POD Session Splinter Summary

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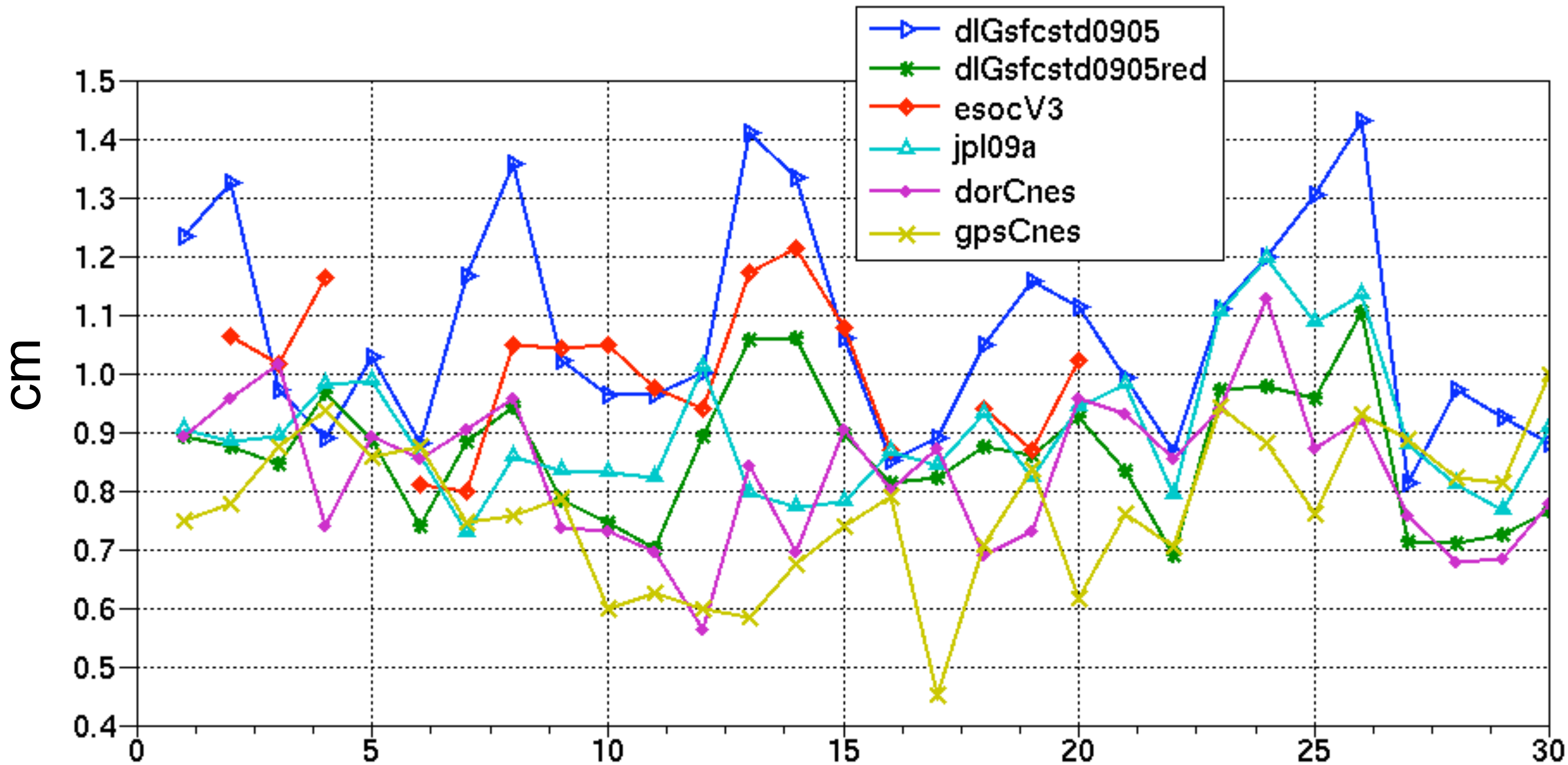
June 25, 2009

What is the Jason-2 POD Performance?

Jason-2: Comparison of different orbits to CNES POE

Good agreement between different solutions, close or better than 1 cm for all orbits



Jason-2 orbit evaluation

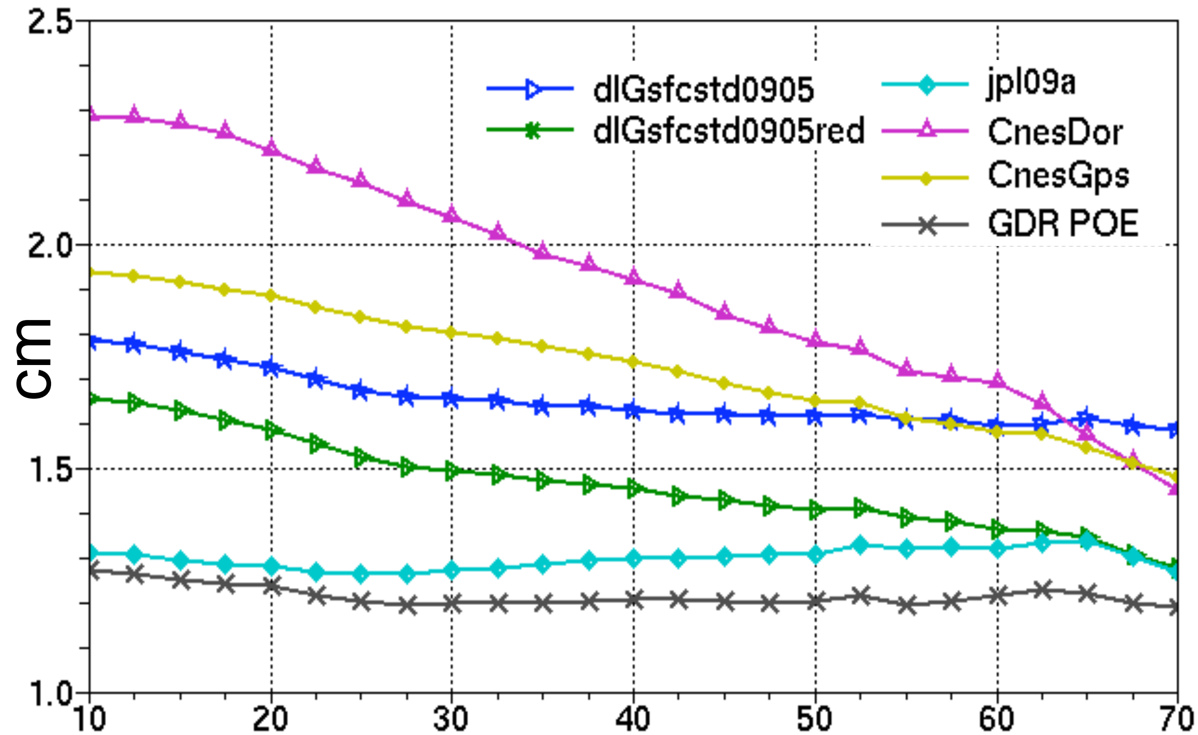
Jason2 orbit evaluation cycles 1 -20	doris (edit cyc 18)		slr (edit cycles 18)			xover rms (cm) (edit cyc 18,20)	
	point s	rms (mm/s)	points	mean (cm)	rms (cm)	points	rms (cm)
gsfc ld std0905	169900	0.3719	2764	-0.02 0	1.288	4814	5.512
gsfc ld srp0906	169900	0.3718	2764	-0.017	1.29 0	4814	5.505
gsfc ld red_std0905	169900	0.3711	2764	-0.075	1.242	4814	5.46 0
cnes ldg gdrc	167553	0.3719	2718	0.000	1.215	4812	5.523
cnes ldg gdrc tune00	167553	0.3718	2718	-0.019	1.209	4812	5.532
jpl gps rlse09a	162291	0.372 0	2662	0.015	1.307	4414	5.362

