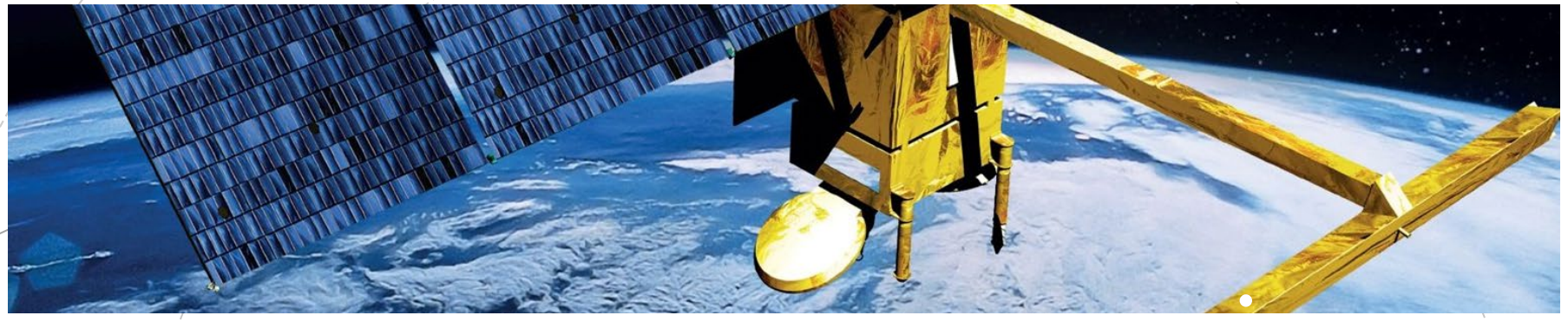


POD STATUS

SWOT ST 2024

SWOT ST 2024
JUNE 17-21

SUMMARY

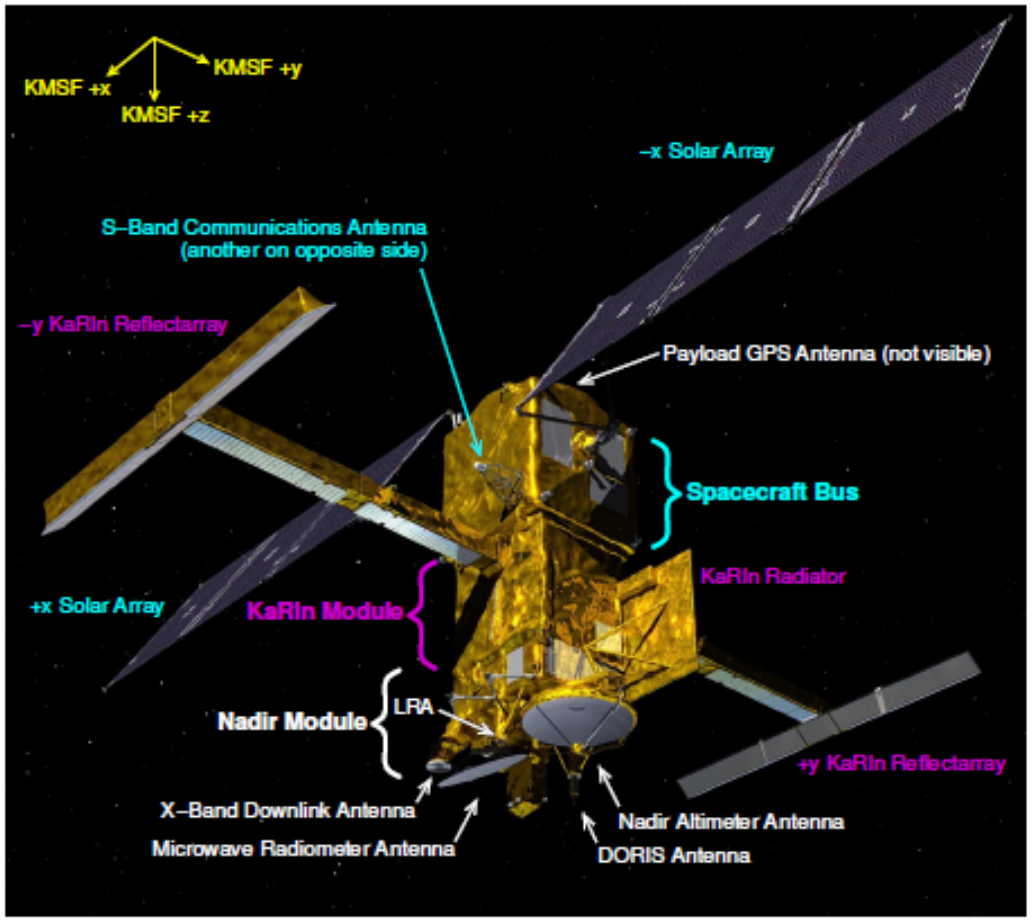
POD INSTRUMENTS

Refer to the SWOT User Handbook : **3 POD** instruments are providing independent data : **DORIS**, **GPS**, **LRA**

