



CENTRE NATIONAL D'ÉTUDES SPATIALES

# Jason-1 and Jason-2 POD Status , and other DORIS-related activities

CNES POD Team

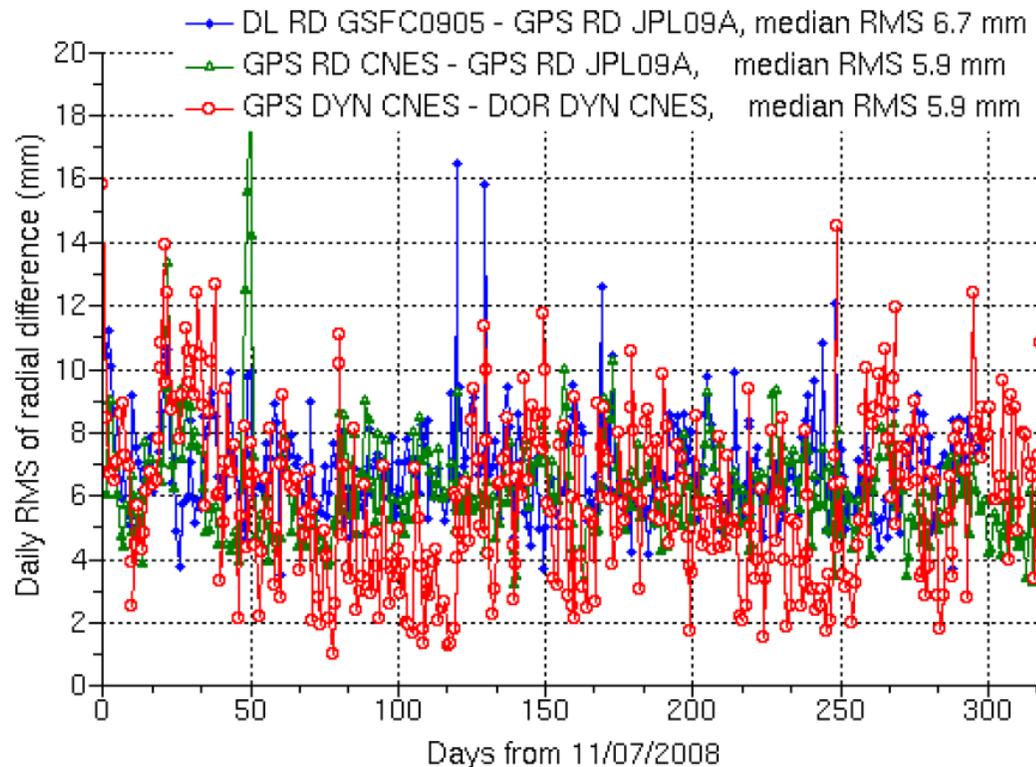
DORIS AWG MEETING – April 20-21, 2010 ESOC

## Jason-1/Jason-2 status

- Jason-1/Jason-2 nominal POE processing up to cycles 305/066
- Currently adopted POD standards (GDR-C)
  - ◆ described in Jason POD Team paper “Precision Orbit Determination Standards for the Jason Series of Altimeter Missions”, Marine Geodesy, in press; focus on remaining geographically correlated errors and long term stability
  - ◆ among currently adopted dynamic models, the main contributors to the error budget of Jason GDR orbit solutions are time-varying gravity and solar radiation pressure

