

# Doris system developments and future missions



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# CURRENT MISSIONS

## 6 SATELLITES

- HY2-A (CNSA, NSOAS): 960km, 99° August 2011 → mid 2014 (DGXX+LRA+GPS)
- CRYOSAT-2 (ESA): 717 km, 92° April 2010 → end 2013 (DGXX + LRA)
- JASON2 (NASA/CNES): 1336 km, 66° June 2008 → 2013 (DGXX+LRA+GPS)
- SPOT5 (CNES): 830 km, 98° May 2002 → 2015 (DGM)
- JASON1 (NASA/CNES): 1336 km, 66° Dec 2001 → 2013 (DGM+LRA+GPS)
- SPOT4 (CNES): 830 km, 98° March 98 → 2012 (D1G)

# FUTURE MISSIONS / SARAL/ALTIKA (ISRO/CNES)



December 2012 (5 years)  
DGXX + LRA

## HY-2B (CNSA/NSOAS)

2014 (3 years) DGXX + LRA + GPS  
then 2C, 2D... to be confirmed



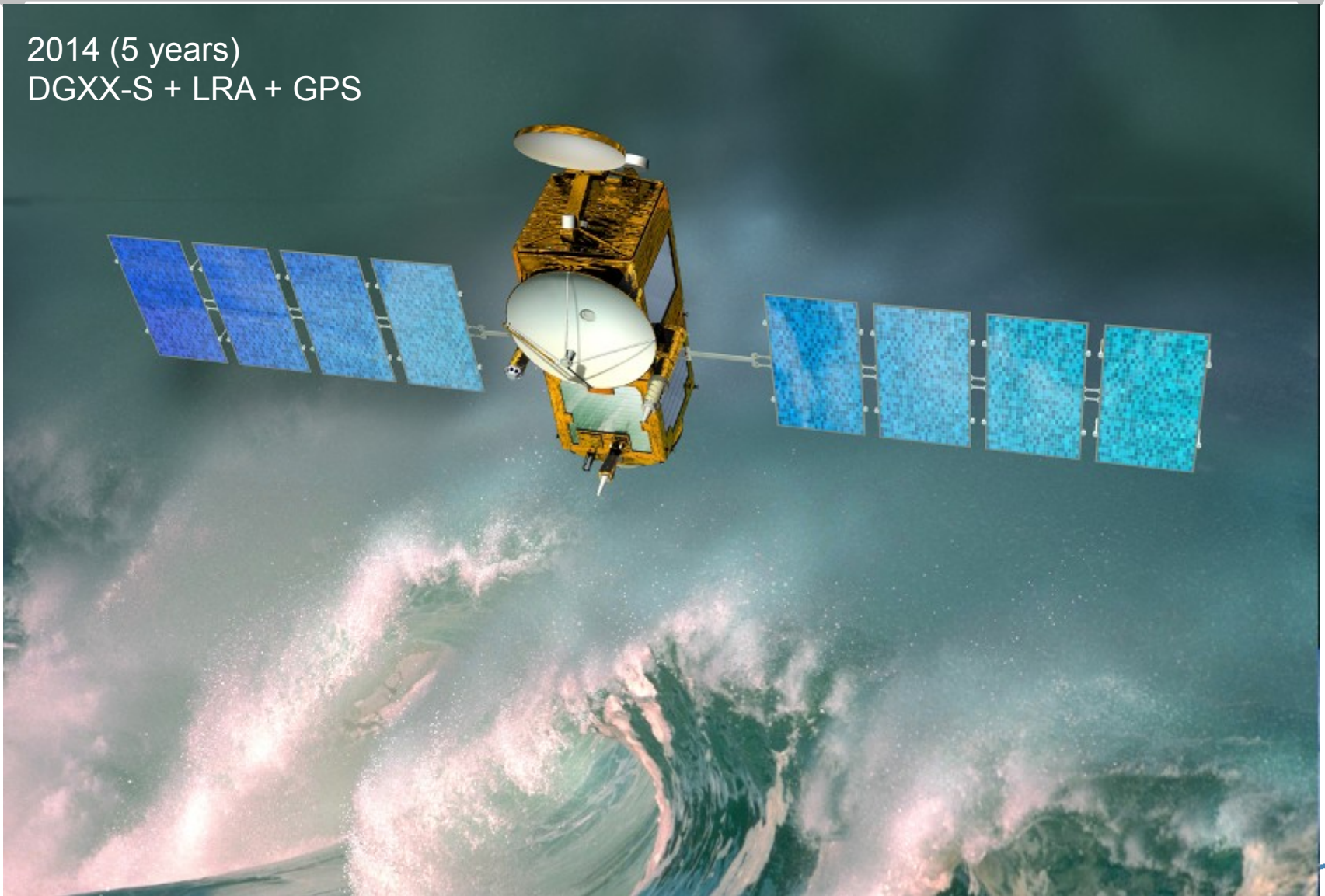
# SENTINEL 3A (GMES)

