Jason-2/OSTM Precision Orbit Determination with GPS, Model Improvements, Data Processing Improvements

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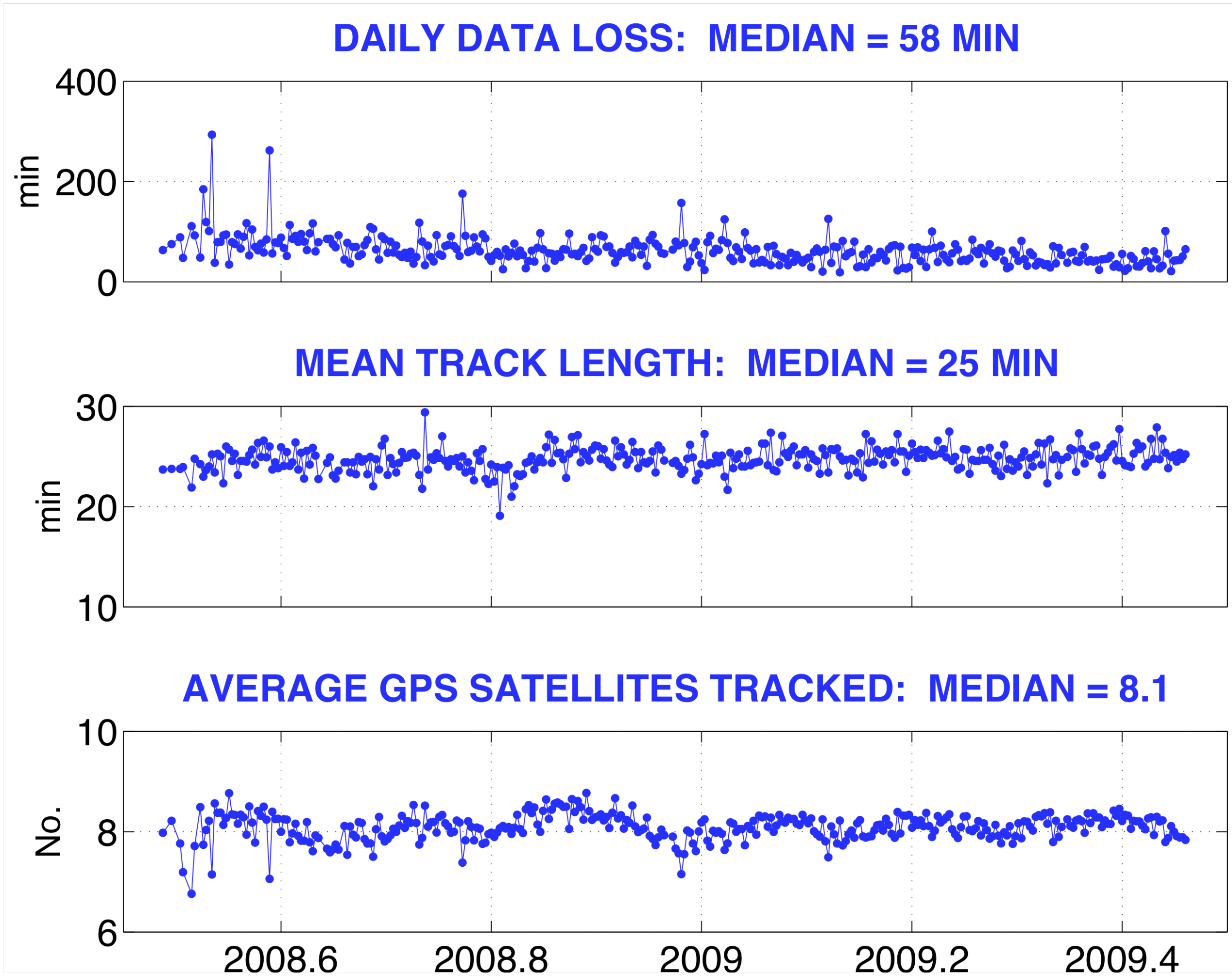
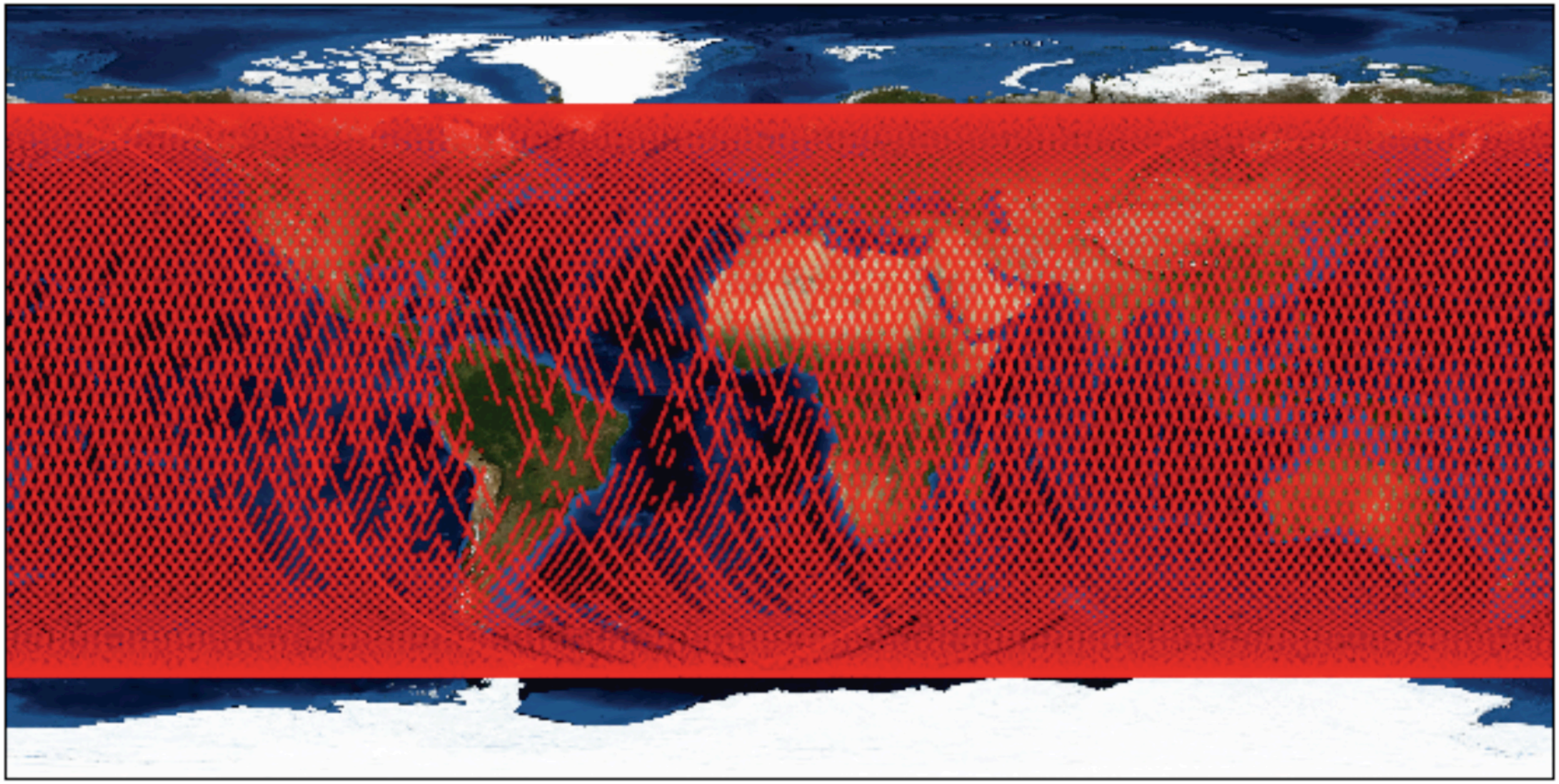
OSTM GPS Receiver Daily Tracking Statistics