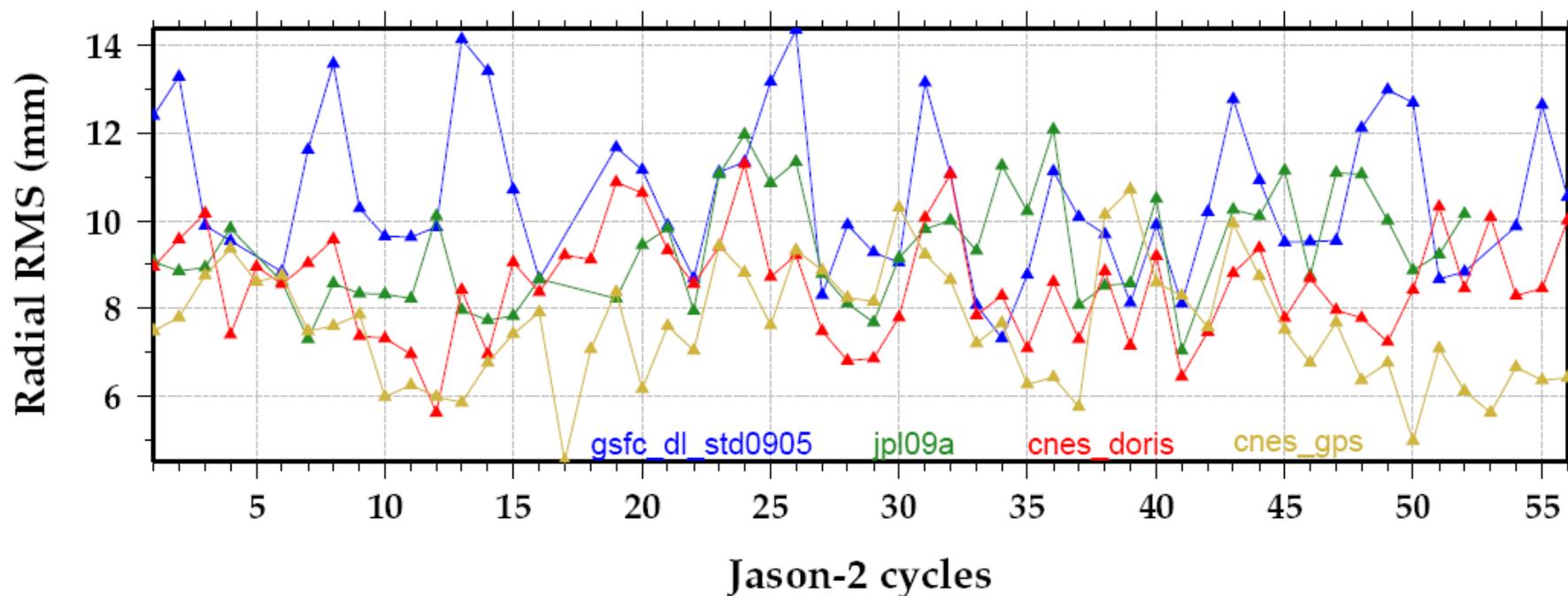
## Jason-1/Jason-2 status

- Jason-2 reduced dynamic orbits (or dynamic orbits obtained with different tracking data but identical models) compare at better than 7 mm RMS



## Latest orbit comparisons – Jason-2

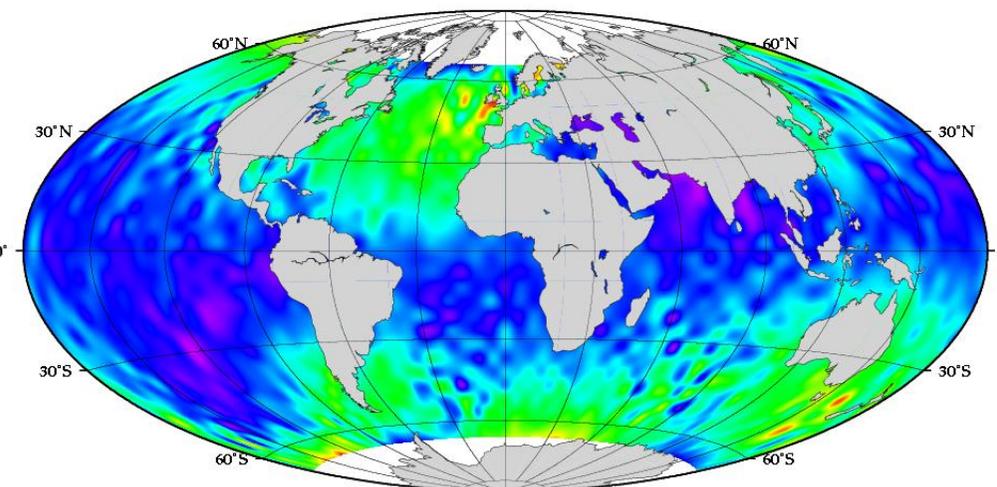
- Orbit comparison between GDR D+L+G orbit and reference solutions from different groups is stable in terms of radial RMS



## Latest orbit comparisons – Jason-2

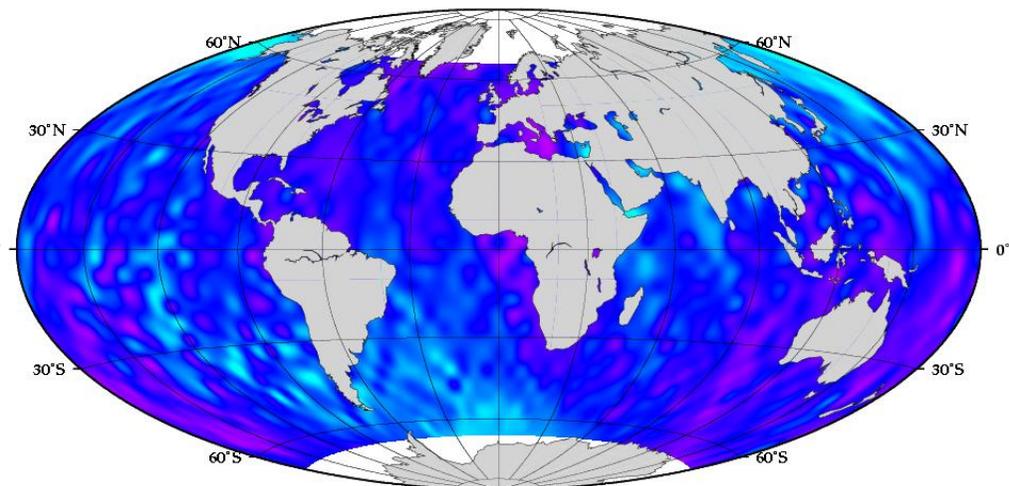
- Geographically correlated 118-day signal typical of SRP modeling differences