Many activities have been conducted pre flight to develop the satellite model, the GPS antenna model,o account for the impact of the solar array panel position, etc …

SWOT satellite is obviously a 1st of its kind and some tuning are still required

POD processing performed by 2 independent teams and software solutions : CNES solutions used for all products, JPL provides an independent expertise



DORIS SYSTEM STATUS

DORIS network of ground beacons

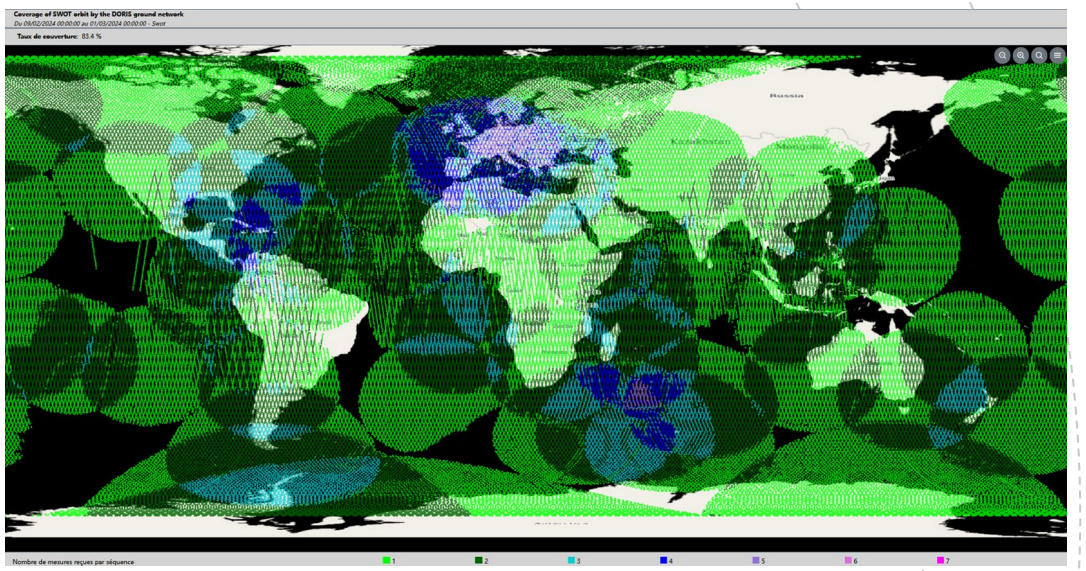
- Coverage of SWOT orbit: **~83%**
- Operations secured until **2035/2040** at least

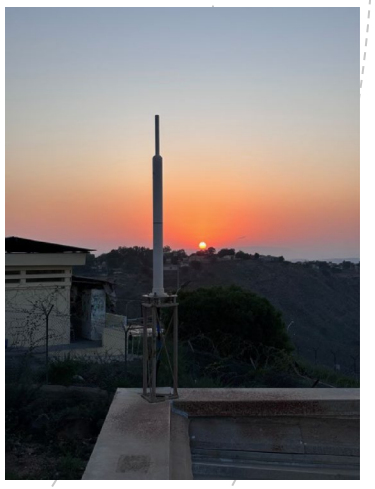
Additional DORIS payloads to be launched soon: S6B, S3C/D, GENESIS,…

- **4th generation** of beacons under deployment (38/58 sites)