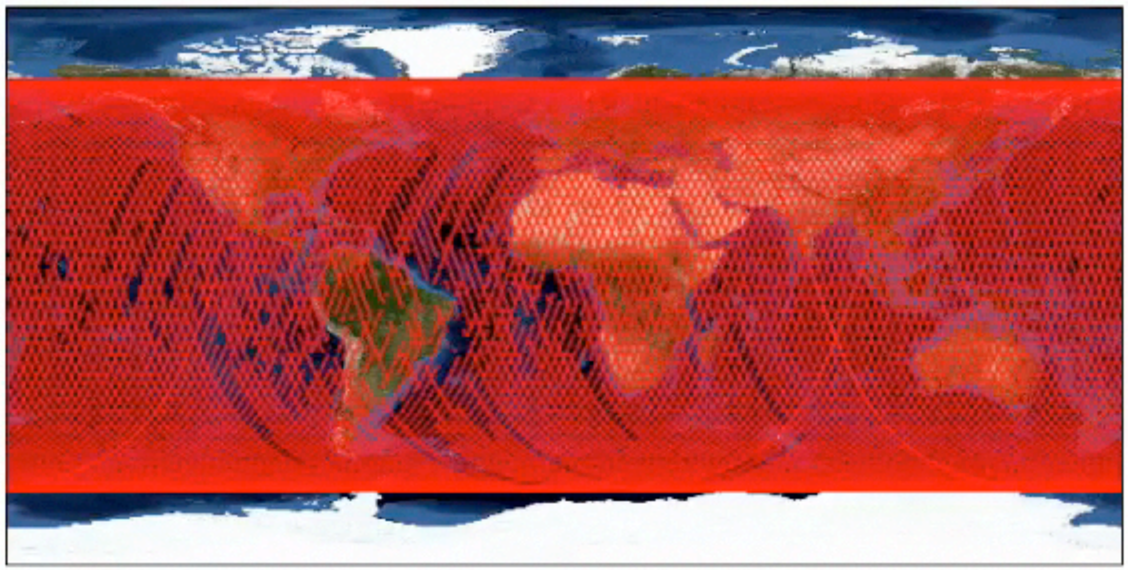


Typical Data Coverage



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

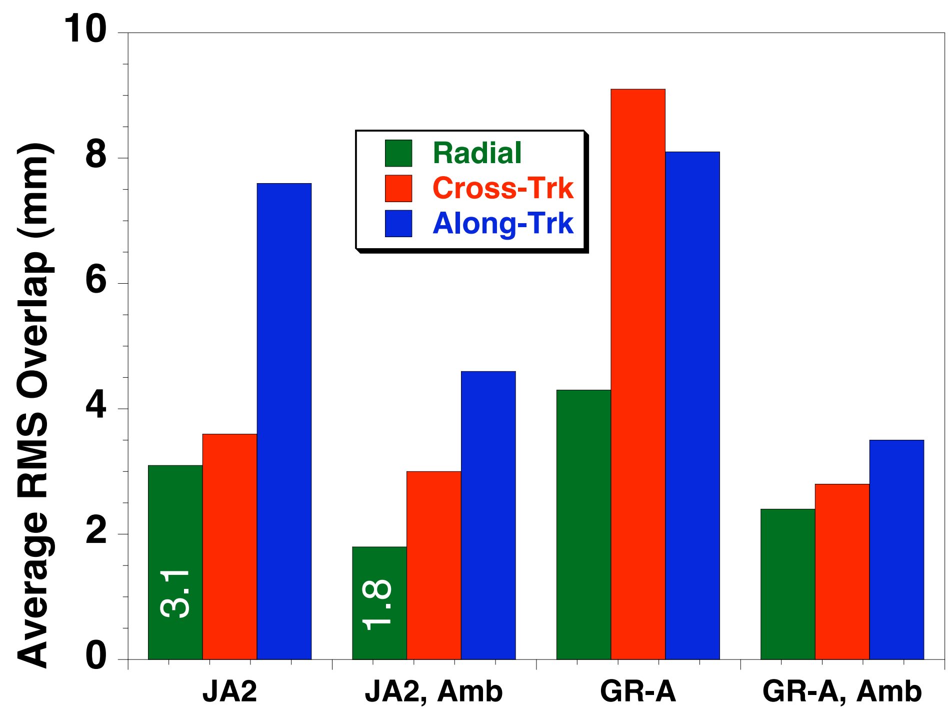
GPS Data Coverage The Movie
Points with >= 4 Sats



Data Processing/Ambiguity Resolution

- **Single Receiver Ambiguity Resolution**
  - Not fixing, finite weight on double-differences
- **Global GPS Orbit and Clock Process (JPL FLINN, QL,…)**
  - For each arc saves – Transmitter name, receiver name, widelane average/standard deviation, phase bias (wlpb file)
- **Single receiver uses orbit/clock and wlpb information and tries to resolve all possible double differences**
  - Widelanes, narrow lanes, iterative improvement
  - Parameter adjustment allows for non-normal error distributions

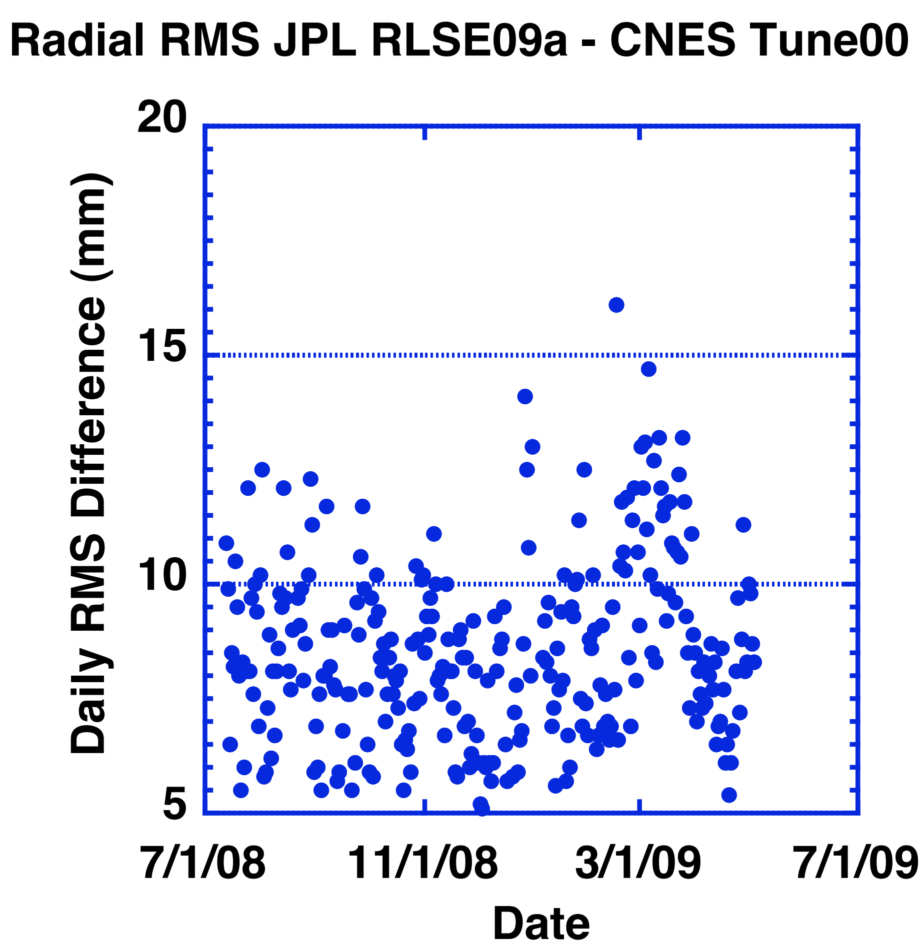
Overlap Improvement with Ambiguity Resolution