Jason-2 GDR POE - GSFC DL STD0905 radial differences, cycles 1-56



118-day amplitude geographic projection

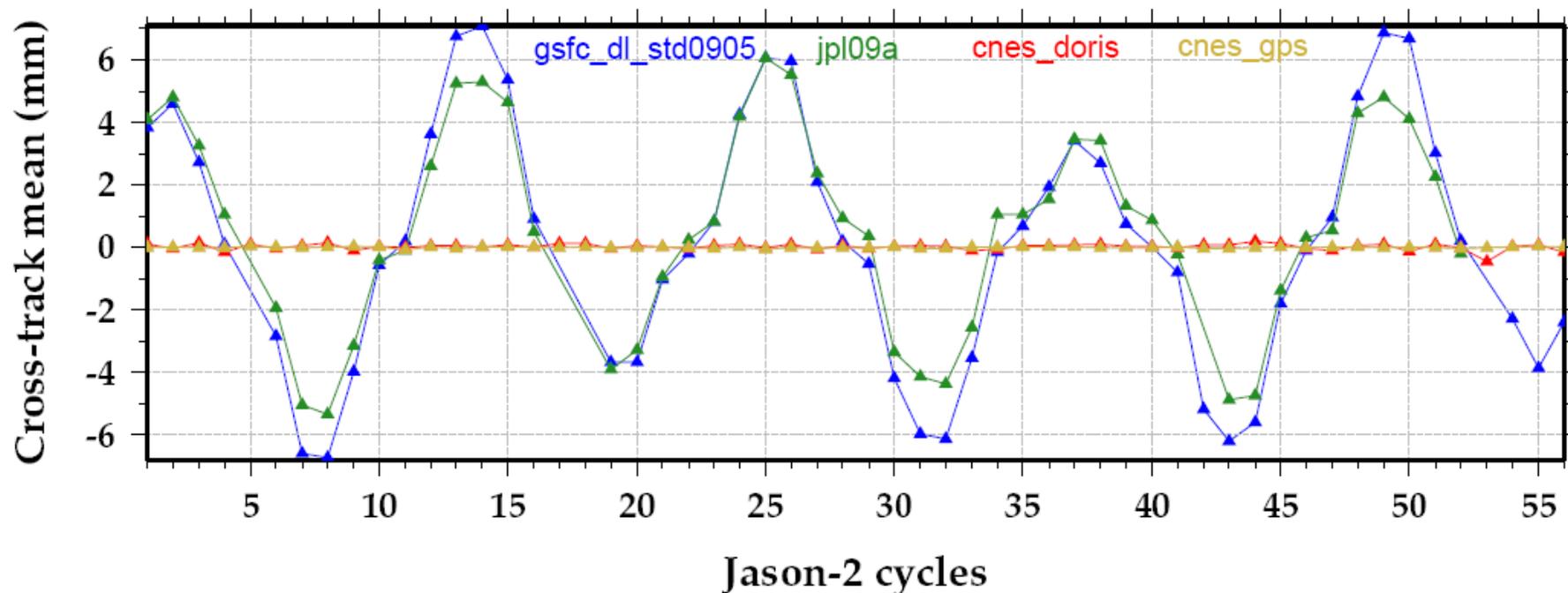
Jason-2 GDR POE - JPL09A radial differences, cycles 1-52