Crossover fits are independent

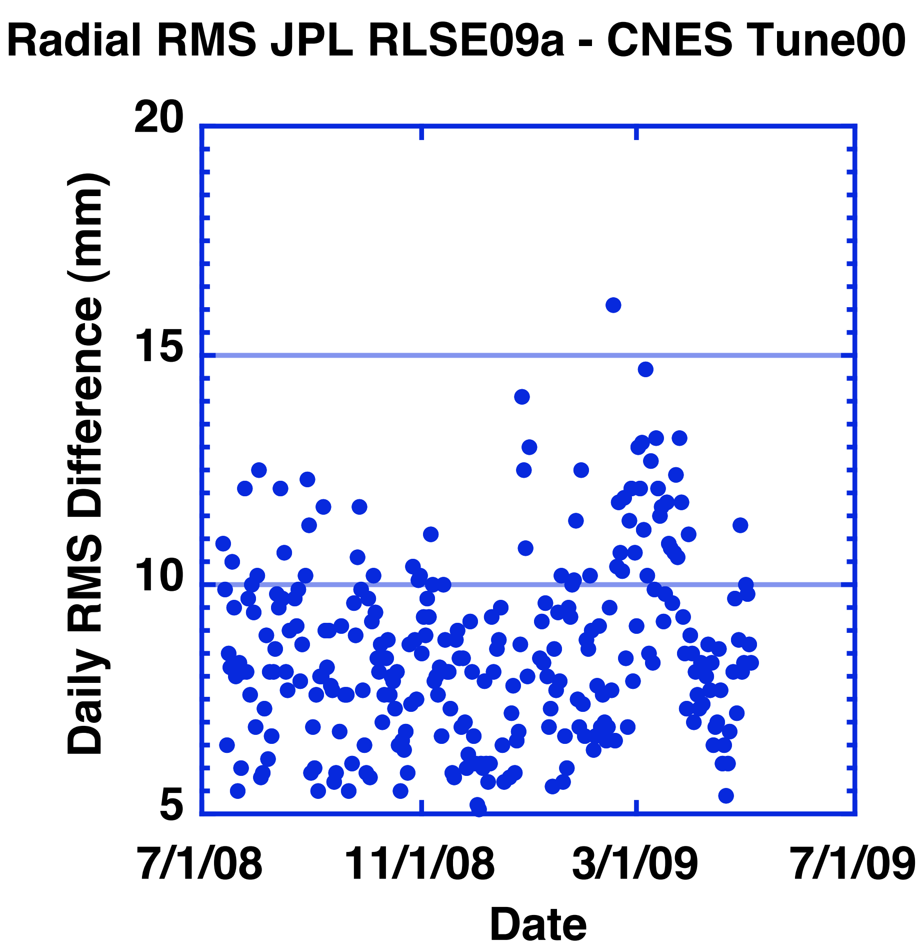
Jason-2: SLR residuals on different orbits

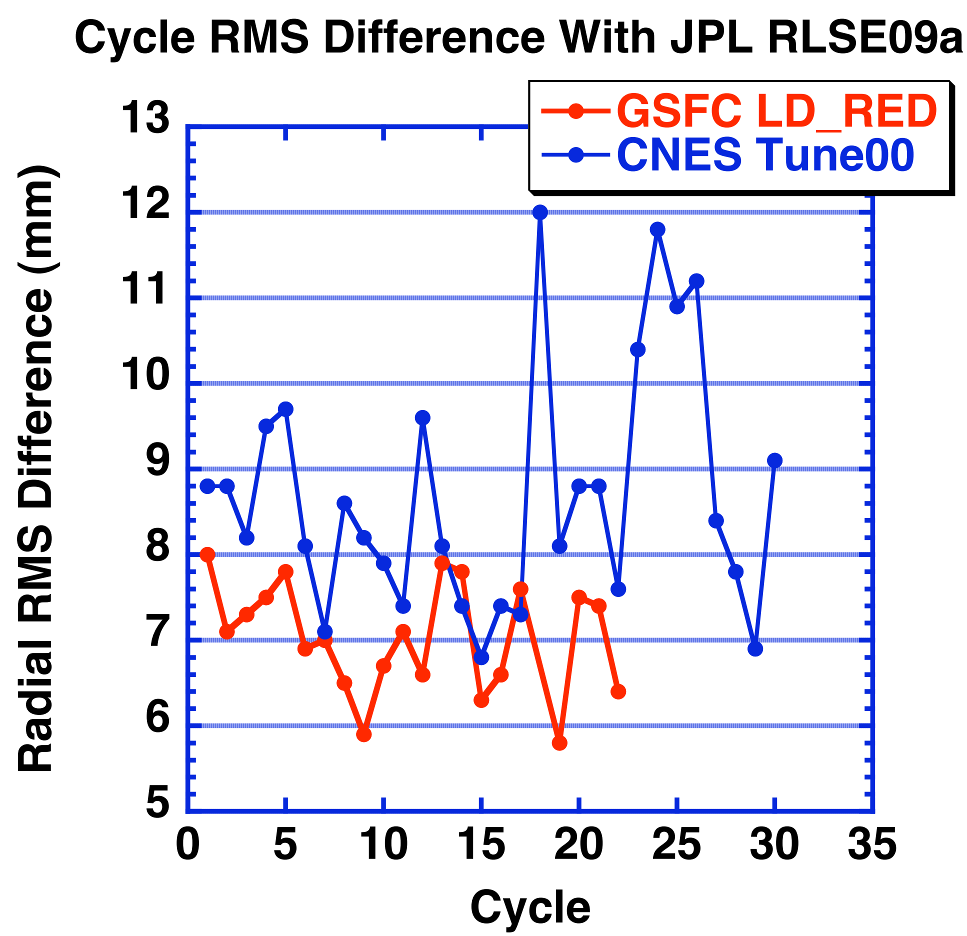
- Degraded RMS for non-GPS orbits when low elevation data is included
- Similar performance of SLR statistics for reduced dynamic orbits (JPL GPS , GSFC DL)
- SLR is included in GDR-POE solution
- CNES dynamic Doris and GPS orbits exhibit similar radial performance