2014 (7 years)  
DGXX-S + LRA + GPS  
Sentinel 3B: 2017  
3C, 3D: to be confirmed

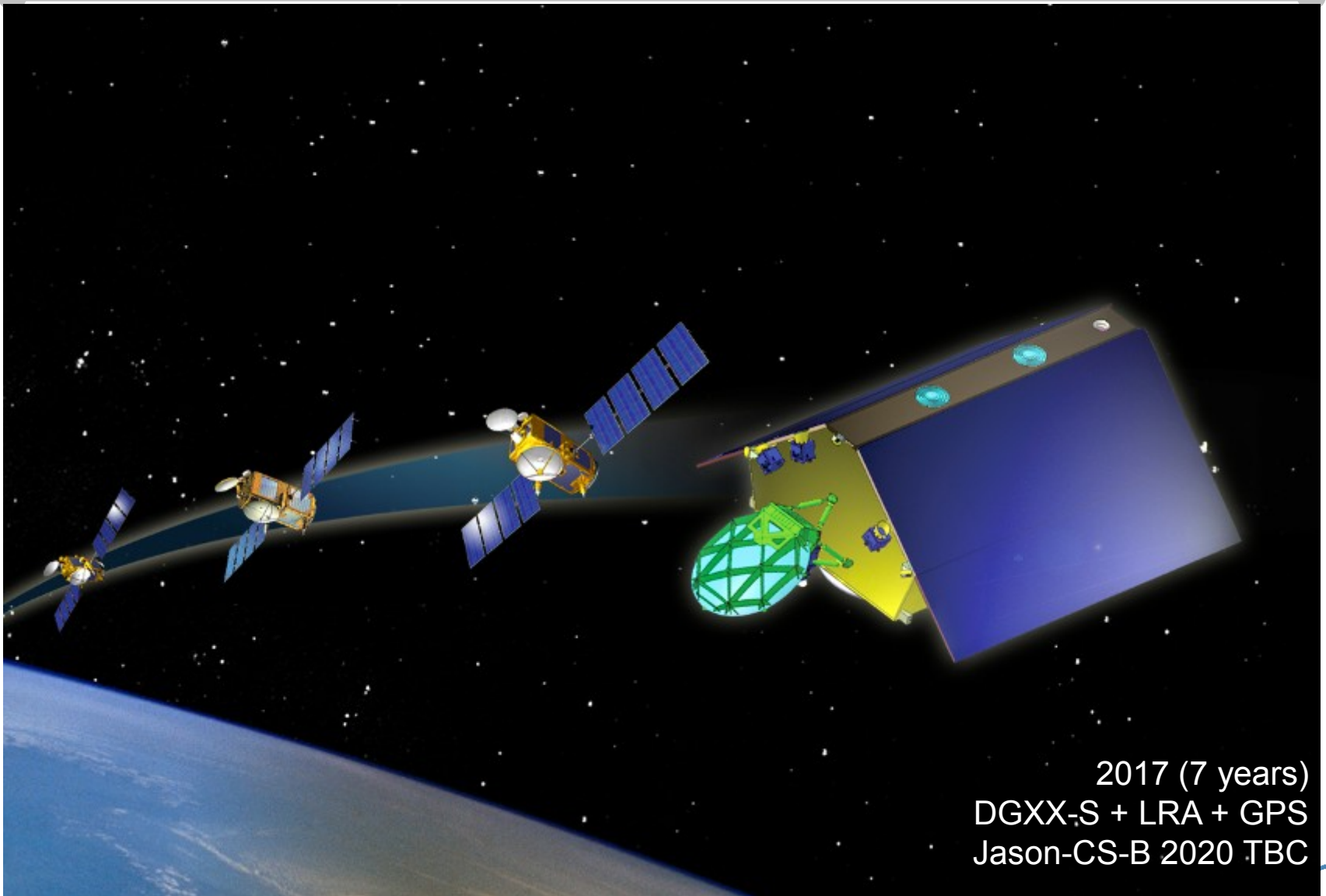


# JASON 3 (EUMETSAT/NOAA/NASA/CNES)

2014 (5 years)  