Latest sites upgrades: Yellowknife, Djibouti, Rikitea

New sites under construction in Mongolia and Australia



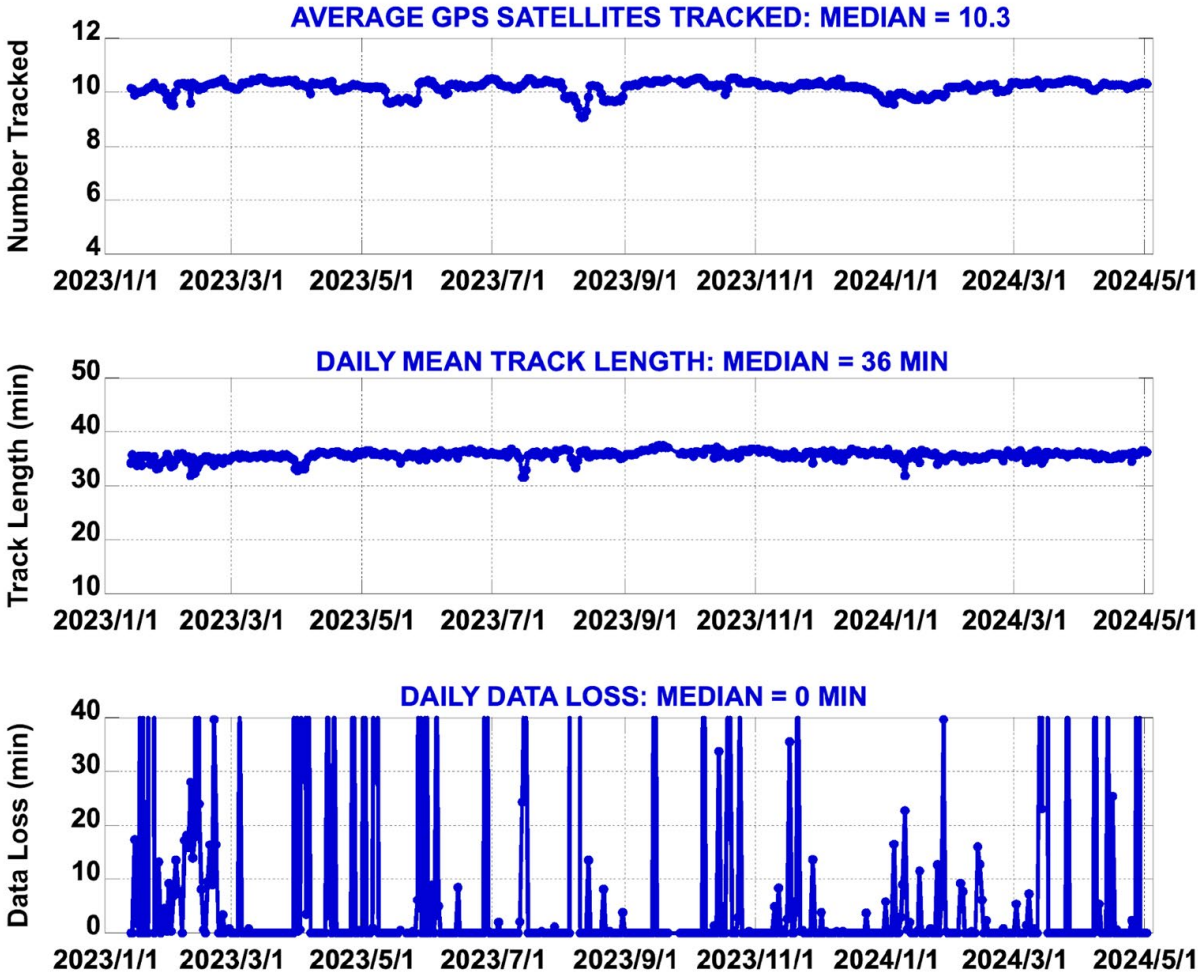


SSALTO ground segment and expertise

- Real-time monitoring software (SSALTO CC)
- Simulation tools and DORIS test bed for expertise