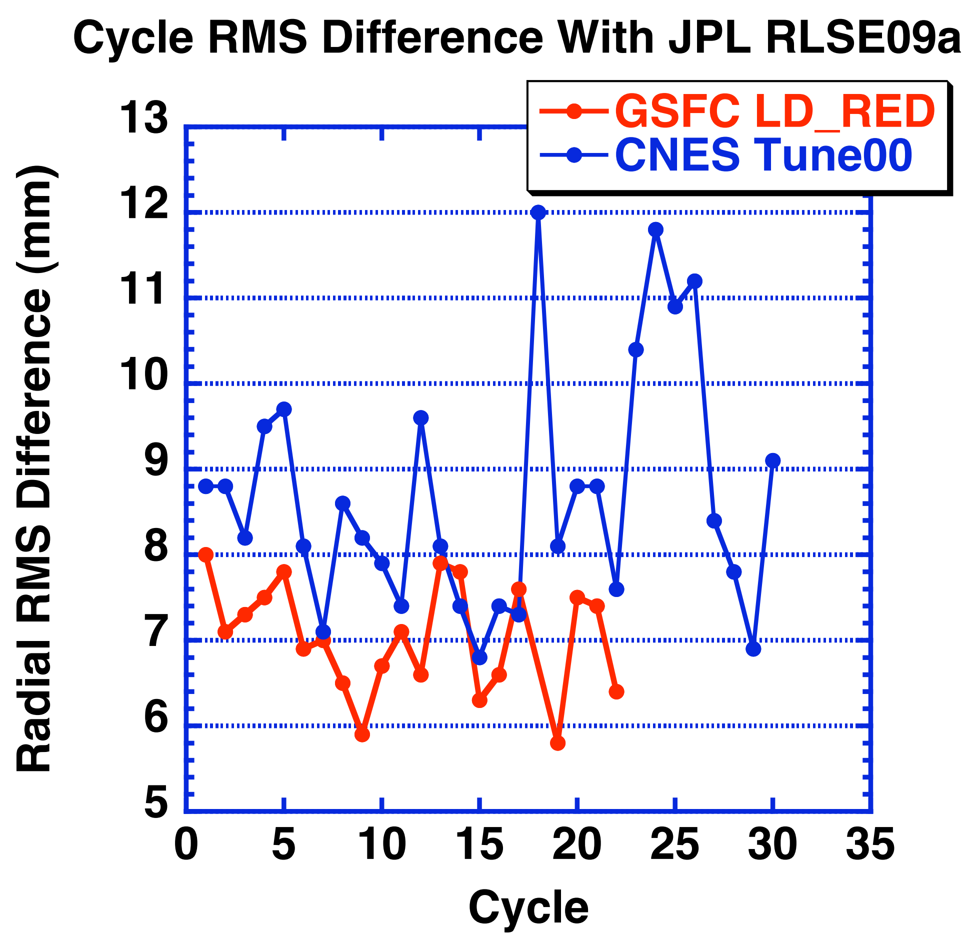


POD Strategy RLSE09A

- Ambiguity Resolution
- Reduced dynamics (same as Jason-1 strategy)
- GGM02C (200X200)
  - AOD1B was not used
- Custom Surface force model, Engineering Drawings, Surface Properties
  - Box/Wing + AMR + Altimeter
- New GPS s/c orbit and clock solutions
  - Use IGS phase variation maps
  - Typical 1D RMS overlap (GPS s/c) of 1.5 cm (2.6 cm 3D)
  - Official JPL submission to IGS beginning Sept. 14, 2007.
  - ITRF2005 (using fiducial solution).
- Phase and group delay variation maps for Jason-2 antenna
  - Updated with data from July-Dec. 2008
  - Transmitter reference: IGS offsets, and phase variation maps.
    - Defaults to offset at nadir angles > 14 degrees
  - Receiver reference: pre-launch offset only (no anechoic map)