DGXX-S + LRA + GPS



# JASON CS (GMES - EUMETSAT/NOAA/NASA/ESA/CNES)



2017 (7 years)  
DGXX-S + LRA + GPS  
Jason-CS-B 2020 TBC

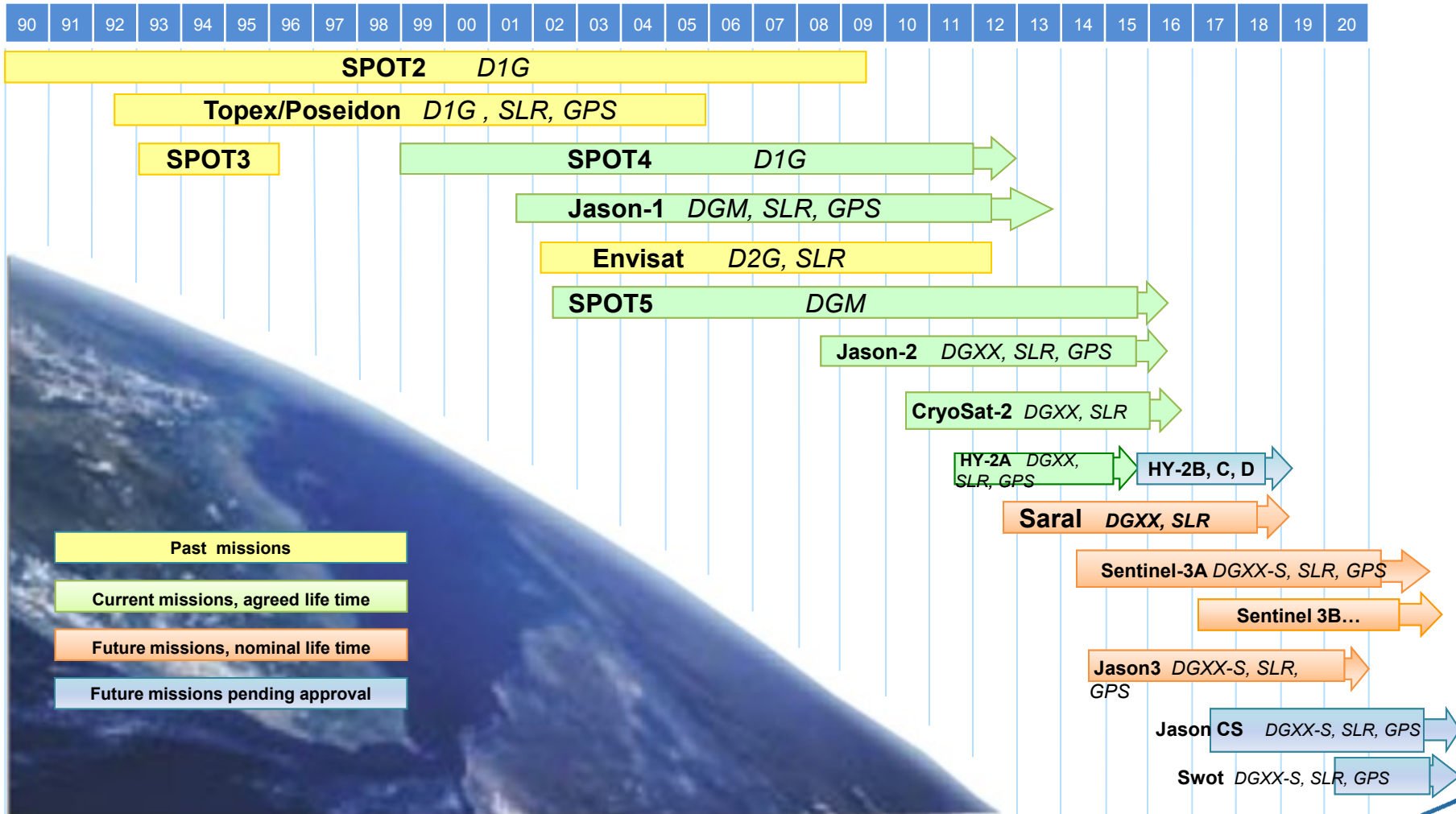
# SWOT (NASA/CNES)