RMS of common SLR residuals on core network(*) obtained by varying the elevation cut-off angle



POD Radial Differences





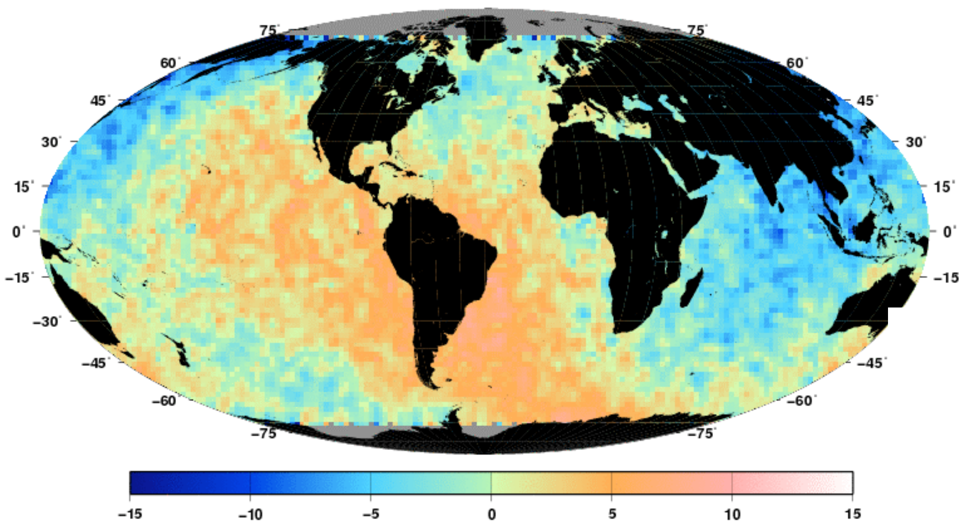
GPS Red-dyn vs GPS/SLR/DOR Dyn

GPS Red-dyn vs SLR/DOR RedDyn

What are the J2 geographically correlated orbit differences ?