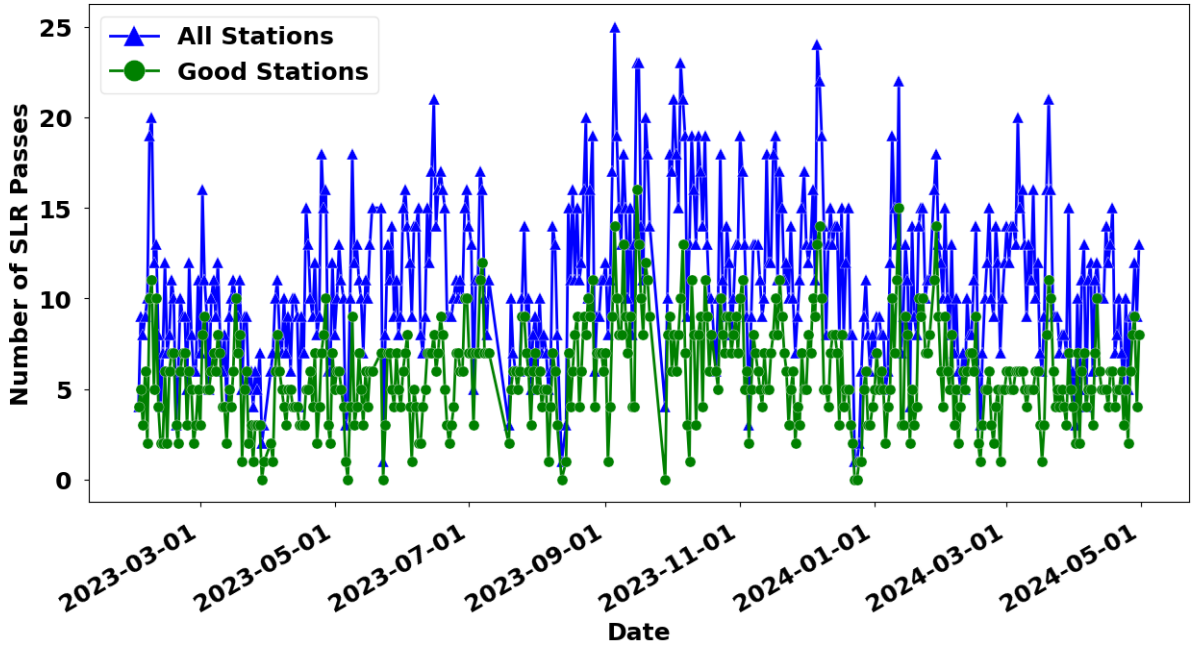
GPS TRACKING METRICS

- **Average number of satellites better than requirement.**
  - 10.3 vs 7.
  - Typically tracks up to 12 GPS satellites.
- **Average track length better than requirement.**
  - 36 vs 30 minutes.
  - Improving (upward) trend in first 6 months.
- Few data losses due to instrument.
  - Data losses almost completely explained by SSR, downlink, data transfer issues.



ILRS TRACKING SUPPORT

- Laser Retroreflector Array (LRA) is passive.
- International Laser Ranging Service (ILRS) collects and publicly disseminates satellite laser ranging (SLR) tracking data.
  - ILRS started routine tracking of SWOT Jan 15, 2023.
  - ILRS continues to nominally track SWOT in calibration (1-day) and science (21-day) orbit.
- SLR data used to independently validate DORIS/GPSP orbit solutions.
  - Not used to generate the MOE and POE.
  - Can be used if need arises.