2020 (3 years)  
DGXX-S + LRA + GPS





# DORIS CONSTELLATION



# Reminder

## ◆ use of DORIS measurements for Ionosphere studies

- ✓ The DORIS system works with 2 frequency bands separated by a ratio of 5
- ✓ The synchronous DORIS phase measurements on both frequencies are available in RINEX files (since DGXX generation : Jason2,...)
- ✓ After the NRL\*, others agencies or projects plan to use DORIS signals for ionosphere studies purpose\*\*

\* see presentation IDS4\_5 “Ionospheric Radio Scintillations and TEC Using the CITRIS Reception of DORIS Transmissions” P. Bernhardt

\*\* see poster “DORIS measurement for ionosphere studies “of C. TOURAIN

## ◆ Second phase measurement (DGXX)

- ✓ in routine, every 10s, The DGXX series instrument performs 2 different phase measurements
  - One at the beginning of the sequence
  - A second one  $3s_{OBT}$  later
  - They have the same accuracy, depends on the same clock, but are made at different epochs
- ✓ use of both may add information (TBC)

# What's up

## DGXX-S series instruments

- ◆ The instruments currently under development for Sentinel3A, 3B and Jason3 are from generation “DGXX-S”
  - ✓ same functions as DGXX instruments
  - ✓ new processor (LEON) allowing new processing capacities on board
    - Improvement of real time orbit determination (toward centimetric accuracy)
    - Earth pole determination ( $< 1$  mas)
    - beacons frequency estimation ( $< 10E-12$ )
    - ...
  - ✓ will also fly on board Jason-CS and SWOT satellites



# What's up on ground (2)

- Beacons of generation 3.1

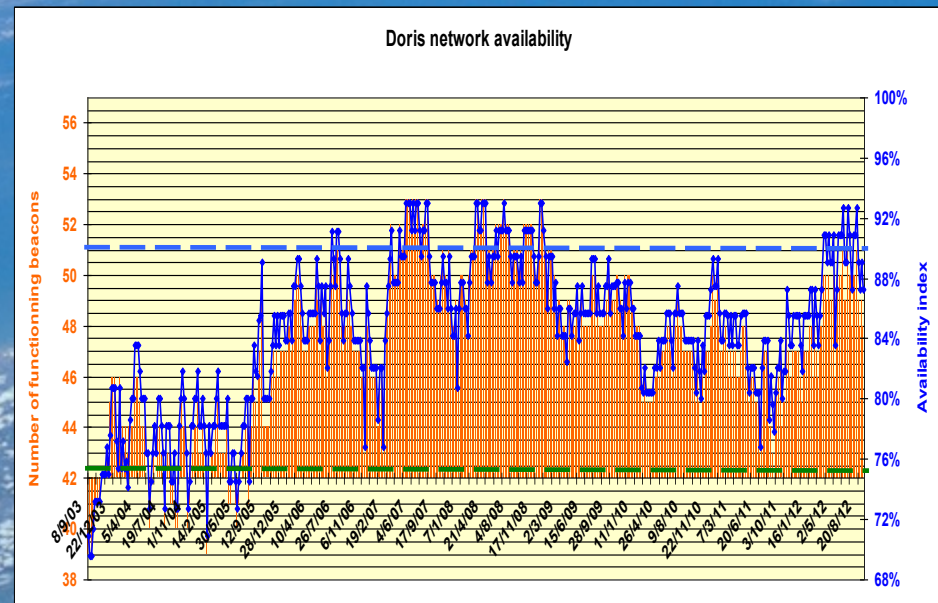
- ◆ less outages expected
- ◆ deployment started (3 installed)

- Beacons of generation 3.2

- ◆ same features as 3.1, but the power amplifier is deported at the foot of the antenna allowing more distance from the building => less mask and multipath issues
- ◆ 1 station equipped : Mahé

All combined and thanks to the Vigilance of the different DORIS Teams : (Integrity, GECO, Mission, SIRS, SMOS)