118-day amplitude geographic projection

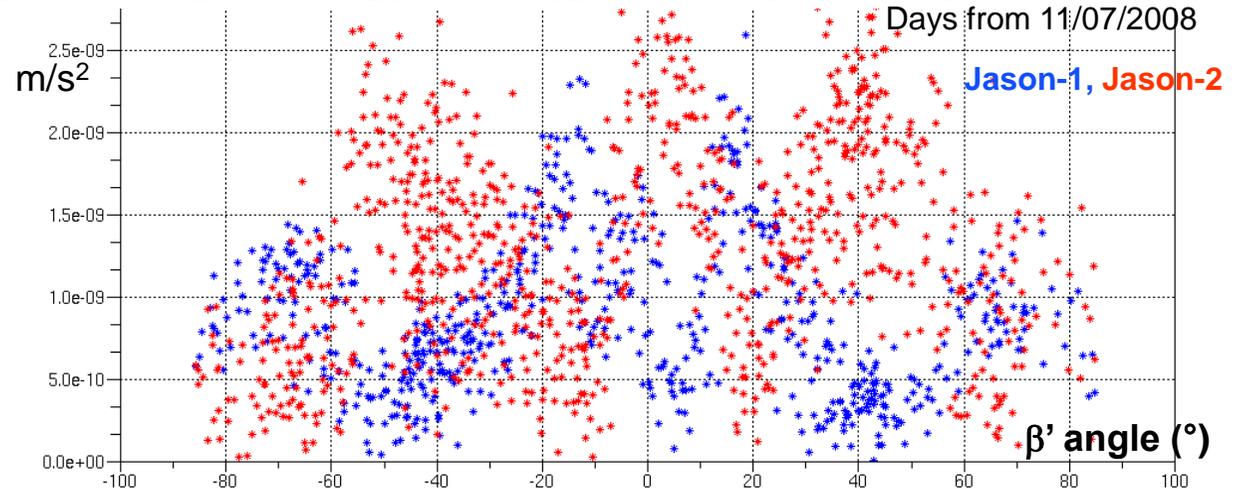
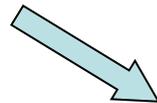
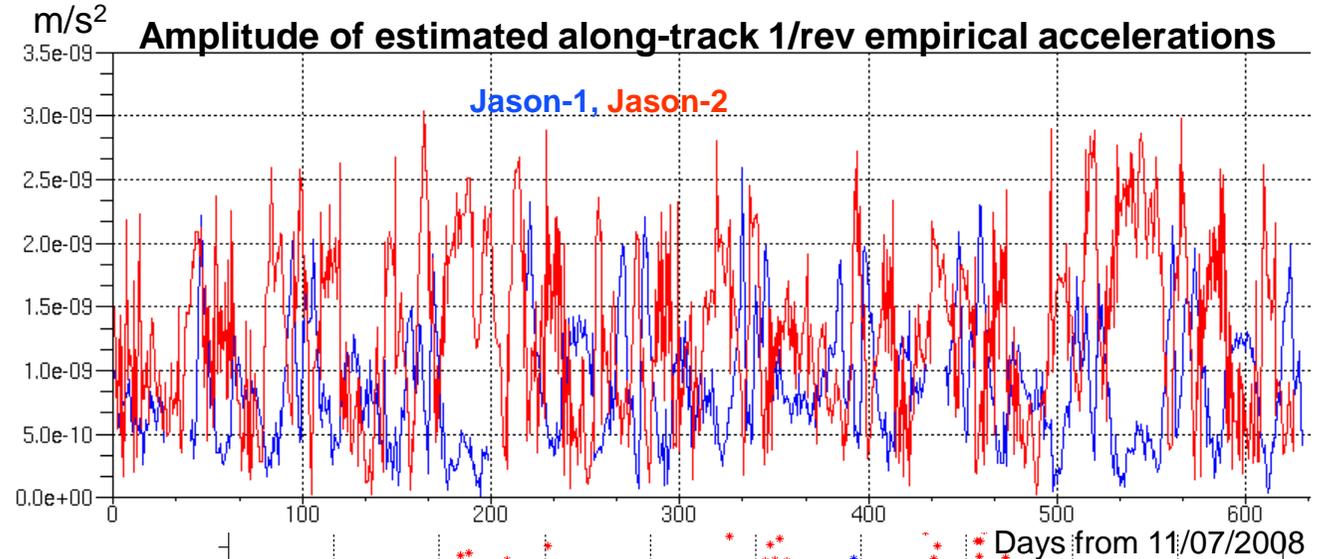
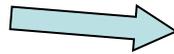
## Latest orbit comparisons – Jason-2

- Cross-track mean differences have a clear Beta-dependent signature; close behavior of JPL and GSFC orbits



## Amplitude of 1/rev for GDR orbit

- Along-track 1/rev generally below  $2 \times 10^{-9} \text{ m/s}^2$
- Beta-dependent pattern indicate that surface force models can be somewhat improved



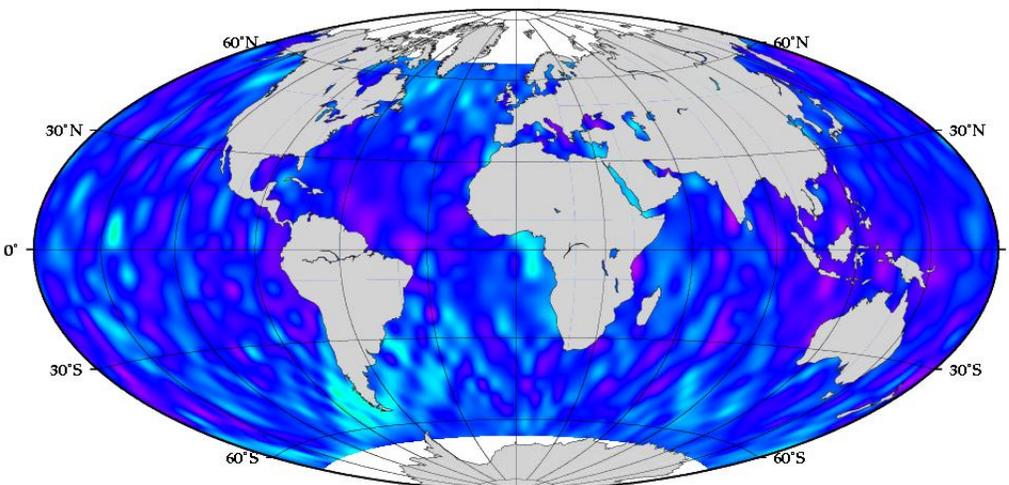
## Latest orbit comparisons – Jason-2

- **Current Jas-2 box&wing is inherited from Jas-1 and could probably be improved**
- **GSFC/CNES use the same box&wing model , JPL uses own model, but JPL/CNES orbits are closer**
- **Could there be an implementation issue related to box&wing model ?**
  - ◆ **Actions should be taken on both CNES/GSFC side to intercompare box&wing model implementation and understand the nature of this orbit difference**
  - ◆ **IDS analysis might also benefit from such comparison, as box and wing models are widely used for Doris satellites**