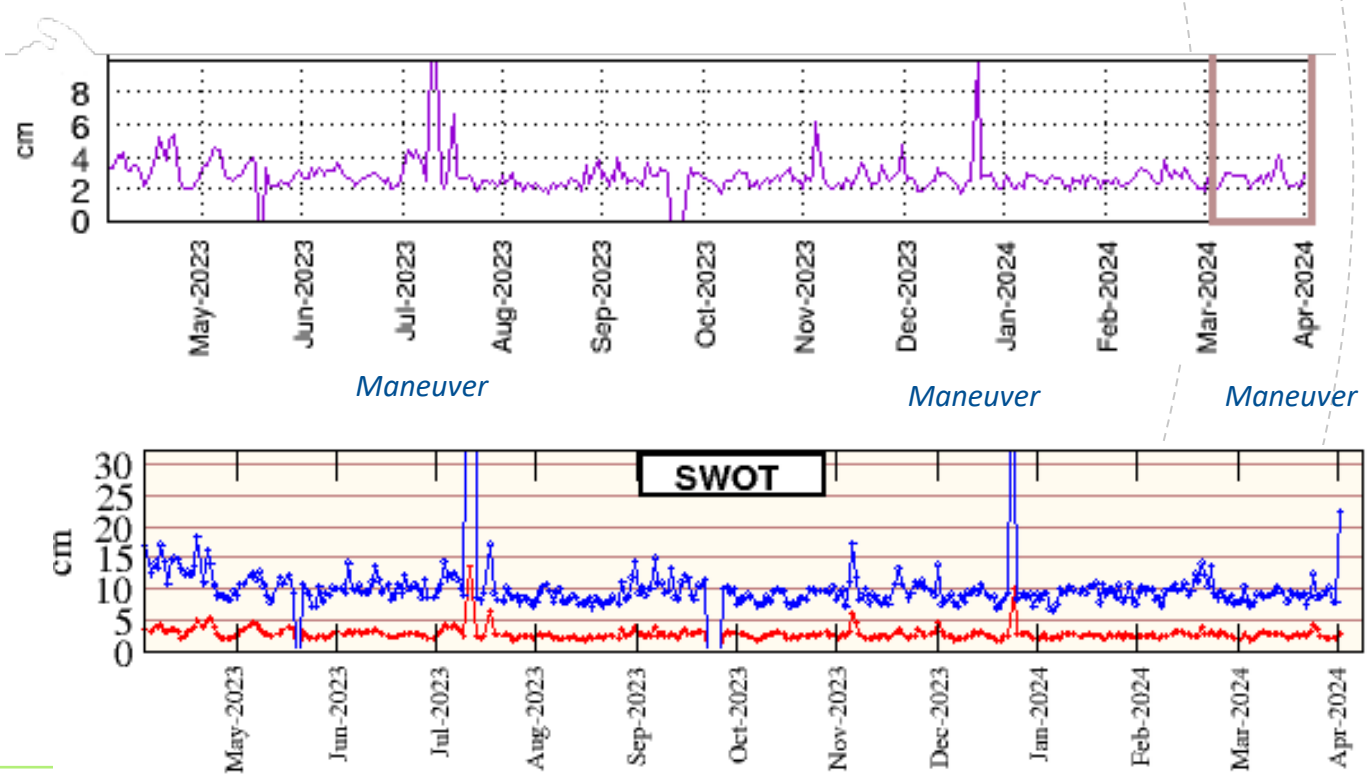
ORBITS SOLUTIONS USED FOR SWOT PRODUCTS

- NAV (DORIS) used for NALT and RAD OGDR
- MOE used for NALT and RAD IGDR and Karin Forward Processing (ie current P**I**C1 products)
    - MOE DORIS only from Jan, 20th onwards
    - MOE **DORIS+GPS** from Feb, 19th onwards
- POE used for NALT and RAD GDR and Karin Re Processing (ie current P**G**C1 products)
    - POE-F DORIS+GPS orbit solutions,
    - Reduced-dynamic parameterization (not yet applicable to MOE processing)
    - SLR is used only for independent validations.

DIODE NAVIGATOR PERFORMANCES: REAL-TIME ORBITS

Provision of real-time orbits + geodetic data for altimeter open-loop mode

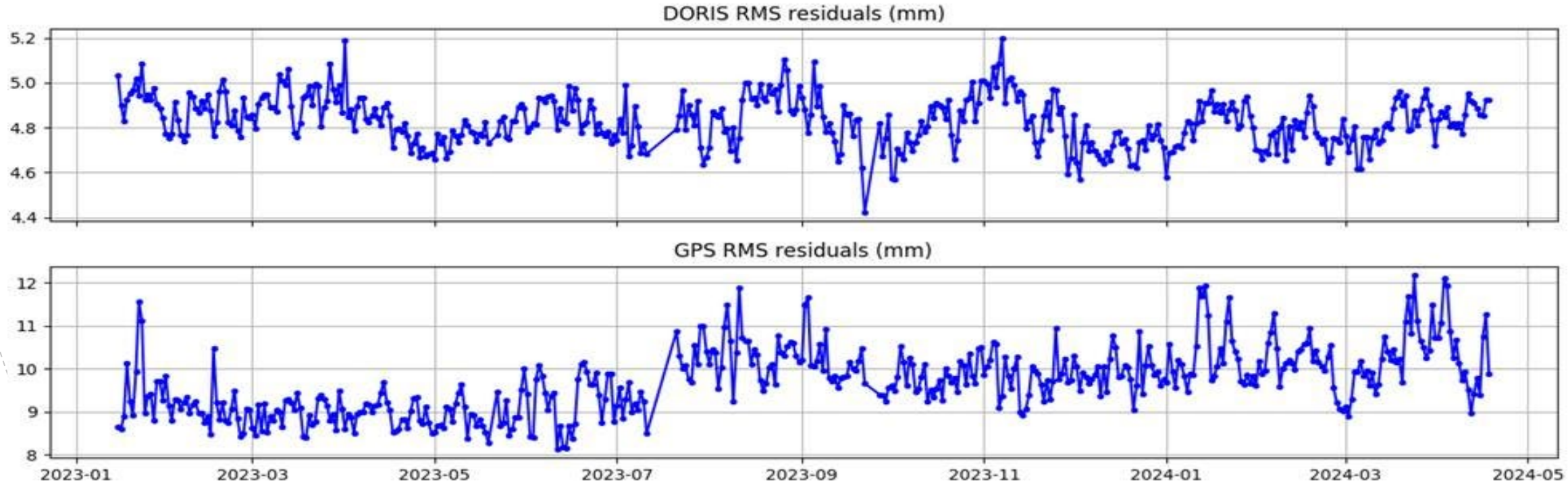
- ***Requirements*** ***(ITRF reference frame):***
  - *1m rms radial*
  - *10m rms along-track and cross-track*
- **DORIS/DIODE radial accuracy ~3cm**
- **DORIS/DIODE 3D accuracy ~10cm**



