



# IDS REPORT 2023

*IERS Directing Board Meeting*

*November 20, 2023*

DORIS

IDS IERS members:  
Petr Stepanek (GOP)  
Jérôme Saunier (IGN)

# IDS News

- ❑ **„New Results from DORIS for Science and Society“**
  - ❖ **Advances in Space research, special issue**
  - ❖ **Volume 72, Issue 1, Pages 1-128 (1 July 2023)**
  - ❖ **Edited by Ernst Schrama and Denise Dettmering**
  - ❖ **8 articles**
- ❑ **IDS AWG meeting (hybrid) 28.-29. Nov in Paris**
  - ❖ **Including IDS 20th anniversary**
- ❑ **IDS GB meeting (hybrid) 29. Nov in Paris**



# DORIS Network Operational Status

## ❑ Past Events

- April 2023: Hanga-Roa new DORIS site at Easter Island, Chile
- June 2023: Santa-Cruz (Galapagos, Ecuador) restarted after 2-yr outage
- July 2023: Ulaanbaatar (Mongolia) site reconnaissance for a new DORIS site
- Sep. 2023: Gavdos (Crete, Greece) new DORIS site

## ❑ Network reliability

- Good rate of stations in operation: 85% (8 stations down)
- Almost 60% of the network stations equipped with the 4<sup>th</sup> generation beacon (deployment started from mid 2019)
- Gradual replacement of the Starec B antenna with Starec C: 27/60 stations equipped

## ❑ Planned Network Maintenance in the coming months

- Major renovation at Rikitea (French Polynesia): antenna move + equipment upgrade
- Major renovation at Syowa (Antarctic): station relocation + equipment upgrade
- Major renovation at Cachoeira (Brazil): antenna move + equipment upgrade
- Major renovation at Everest (Nepal): antenna move + equipment upgrade
- Continuation of the 4<sup>th</sup> generation beacon deployment

# DORIS Network Evolution

## □ Short Term (within a year)

- New station installation in Katherine (NT, Australia): co-location with VLBI and GNSS
- New station installation in Ulaanbaatar (Mongolia): co-location with GNSS “ULAB”
- New station installation in Kanpur (India): co-location with GNSS “IITK”

## □ Long Term

- New station in Changchun (China): co-location with SLR and GNSS
- New station in French Polynesia: new Geodetic and Geophysics Observatory

## □ IDS Retreat 2018 recommendation: make the IDS Network denser up to 70 sites

- Improvement factor for the ITRF realizations and others scientific products
- Densification while improving homogeneous distribution and co-location
- 2023: +2 stations (Hanga-Roa + Gavdos)
- 2024: +4 stations => 64 stations



# The DORIS constellation 2023

## Past missions

Spot-2	Spot-4	Spot-5
Topex	Jason-1	Jason-2
Spot-3	Envisat	HY-2A

## Current missions

Cryosat-2	Sentinel-3A	Sentinel-6MF
Saral	Sentinel-3B	HY-2D
Jason-3	HY-2C	SWOT



### 3 generations of DORIS instruments



Number of tracked beacons:

1      2      7

### 5 altitudes

- 1336 kms
- 971 kms
- 891 kms
- ~800 kms
- ~700 kms

### 4 orbit planes



Studio Grafik CNES, 2022-145 - © Adobe Stock

# Active DORIS Satellites

□ 9 active satellites – historical maximum

Name	Cospar	Launch
SWOT	2217301	2022-12-16
HY-2D	2104301	2021-05-19
SENTINEL-6A	2008601	2020-11-21
HY-2C	2006601	2020-09-21
SENTINEL-3B	1803901	2018-04-25
SENTINEL-3A	1601101	2016-02-16
JASON-3	1600201	2016-01-17
SARAL	1300901	2013-02-25
CRYOSAT-2	1001301	2010-04-08

# IDS analysis working group

- Standard IDS weekly solutions since 2Q/2023
- Re-processing 2021.0-2024.0 for ITRF2020 update is running
- Active NRT IDS working group
- IDS GB meeting (hybrid) 29. Nov in Paris
- Main issues
  - South Atlantic Anomaly
  - Update to more recent time-variable gravity field models
  - Satellite-specific scale bias