## Latest orbit comparisons – Jason-2

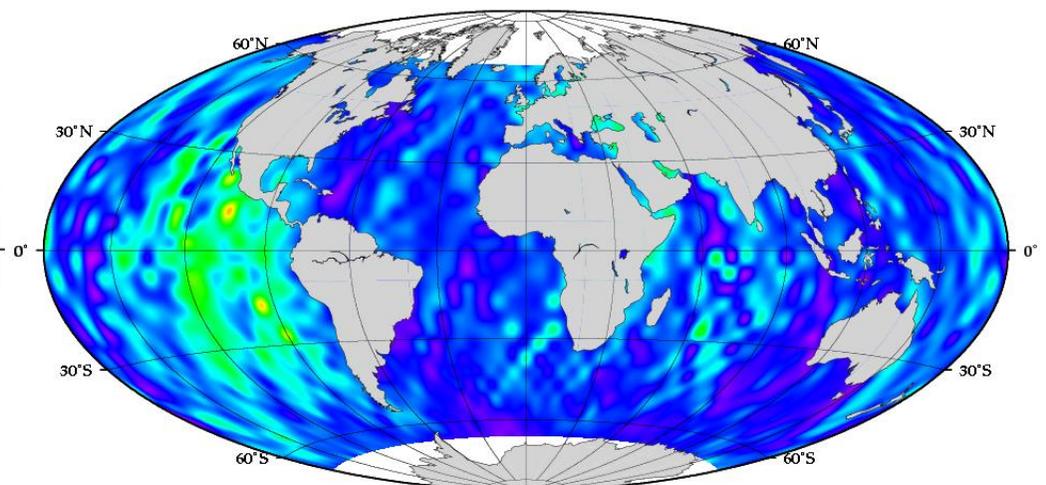
- Geographically correlated 365-day signal: TVG modeling differences? (GSFC and GDR use similar TVG models; JPL is reduced dynamic solution)