POD Radial Differences



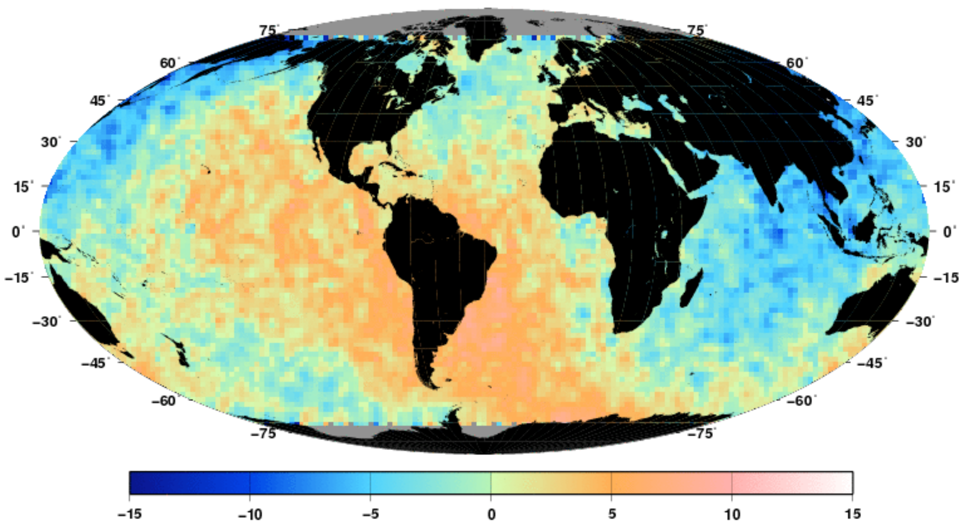


GSFC Mean Cycle RMS = 7.1 mm

CNES Mean Cycle RMS = 8.7 mm

Geographical Differences with RLSE09a

Cy 1–30 Bin RMS = 5.0 mm, CNES Tune00

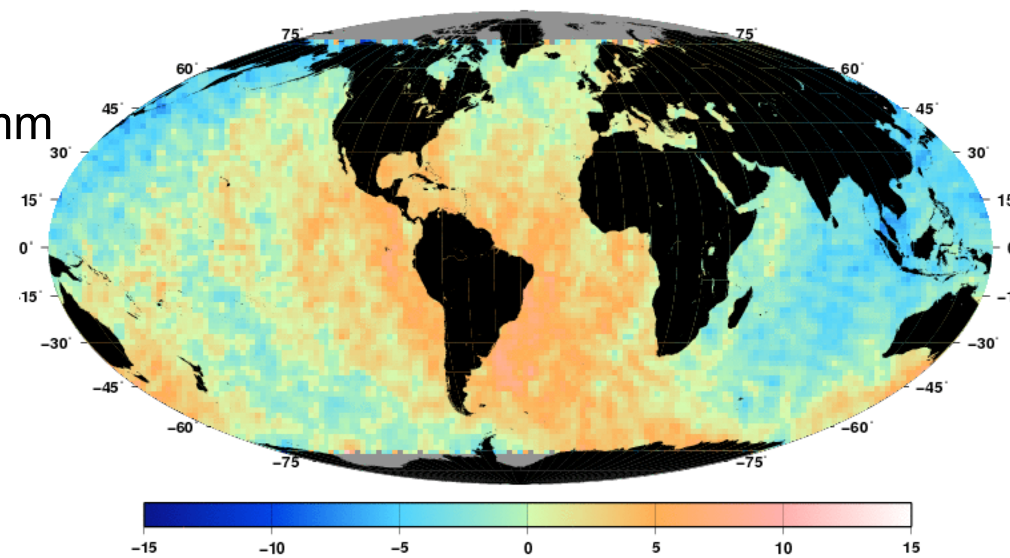


-15 mm

15 mm

GSFC LD_RED