POE EVALUATION

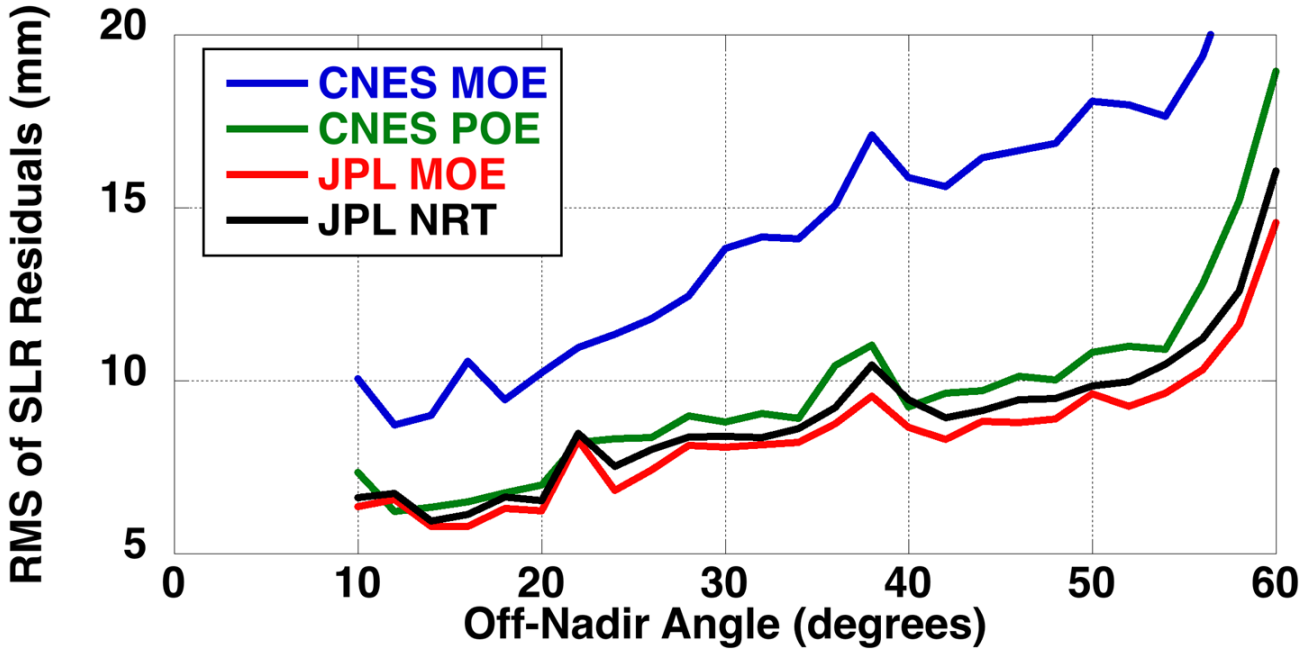
RMS of daily DORIS Doppler post-fit residuals: ~4,8 – 5 mm suggesting a slightly stronger sensitivity to SAA than for Jason-3

RMS of daily GPS residuals : ~9mm for 1-day orbit ; ~10 mm for 21-day orbit Slightly higher than for Jason-3 but with a pre-flight phase map (solar array perturbations).