**Network availability reaches 90%**



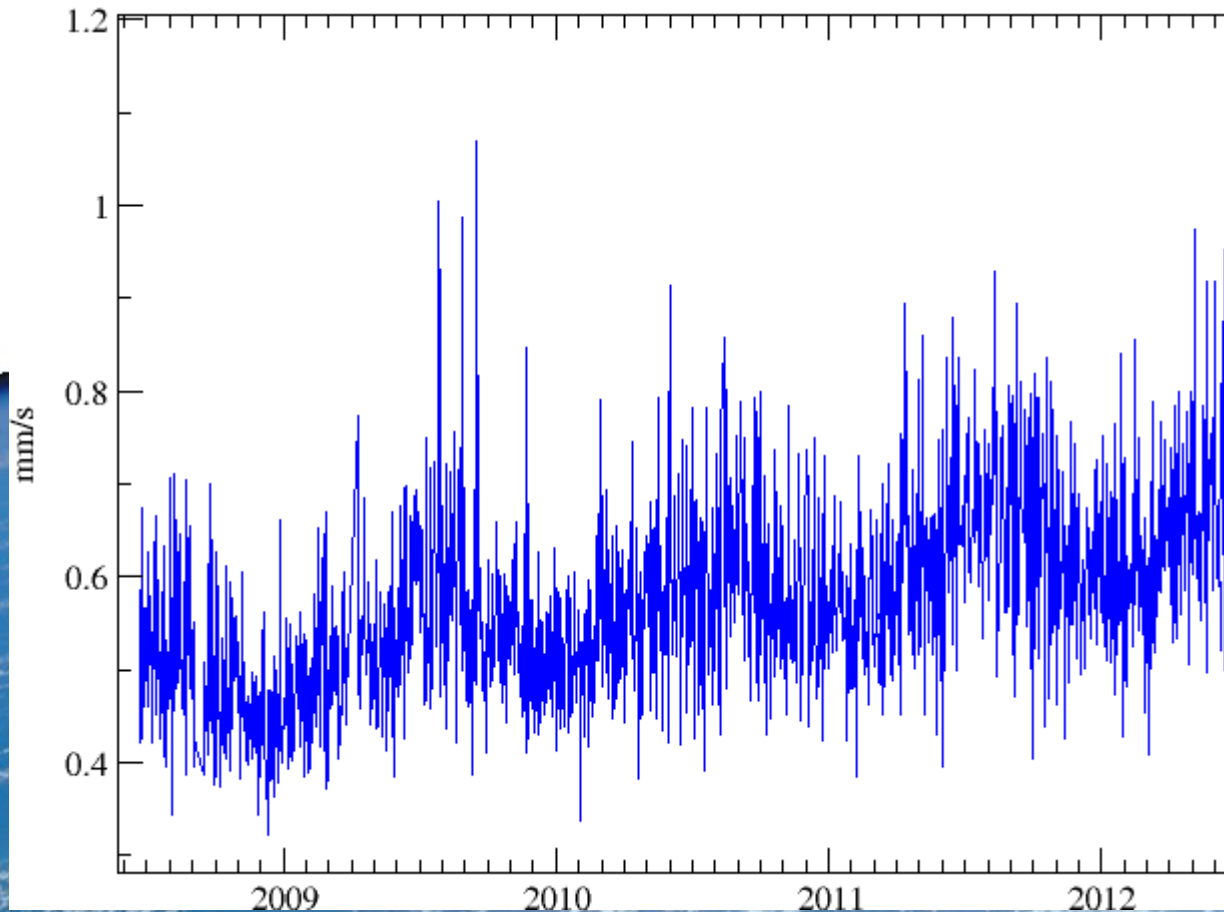
# what's coming soon

## ◆ 4<sup>th</sup> generation beacons

- ✓ maintain in operational conditions of the Network until at least 2025
- ✓ study started
- ✓ development 2014 - 2015
- ✓ deployment from 2016
- ✓ feedback from IDS is expected :
  - what about meteo sensors ?
  - ...