Jason-2 GDR POE - GSFC DL STD0905 radial differences, cycles 1-56



365-day amplitude geographic projection

Jason-2 GDR POE - JPL09A radial differences, cycles 1-52



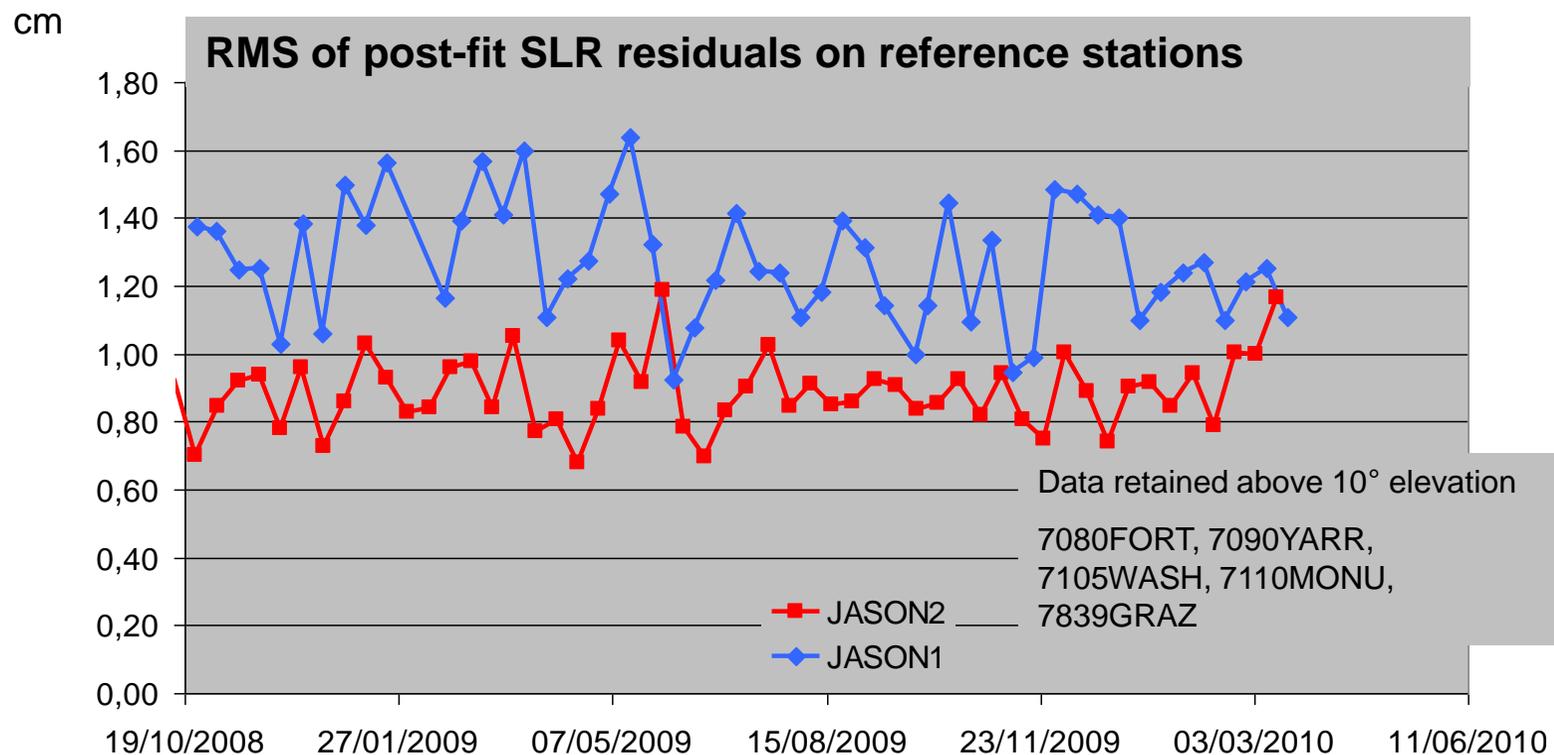
365-day amplitude geographic projection

## Latest orbit comparisons – Jason-2

- Past analysis have shown the sensitivity of Jason orbits to order-1 harmonics of the gravity field
- Current GDR-C (EIGEN-GL04S-ANNUAL) model is obtained using only 2 year of GRACE data,
  - ◆ could be updated using newer version for next standards (EIGEN-GRGS.RL02.MEAN-FIELD)
- Investigate mitigation strategies on DORIS based solutions to reduce sensitivity to errors in order 1 harmonics of the gravity model