Cy 1–22 Bin RMS = 4.0 mm

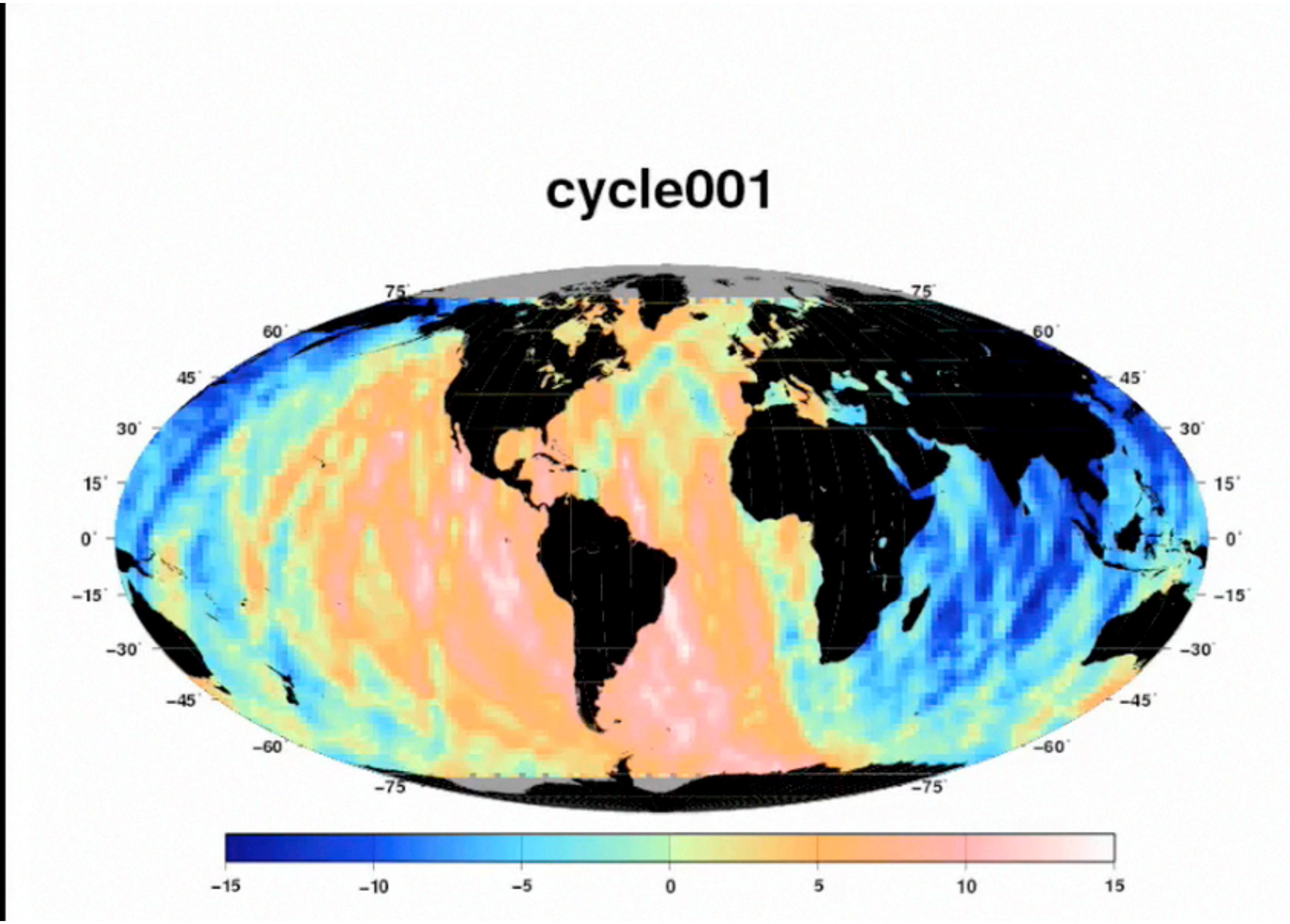


-15 mm

15 mm

Mean XYZ Differences:
CNES – JPL = [-1.1, 3.3, -2.8] mm
GSFC – JPL = [-1.6, 2.1, -1.5] mm

CNES – JPL Radial Movie



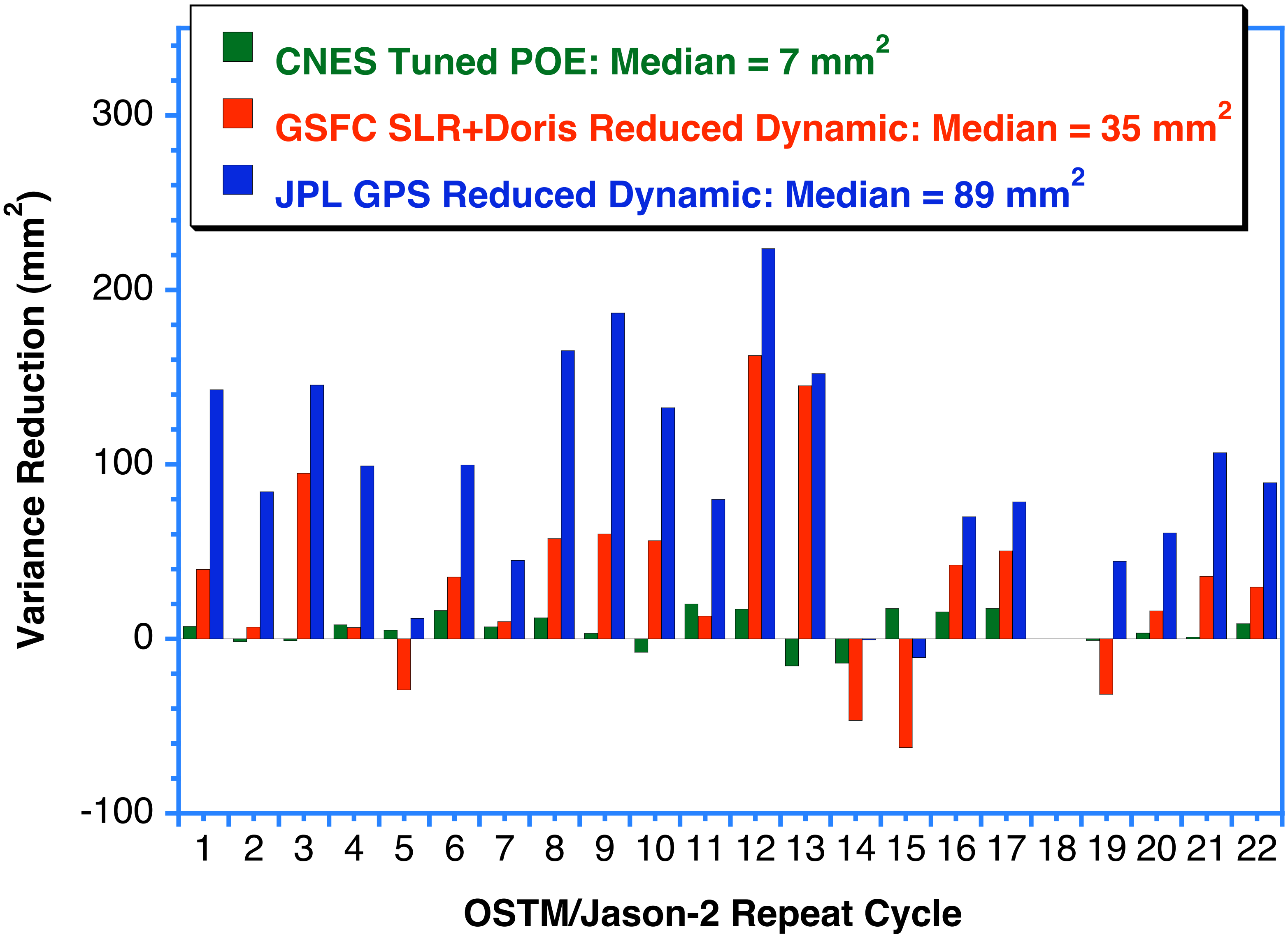
SLR Residual Tests
Pass Mean Statistics, 60 deg. Elev. Cut