USING SLR TO EVALUATE RADIAL ORBIT ACCURACY

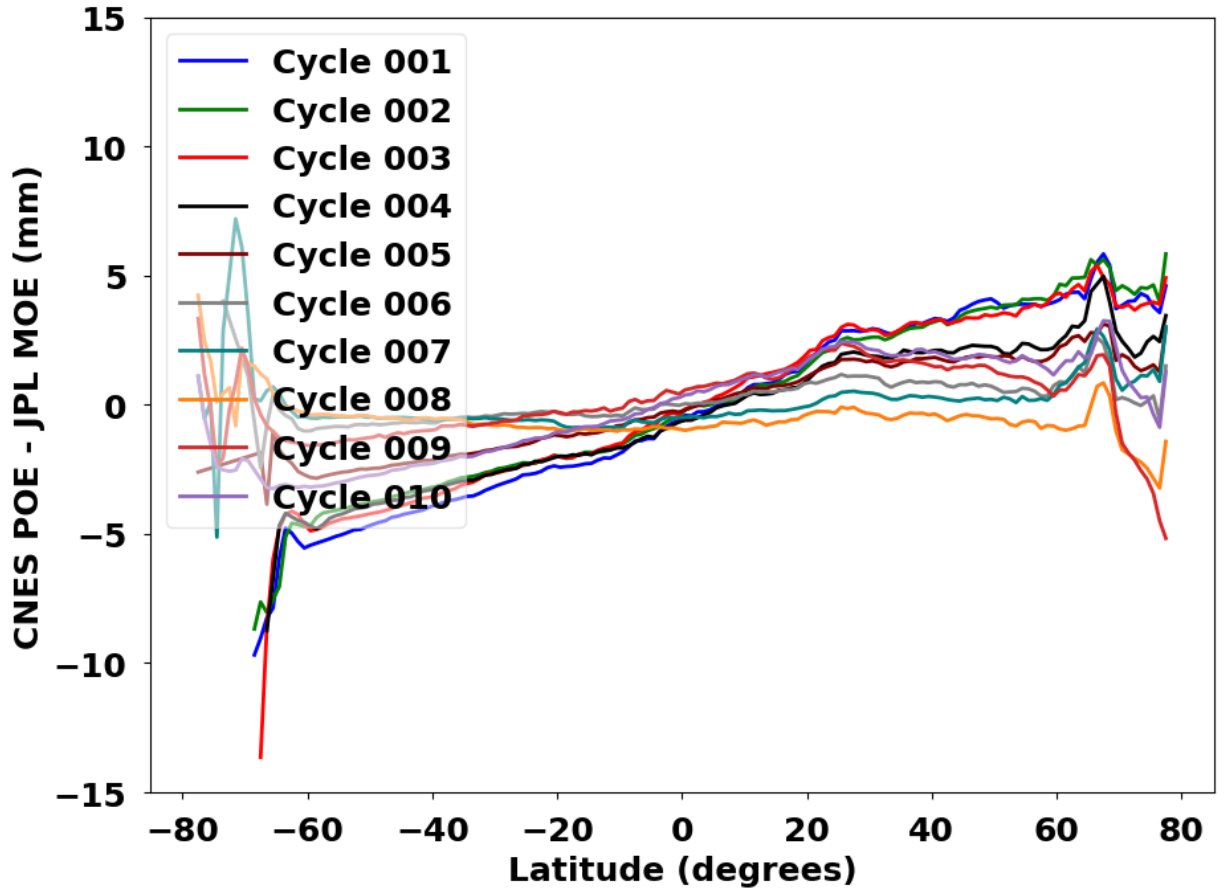
Using 10 Best Performing ILRS Sites with Good Coverage



- **SLR data support < 1 cm (RMS) radial orbit accuracy.**
  - Radial orbit accuracy represented by SLR measurements at low (< 30 deg) off-nadir angles.
- **CNES POE, JPL MOE and JPL NRT have similar radial orbit accuracy (~6 mm RMS).**

CNES / JPL RADIAL DIFFERENCES

Slight latitude dependent differences between CNES and JPL POE solutions



CONCLUSIONS

All orbits are meeting/exceeding missions requirements.

Routine monitoring of all orbit solutions are in place including comparison with JPL solution

Ongoing analysis of potential impact of the solar position on GPS antenna phase center, satellite surface model tuning, DORIS SAA sensitivity, CNES/JPL radial differences. More detailed analysis will be presented during the 30 years of altimetry symposium

POE-G processing standard under development, will not be implemented for the next SWOT reprocessing campaign due to the schedule.