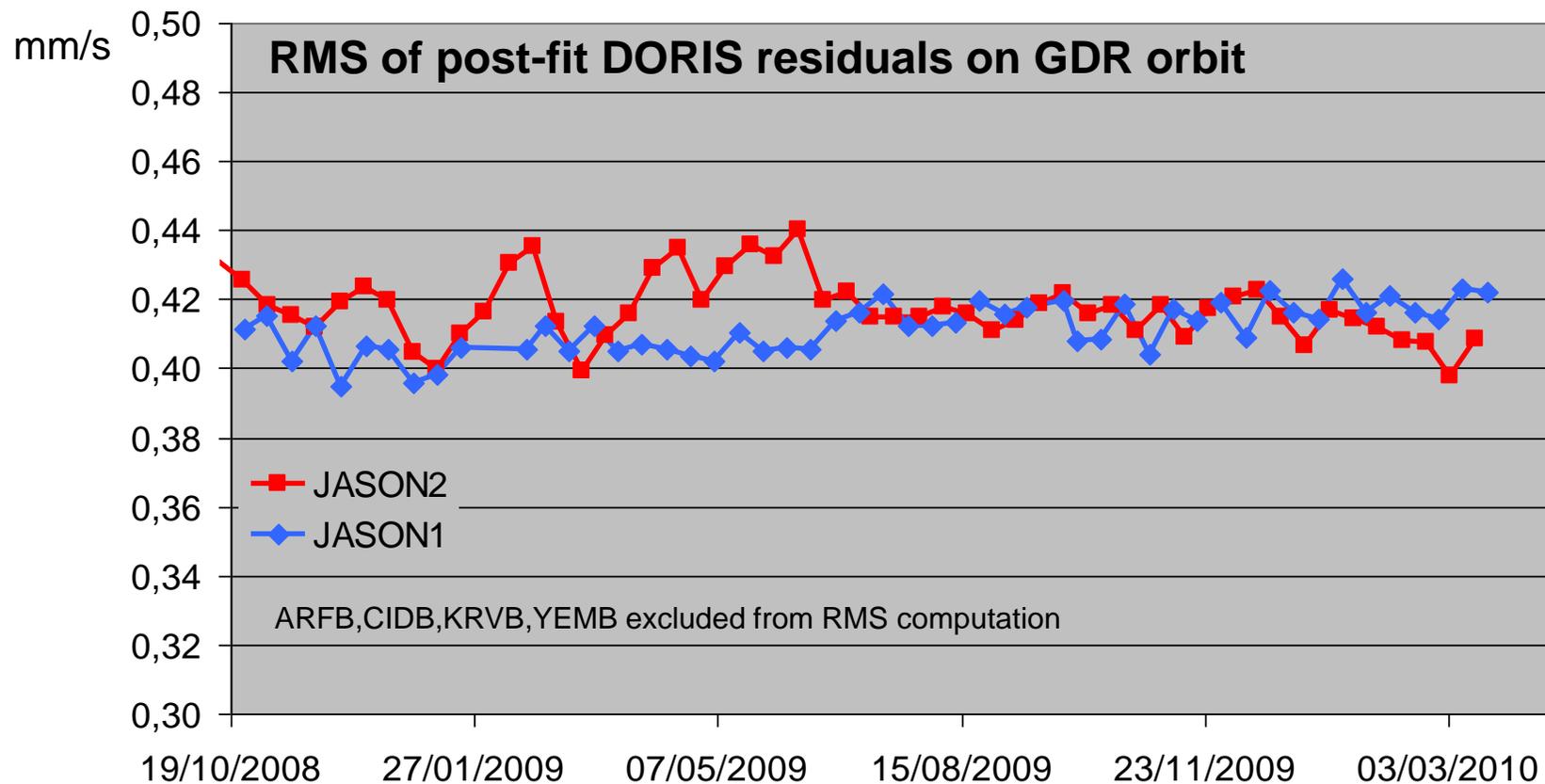
## SLR Residuals

- RMS of SLR post-fit residuals per cycle is stable and close to 1.0 cm for both JASON satellites (Jason-2 orbit is less constrained thanks to the inclusion of GPS data, and not affected by SAA, )



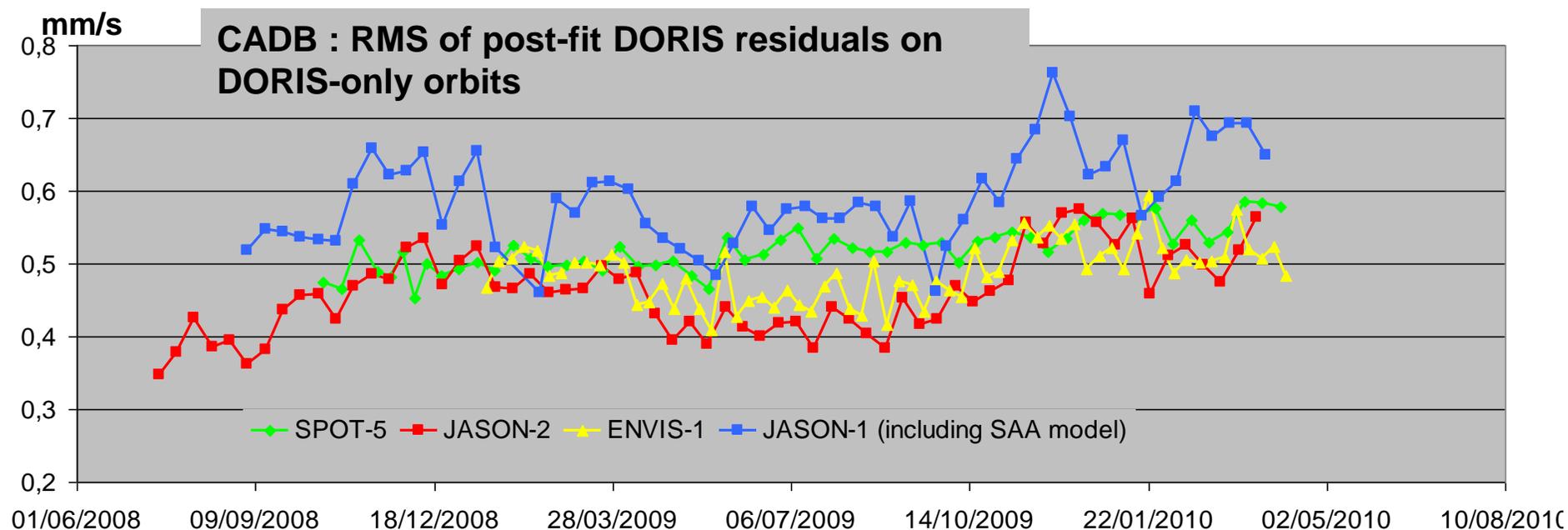
## DORIS residuals

- **RMS of DORIS post-fit residuals per cycle is stable and close to 0.4 mm/s for both JASON satellites**



