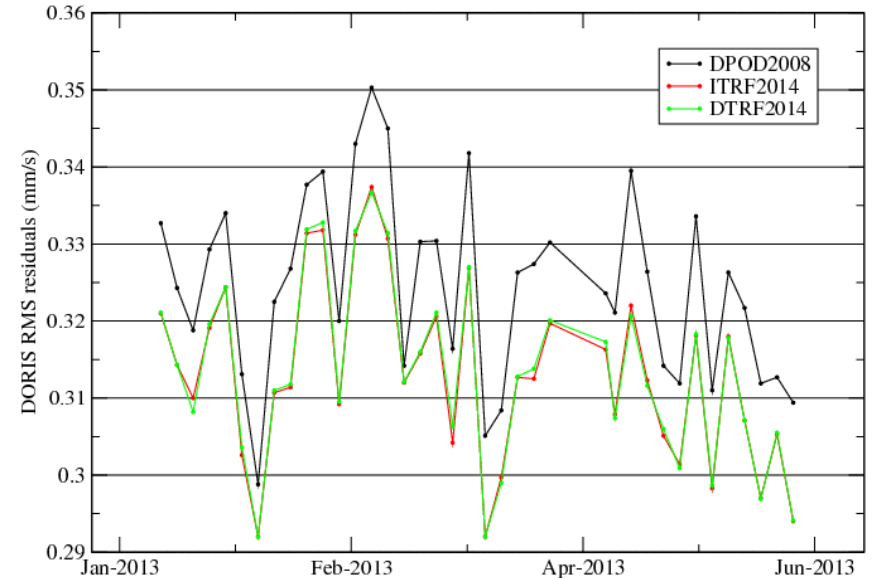
Jason-2 POD results from CNES/CLS (GRG) AC over 2 years (2013-2014)

Jason-2 DORIS post-fit residuals differences per stations



See G. Moreaux oral EGU2016-3240
Tue, 19 Apr 2016 14:45-15:00

Jason-2 DORIS post-fit residuals for Santiago



POD results	TRF	Jason-2
DORIS RMS [mm/sec]	DPOD2008	0.322
	DTRF2014	0.320
	ITRF2014	0.321
RMS of Radial differences wrt DPOD2008 [mm]	DTRF2014	1.7 ± 0.3
	ITRF2014	1.3 ± 0.2
Mean Z-offset wrt DPOD2008 [mm]	DTRF2014	-1.7 ± 0.9
	ITRF2014	0.1 ± 0.9

Orbit Comparison wrt DPOD2008 orbit

RMS of radial differences over 2 years

➤ *The orbits are very close*

Mean of Z orbit differences over 2 years

➤ *Z-offset is correlated to Tz Helmert parameter differences*

The results are similar when we use EOP C04 series aligned to ITRF2008 and aligned to ITRF2014

(from ftp://hpiers.obspm.fr/iers/eop/eopc04_14/eopc04_IAU2000.62-now)

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

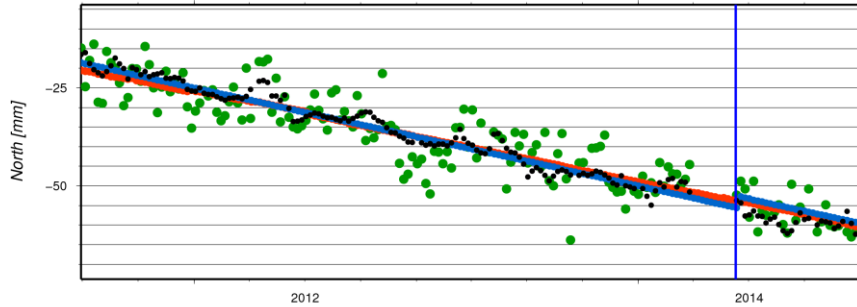
Coordinate Time Series from IDS Combination Center