Station	CNES Mean (cm)	JPL Mean (cm)	CNES Std. Dev. (cm)	JPL Std. Dev. (cm)	# Arcs
Monument	1.04	1.08	0.84	0.64	20
Yaragadee	0.28	0.90	0.64	0.62	190
Graz	-0.73	-0.89	0.63	0.80	75
McDonald	1.16	1.05	0.87	0.83	19
ALL	0.13	0.48	0.87	1.04	304
All Weighted			0.67	0.68	

JPL RLSE09a contains no SLR data

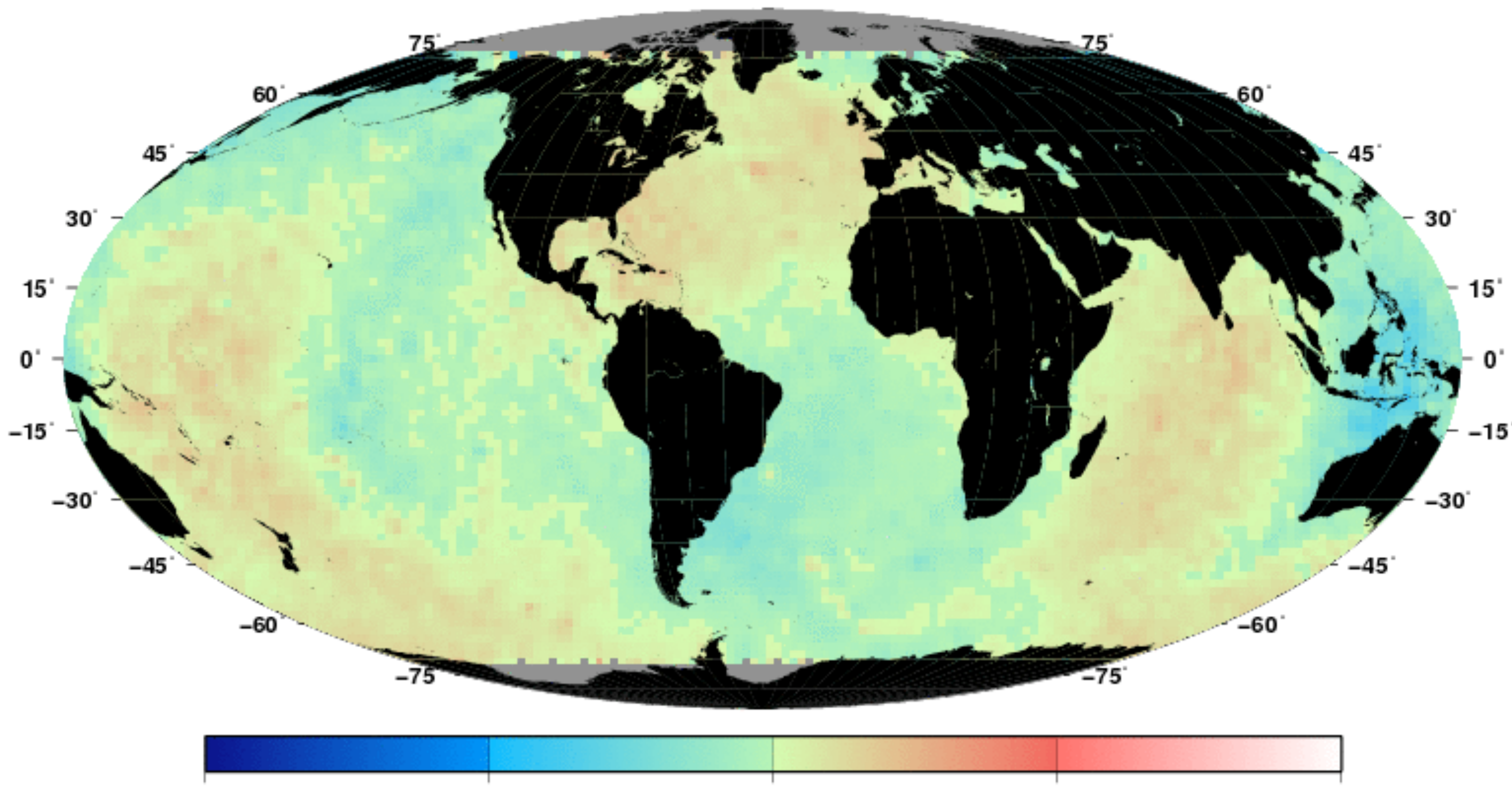
= Larger Std. Dev.