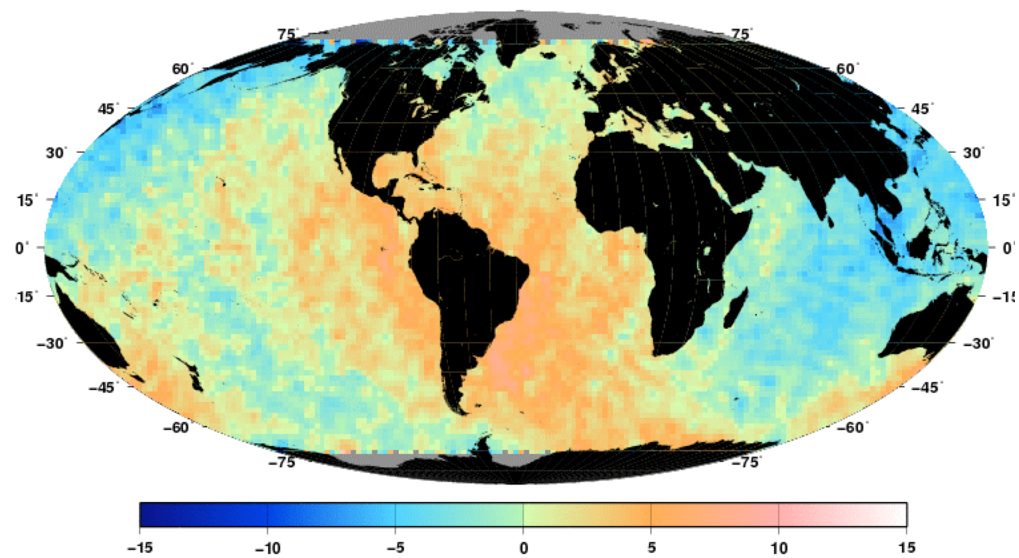
Geographical Differences with RLSE09a

Cy 1–30 Bin RMS = 5.0 mm - CNES Tune00



GSFC LD_RED

Cy 1–22 Bin RMS = 4.0 mm

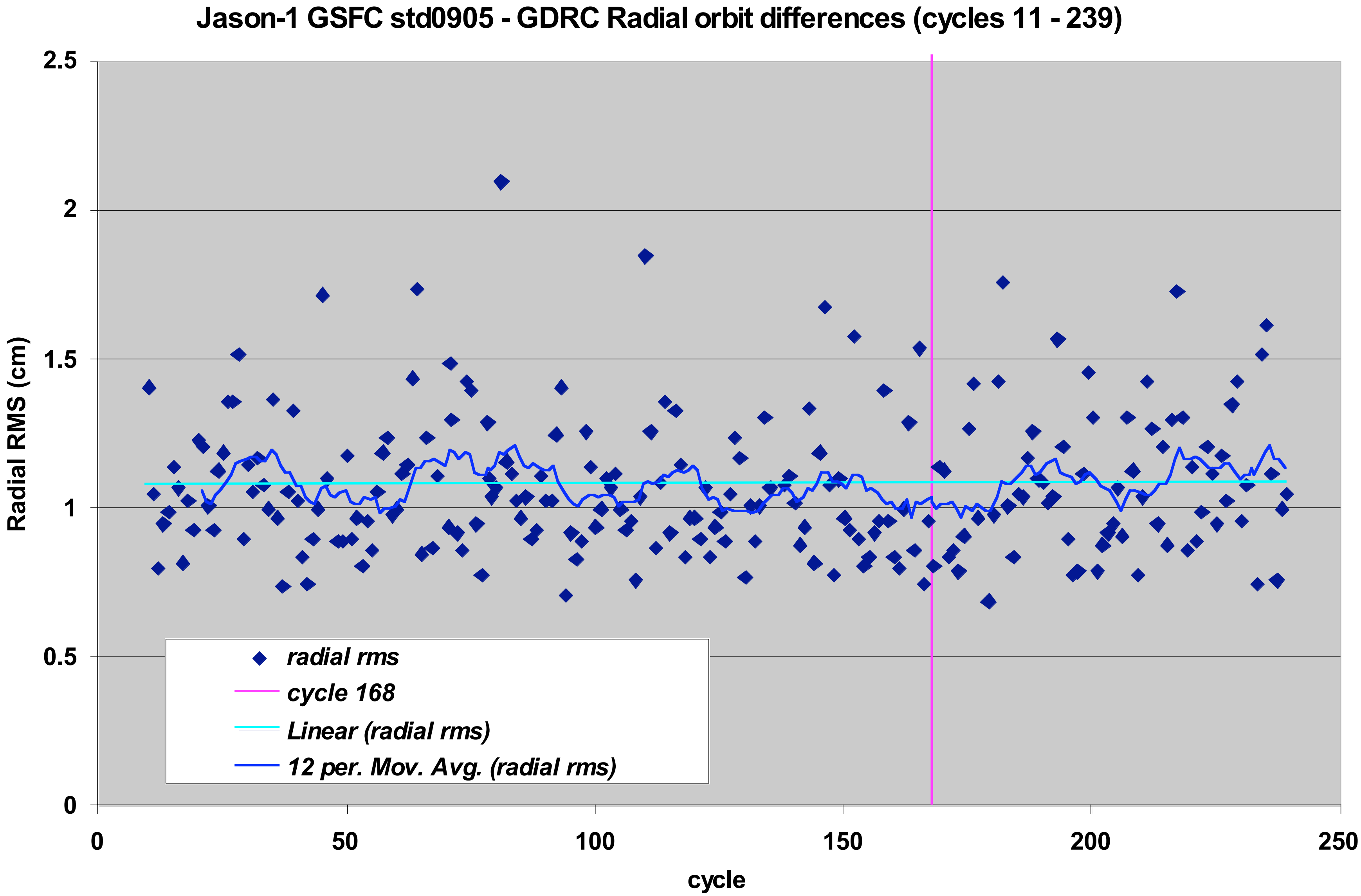


Mean XYZ Differences:

CNES – JPL = [-1.1, 3.3, -2.8] mm

GSFC – JPL = [-1.6, 2.1, -1.5] mm

Excellent agreement between GSFC and GDRC J1 orbits both prior and post GPS receiver degradation



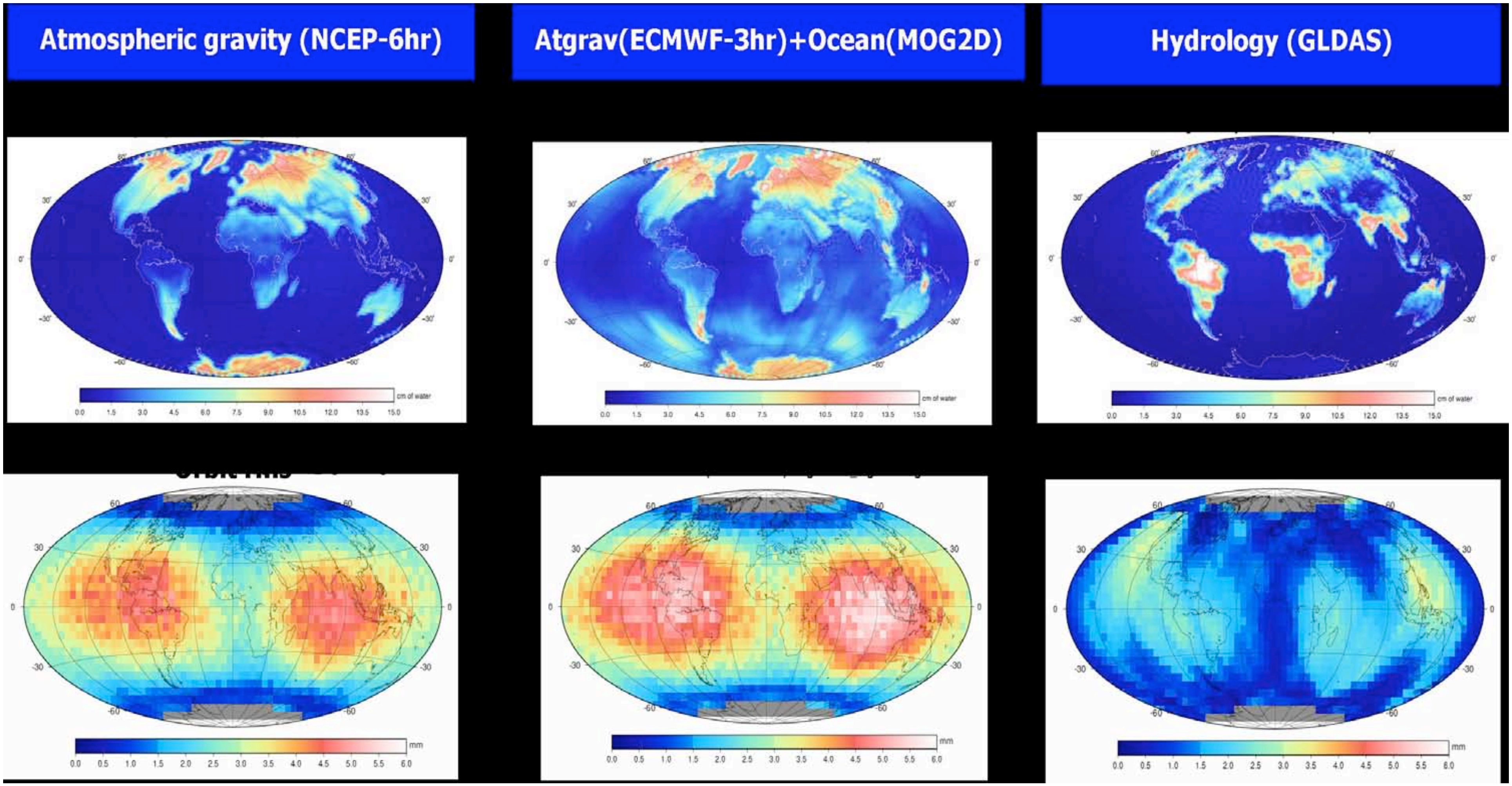
What are the residual modelling errors for Jason-2 & Jason-1

1. Surface forces in general - including radiation pressure.
2. Time-variable gravity not included in operational model.

3. ITRF reference frame issues including station coordinate error and modeling of station specific issues.
   - ITRF2008 will be available late 2009; Could be used for a GDR-D orbit reprocessing in 2010 or 2011 (after validation).