See G. Moreaux oral EGU2016-3240
Tue, 19 Apr 2016 14:45-15:00

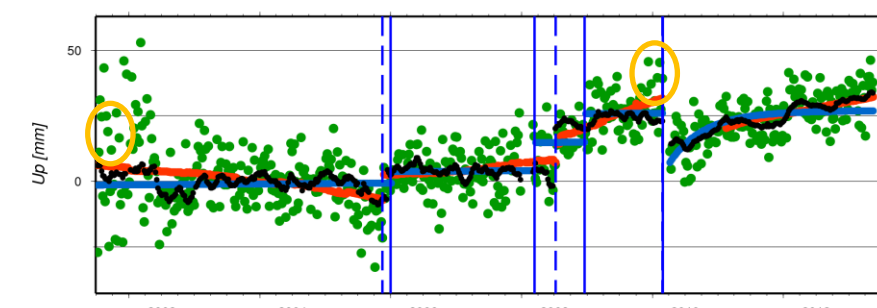
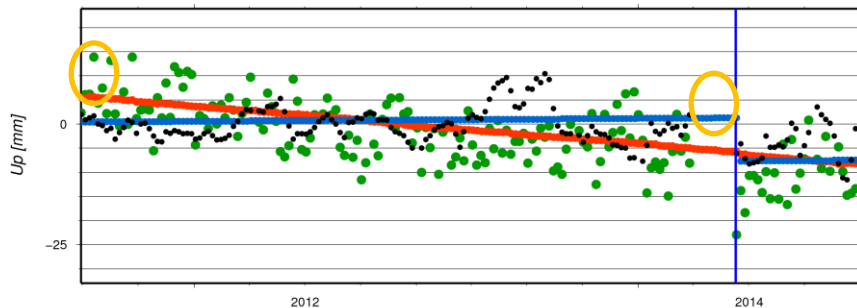
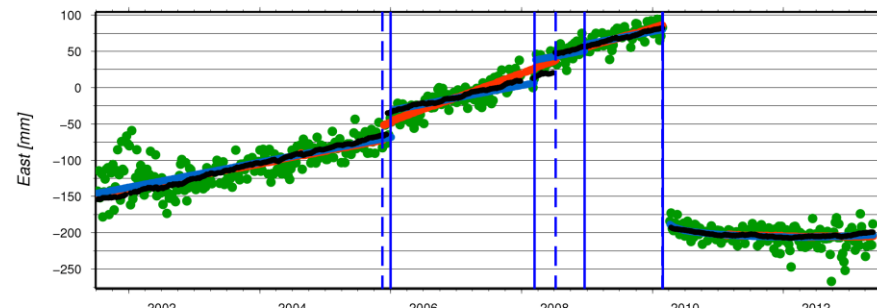
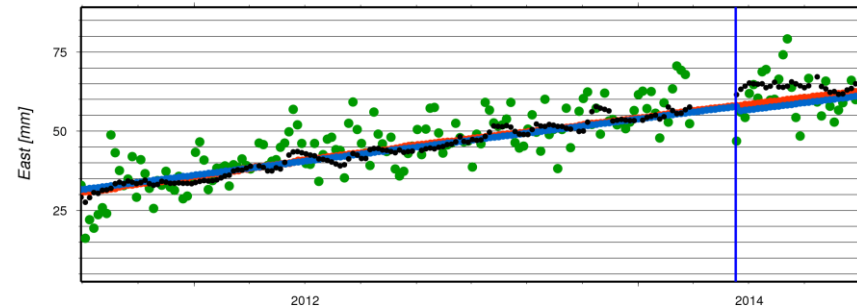
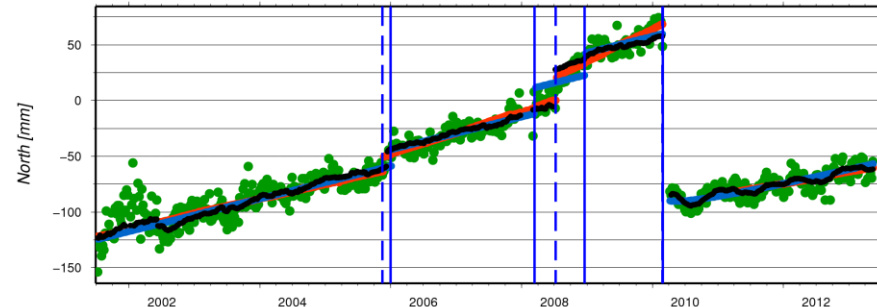
IDS 09 vs DTRF2014 / ITRF2014 / JTRF2014 in ITRF2014

— ITRF2014 discontinuity
- - - DTRF2014/JTRF2014 discontinuity

Terre-Adélie (ADGB – Antarctica)



Santiago (SANB – Chile)



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

Switch to ITRF2014 for IDS operational products

- In addition to the IDS Combination Center, 2 ACs and 1 associated AC implemented and validated PSD corrections.
- POD and positioning performances of DORIS satellites and stations show similar results between DTRF2014 and ITRF2014.
- **PSD corrections were modeled from the GNSS time series**
 - a few DORIS stations benefit of PSD corrections in ITRF2014. 13 beacons over 7 sites:
 - Arequipa (AREB, ARFB), Fairbanks (FAIB),
 - Goldstone (GOMB),
 - Reykjavik (REYB, REZB),
 - Santiago (SANA, SANB),
 - Terre-Adélie (ADEA, ADEB, ADFB, ADGB),
 - Yuzhno-Sakhalinsk (SAKB).
 - Excepted one all the earthquakes happened before 2004
 - most of all the motions can now be modeled by a linear model.
- **IDS CC will compute its cumulative position and velocity solution and DPOD solution using linear motions. DPOD will be aligned to ITRF2014.**

The IDS CC will use ITRF2014 (with PSD corrections) for the evaluation of the IDS products.
The IDS CC proposed to make available to the DORIS community weekly SINEX files obtained from the propagation of ITRF2014 from 1993 to 2020.
- **IDS will decide to switch to ITRF2014 at the next IDS AWG in May**

1. DORIS Special Issue (Adv. Space Research)

Theme: Improvements in DORIS analysis & work related to ITRF2014.

Co-editors (F. Lemoine and EJO Schrama).

Follow-on to special issue in Adv. Space Res (2010).

Available in 2016, 19 papers submitted

- 9 Accepted and online
- 2 Accepted w. minor revision
- 5 Under Revision (with authors)
- 2 Under Review
- 1 Rejected

2. IDS Newsletter #1


Launch of the IDS Newsletter in Apr. 2016

<http://ids-doris.org/report/newsletter.html>

Next IDS Meetings

IDS AWG, May 2016 26-27. at TU Delft (The Netherlands).

IDS WORKSHOP, 2016 (31 Oct.-01 Nov.), before Ocean Surface Topography Science Team meeting in France (La Rochelle).



Users NEWSLETTER #1 April 2016

Editorial

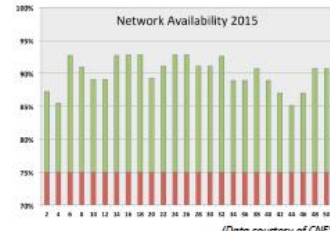

This is the first issue of the Newsletter of the International DORIS Service. The intention is to improve the flow of information within the community of providers and users of DORIS data and products, to highlight the activities of the groups participating in the IDS, and to bring the DORIS and IDS 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.



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.

(Data courtesy of CNES)

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<http://ids-doris.org>