# Striking anecdote

Analysis of processing residuals of the JIUFENG station in the DORIS “Performance” Group : a long term increase with a seasonal signal



This was also correlated with decreases in received power measurements at low elevation

Courtesy P. YAYA

# Striking anecdote



The Integrity team suspected growth of vegetation around the DORIS antenna

⇒ Increase of residuals

Summer/winter variability of the vegetation

⇒ Seasonal effect

**DORIS Antenna**

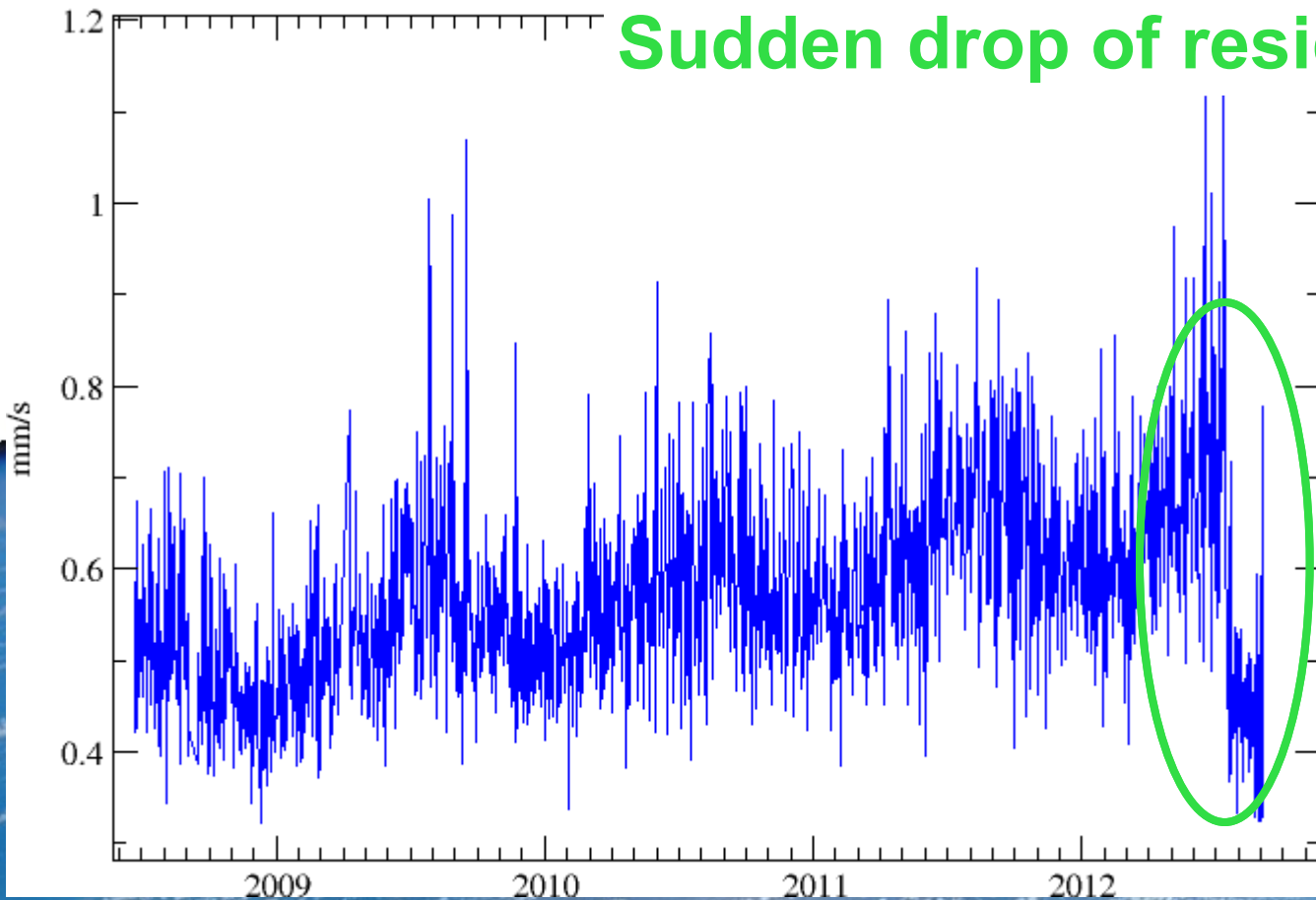


The SIRS requested a “chain saw” corrective action



# Striking anecdote

JIUFENG summer 2012 :



## Sudden drop of residuals

DORIS green  
commitment :  
For every tree cut in  
the vicinity of an  
antenna, a new tree  
will be planted  
somewhere else in  
the world



Thank you for your attention