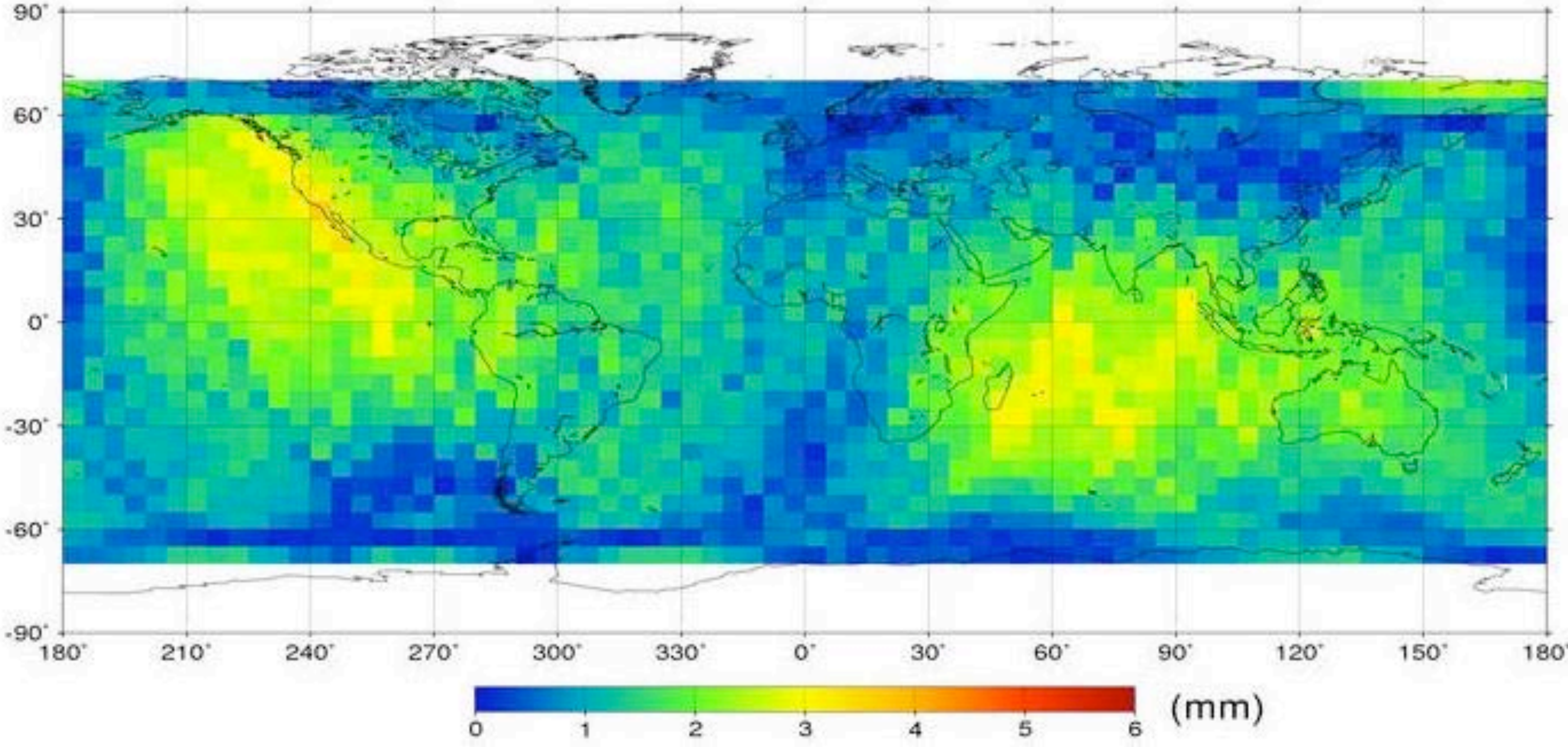
4. For Jason-1 - handling of DORIS USO SAA effect, in particular for cycles 1-90.

Time Varying Gravity Components



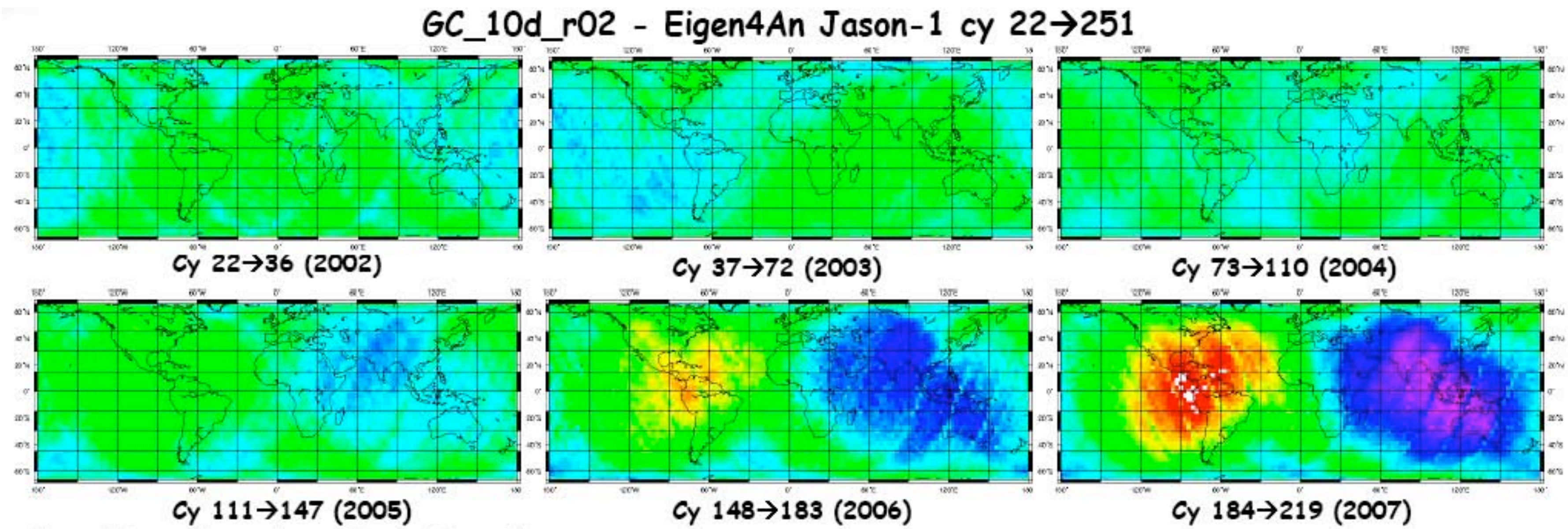
Effect of residual TVG on J1 orbit: (operationally modeled: atgrav+annual) - (atgrav+mog2d+gldas + est. 60x60/mo Grace)