Super Edited Cross-Over Variance Reduction vs. GDR



Time Variable Gravity

Cy 1–26 Bin RMS = 0.48 mm, Eigen_tvg – Eigen



-4 mm

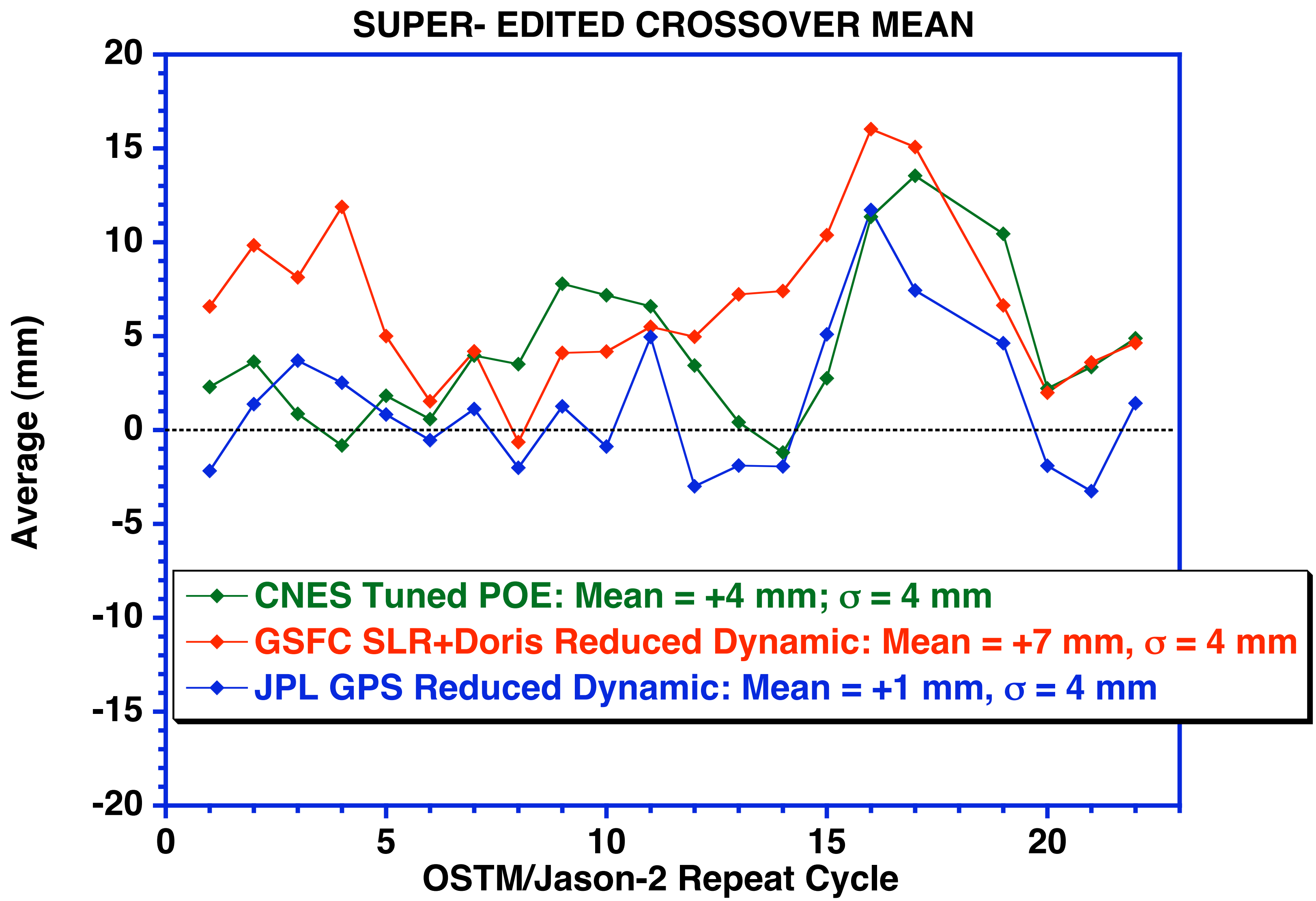
+4 mm

Summary Conclusions

- **Better than 5 mm --- Maybe**
  - GSFC Cycle Variance Improvement: 35 mm^2
  - JPL RLSE09a Cycle Variance Improvement: 89 mm^2
  - GSFC - JPL RLSE09a Typical RMS Difference: 7.1 mm
  - $\mathrm{Sqrt}(7.1^2 – (89 – 35)/2) = 4.8$ mm
- **Improvements, Future Work**
  - Time Variable Gravity
  - Effects of Data Outage --- Implications for future missions
  - UCL Surface Force Models

Backups Follow

Cross-Over Means



Changes Due to AOD1B