## Monitoring of SAA effects on DORIS residuals

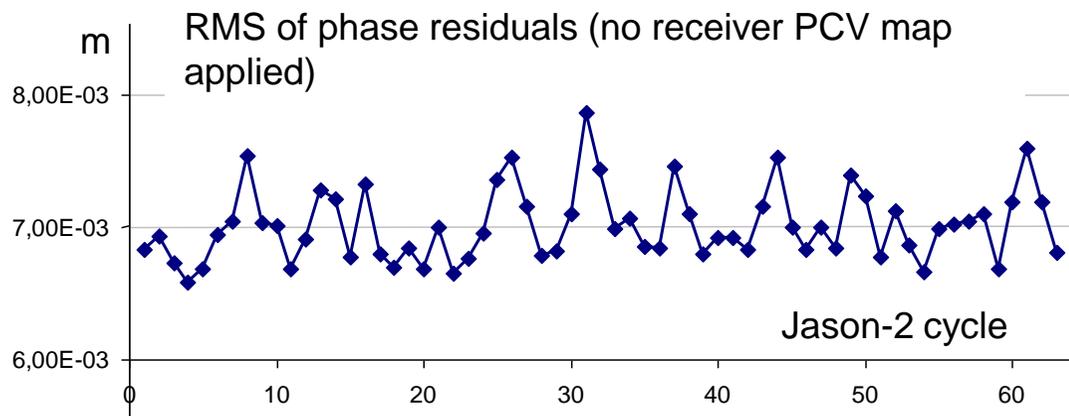
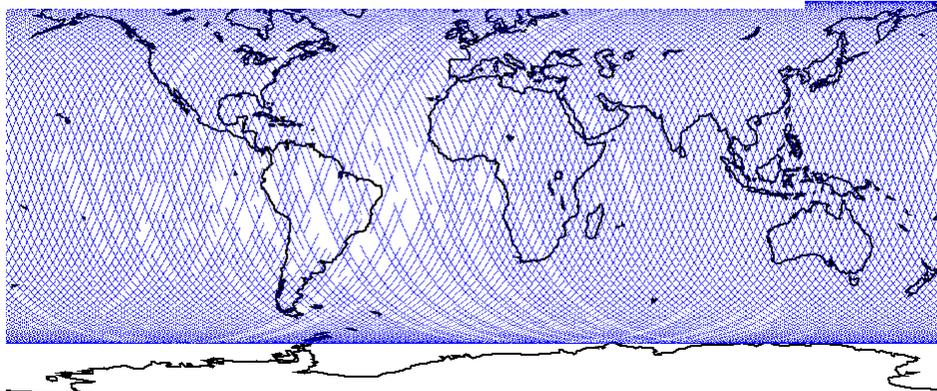
- **JASON-2: no conclusive sign of degradation due to SAA effects (ex. CADB : Cachoeira, Brazil)**



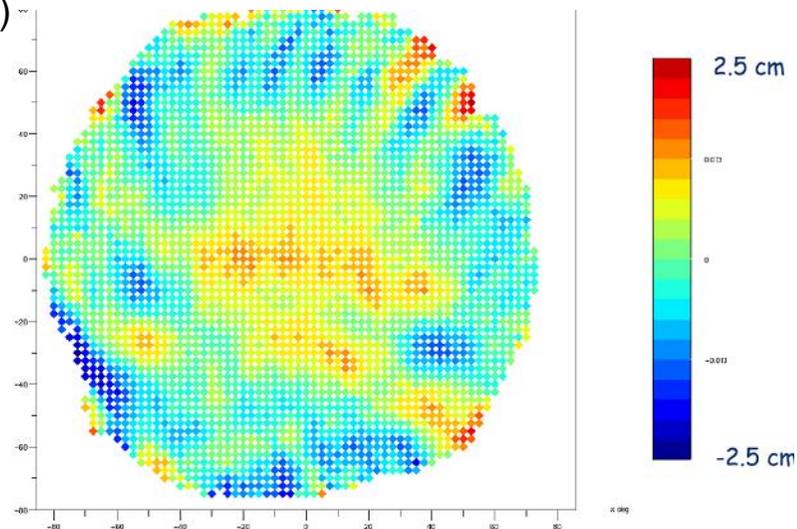
## Jason-2 GPS residuals and availability

- Stable phase residuals
- Phase center variation pattern within 2,5 cm (consistent with JPL)
- Reduced tracking over SAA region

Locations on Jason-2 ground track with at least 4 satellites in visibility for cycle 063



Receiver PCV Map (poster from Mercier et al. at last OSTST)



## Prospects for next OSTST meeting

- ITRF2008p test results
- SRP modeling issues and impact on orbit comparisons
- Mitigation strategies to reduce sensitivity of dynamic solutions from errors in order-1 harmonics
- Monitoring of SLR network biases
  - ◆ Recent problems in 7821 Shanghai and 7406 san Juan

## Other DORIS-related activities...

- **ENVISAT GDR-C reprocessing completed up to 2004**
  - ◆ Waiting for the recovery of a complete set of DORIS1.0 in 2003 data to complete orbit reprocessing and redeliver DORIS2.2 data to IDS
- **Delivery of few corrected SPOT4 DORIS2.2 data files in 1998 for test purposes**
  - ◆ Entire data set has been corrected, delivery can start at any time
- **Delivery of corrected Jason-2 DORIS2.2 data files (ionospheric correction field)**
- **Delivery of POE orbits to IDS servers in SP3c format will start soon (software is ready)**
- **CRYOSAT-2: Delivery of first DORIS-based MOEs to SSALTO data server began soon after launch (see dedicated slides for preliminary results and CNES POD strategy)**

Backups...

# CNES Doris vs GDR-orbit, 120-days signal

Jason-2 GDR POE - CNES DORIS radial differences, cycles 1-56