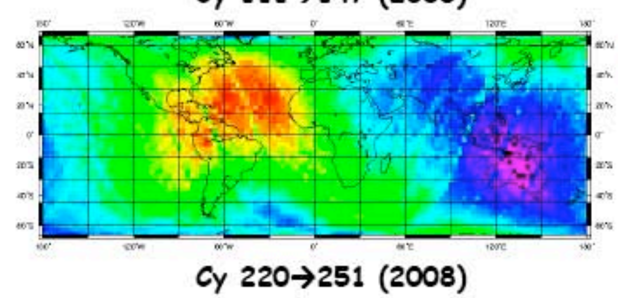
2.5 mm annual residual amplitude from 5x5 degree radial orbit differences over 2004-2005

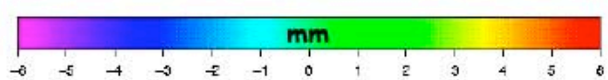


Radial Orbit differences – Geographically correlated difference

(GRGS 10-day GRACE solutions vs. GDRC EIGEN-GL04 standard)







- Non-linear variation of the geographically correlated difference with time

POD Issues (1)

1. For Jason-1: How do we construct a continuous time series with tracking systems that are variable in temporal coverage (DORIS/USO and GPS)?
2. For Jason-2: Monitor GPS performance around SAA.
3. Improvement of Radiation Pressure Models for Jason-2 (at least 3-4 mm differences are evident in dyn vs red-dyn orbits).
4. Stability of the ITRF (a) ie. tracking coordinates *AND* bias implementation for SLR stations. (b) centering of orbits and stability in Z of reference frame.
5. Modelling of Time-variable gravity not in GDRC standards (Responsible for 2.5 to 5 mm radial differences - aperiordic signals).

POD Issues (2)

6. Open modelling issues:

- Atmospheric Loading (e.g. via NCEP or ECMWF) & Hydrological loading on tracking stations.
- Geocenter.
- High order ionosphere corrections (DORIS).
- Troposphere modelling for DORIS & GPS.
- Modelling of laser measurement depends on station laser parameters such as pulse width and type of laser system (single photon or MCP) (Can be responsible for 1 cm effect on Lageos - smaller for Jason).

Importance of Geodetic Networks for Satellite Altimetry

- Satellite Laser Ranging
- DORIS
- GNSS

URL:

http://ilrs.gsfc.nasa.gov

http://ids.cls.fr

http://igscb.jpl.nasa.gov

Proposal for Deployment of Next Generation Geodetic Networks is underway for submission to NASA (for the NASA contribution)

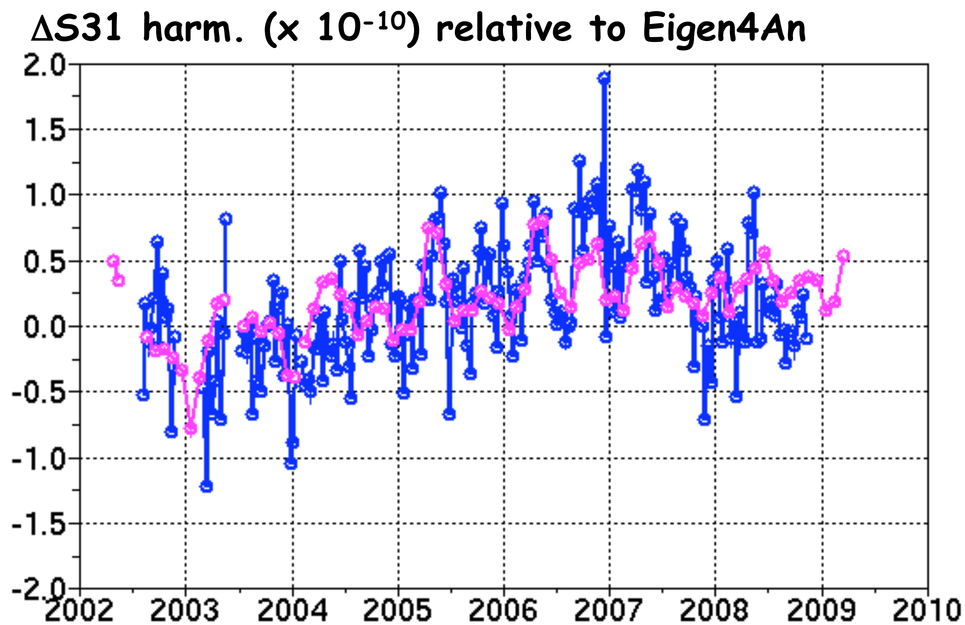
Farewell to DORIS Network Manager, Hervé Fagard

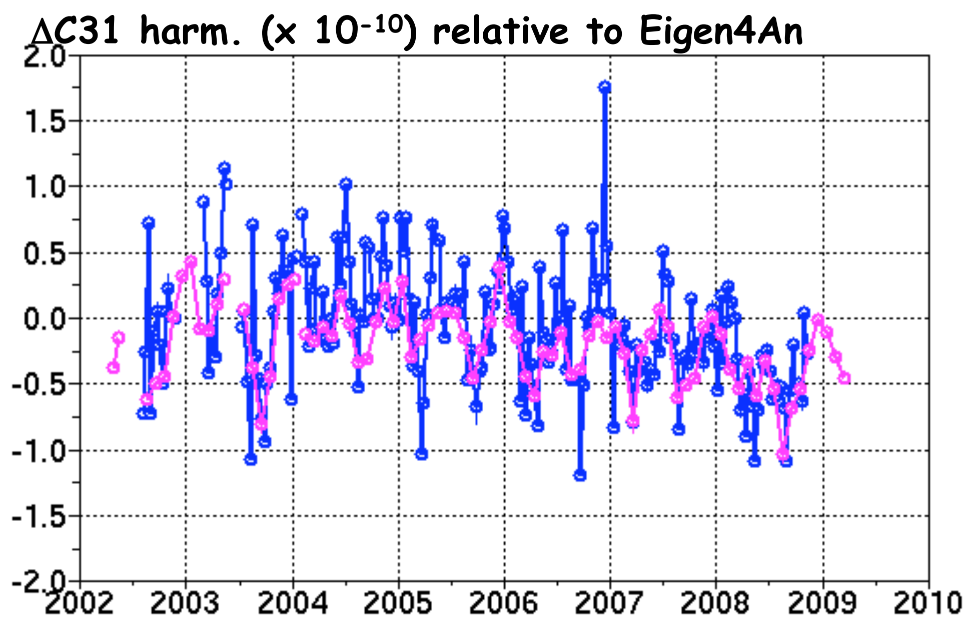
- Network manager for DORIS; Responsible for maintenance and deployment of DORIS stations for 20 yrs.
- Oversaw DORIS station improvement program (2000 to the present)
- OSTST owes Hervé a great debt as he leaves for new job at the IGN.