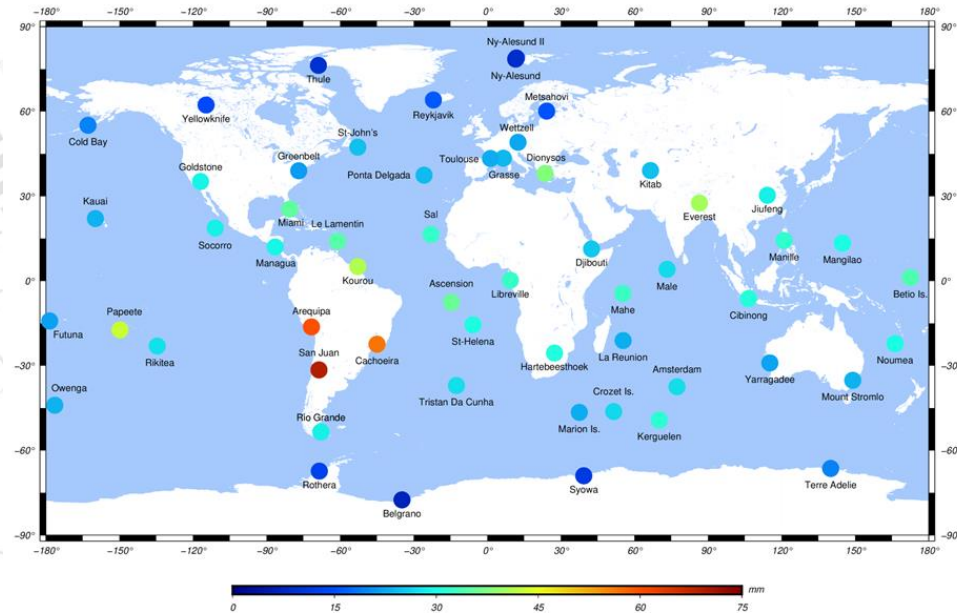
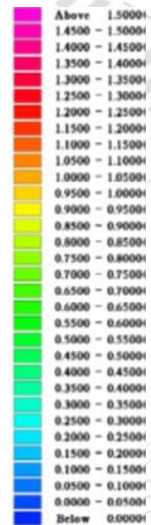
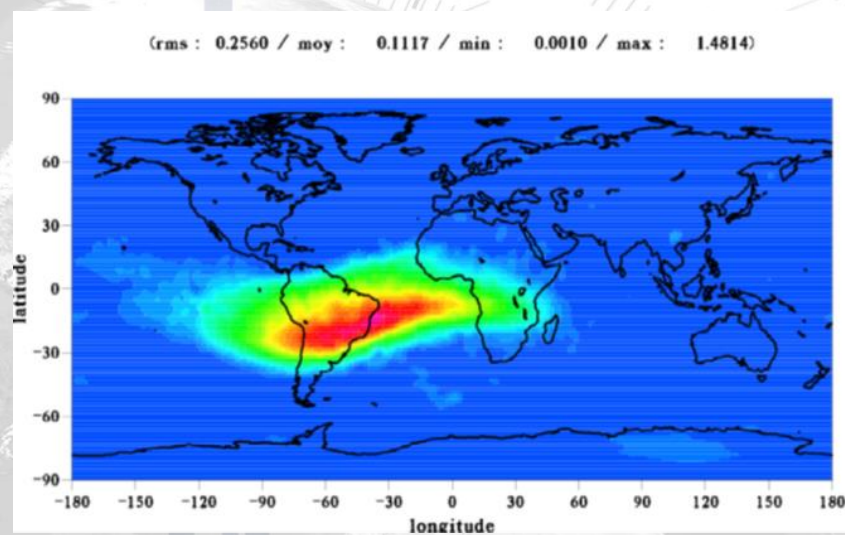
# IDS analysis centers

- ❑ Analysis (AC) and Associated analysis centers (AAC)
- ❑ GFZ is a new AC candidate

Name	Center	Location	Contact	Software	Multi-technique
ESA	AC	Germany	Michiel Otten	NAPEOS	SLR, GNSS
GOP (Geodetic Observatory Pecny)	AC	Czech Republic	Petr Stepanek	Bernese	
GRG (GRGS)	AC	France	Hugues Capdeville	GINS	SLR, GNSS
GSC (NASA/GSFC)	AC	USA	Frank Lemoine	GEODYN	SLR
IGN	AC	France	Samuel Nahmani, Arnaud Pollet	GIPSY	
INA (Inasan)	AC	Russia	Sergei Kuzin	GIPSY	
CNES/POD	AAC	France	Alexandre Couhert	Zoom	SLR, GNSS
GFZ	AAC	Germany	Rolf Koenig	EPOS-OC	SLR, GNSS
TU Delft	AAC	The Netherlands	Ernst Schrama	GEODYN	SLR
DGFI-TUM	AAC	Germany	Mathis Bloßfeld, Sergei Rudenko	DOGS	SLR

# South Atlantic Anomaly mitigation strategies

- ❑ Standard strategy: Alias names for SAA stations, estimate frequency bias and drift per satellite pass, downweighting or elimination of data, data corrective models (not for active satellites)
- ❑ For Sentinels (3 of 9 active satellites) – GNSS receiver is driven by DORIS USO
  - ❖ USO frequency can be observed by GNSS epochwise clock estimation
  - ❖ The approach proven by Jalabert and Mercier 2018, Štěpánek et al. 2020
  - ❖ GNSS clocks for DORIS as a standard input discussed
  - ❖ Suggestion of new IDS working group



The background of the slide is a light blue and white graphic. It features a satellite in orbit on the left, a jet airplane on the right, and a globe at the bottom left. Overlaid on these elements are several concentric, semi-circular lines with tick marks, resembling a scale or a coordinate system. The text is centered in the upper half of the image.

***Thanks for you attention***

<http://ids-doris.org>