Backups

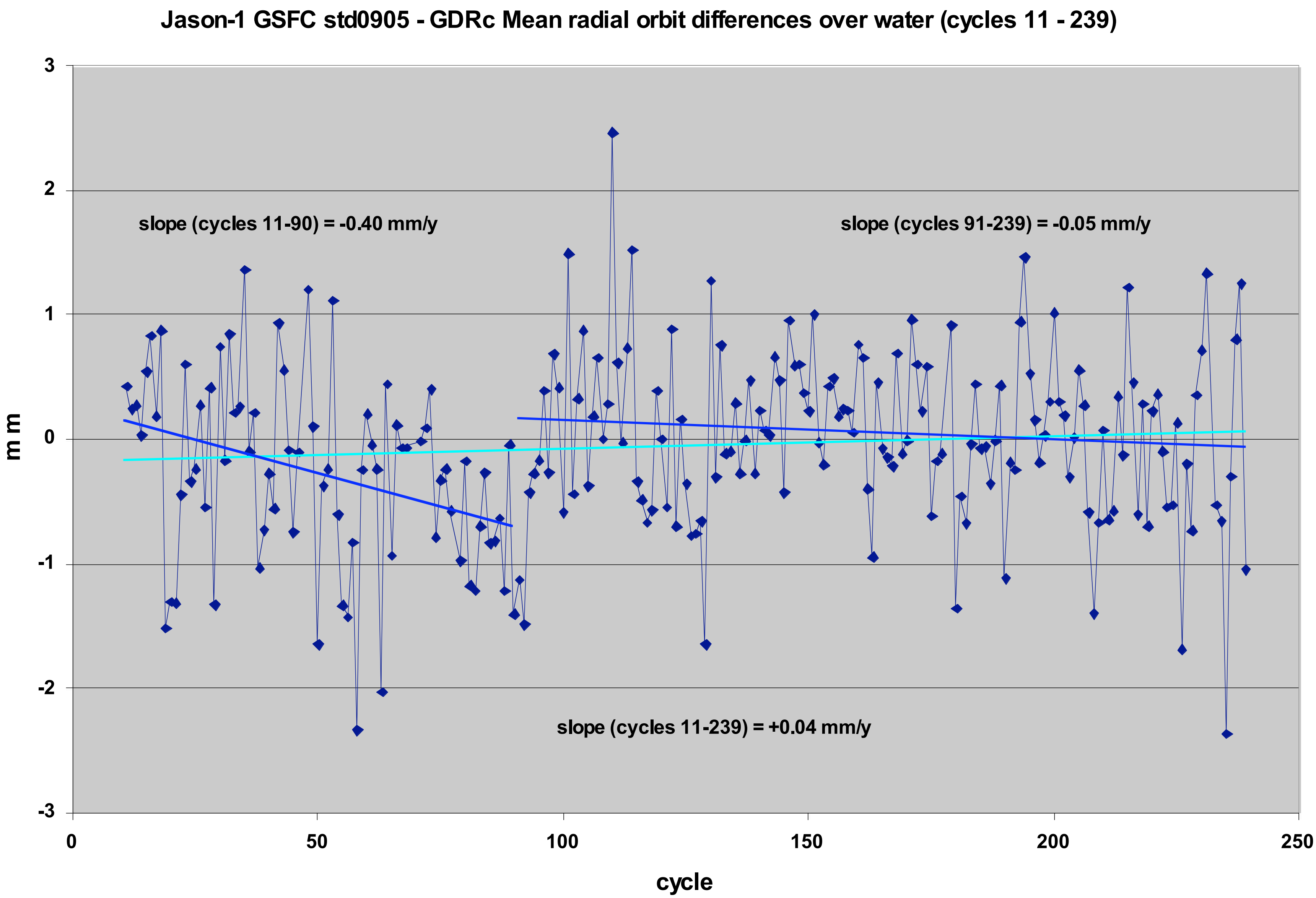
deg. 3/ord. 1 harmonic

- 10-day fields are noisier, each individual solution doesn't necessarily represent the best available gravity model
- Long term behavior is consistent between different series of GRACE fields, and not modeled in current POE standards

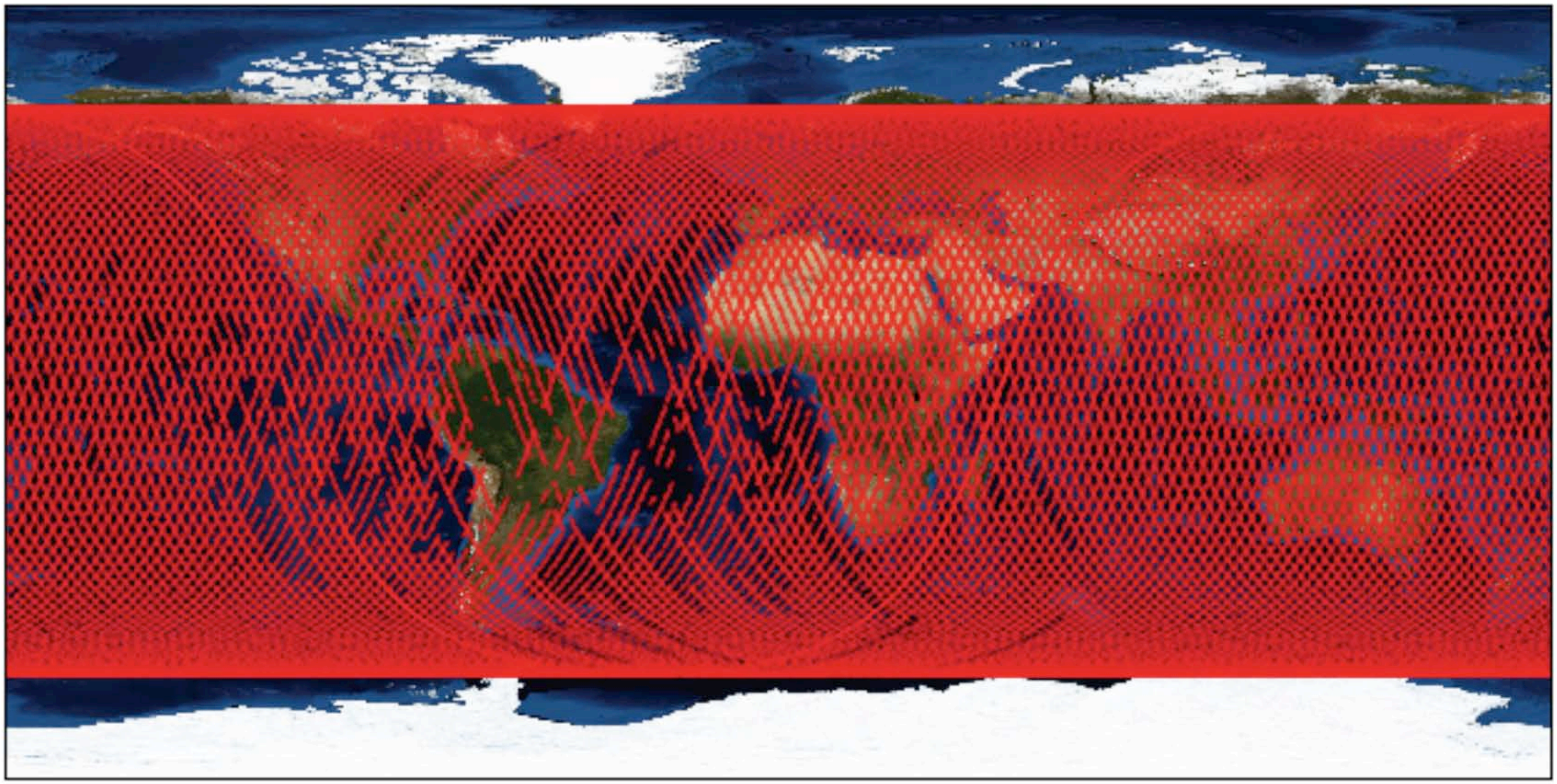




Orbit centering affects mean radial error over water

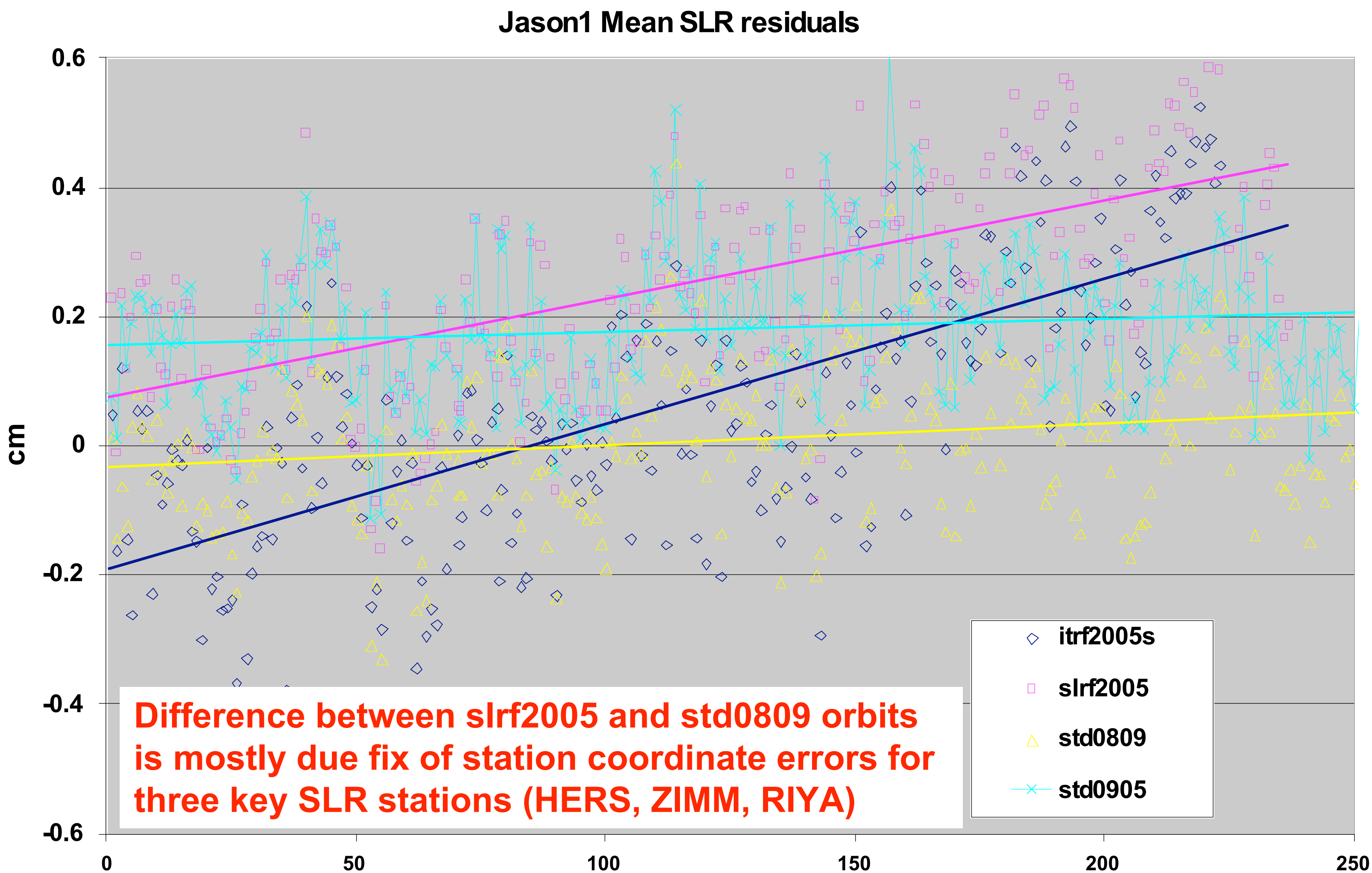


Typical Jason-2 GPS Data Coverage



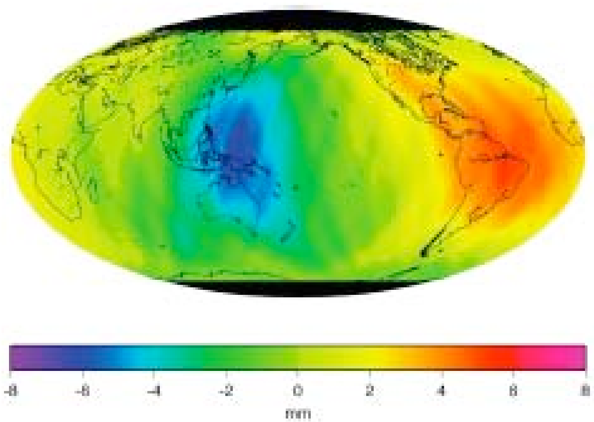
Points on map indicate locations where 4 or more GPS satellites are being tracked for the dates, Aug 10-19, 2008

Evaluation of ITRF2005 SLR terrestrial reference frame – mean residuals



Correlated orbit differences for Jason-1 and Topex/Poseidon

Mean of radial differences



GGM02C vs
EIGEN-GL04C
(+/- 8 mm)

RMS of radial differences