

# Status of the GSFC precise orbit ephemerides for Jason-2, Jason-1 and TOPEX/Poseidon

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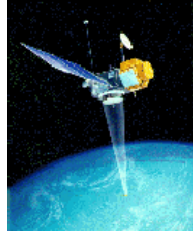
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(2) *SGT Inc., Greenbelt, MD, USA*





# GSFC POE Description

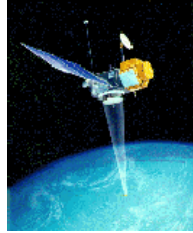


GSFC SLR+DORIS orbits	Description (All orbits use ITRF2008)
std1007	GDR-C comparable; 5 gravity coefficient linear terms; previous Measures orbit
std1204	GDR-D comparable; goco2s_fit2 gravity; current Measures orbit
std1204_iers2010	C21/S21 + pole model acc to. IERS2010 standards; <i>a-priori</i> for tvg5x5_wd20.
tvg5x5_wd20	5x5 gravity time series from 15 SLR/DORIS satellites ( <a href="#">new series 1993-2013, Sept. 2013</a> ).
red_tvg5x5_wd20	SLR/DORIS reduced dynamic.

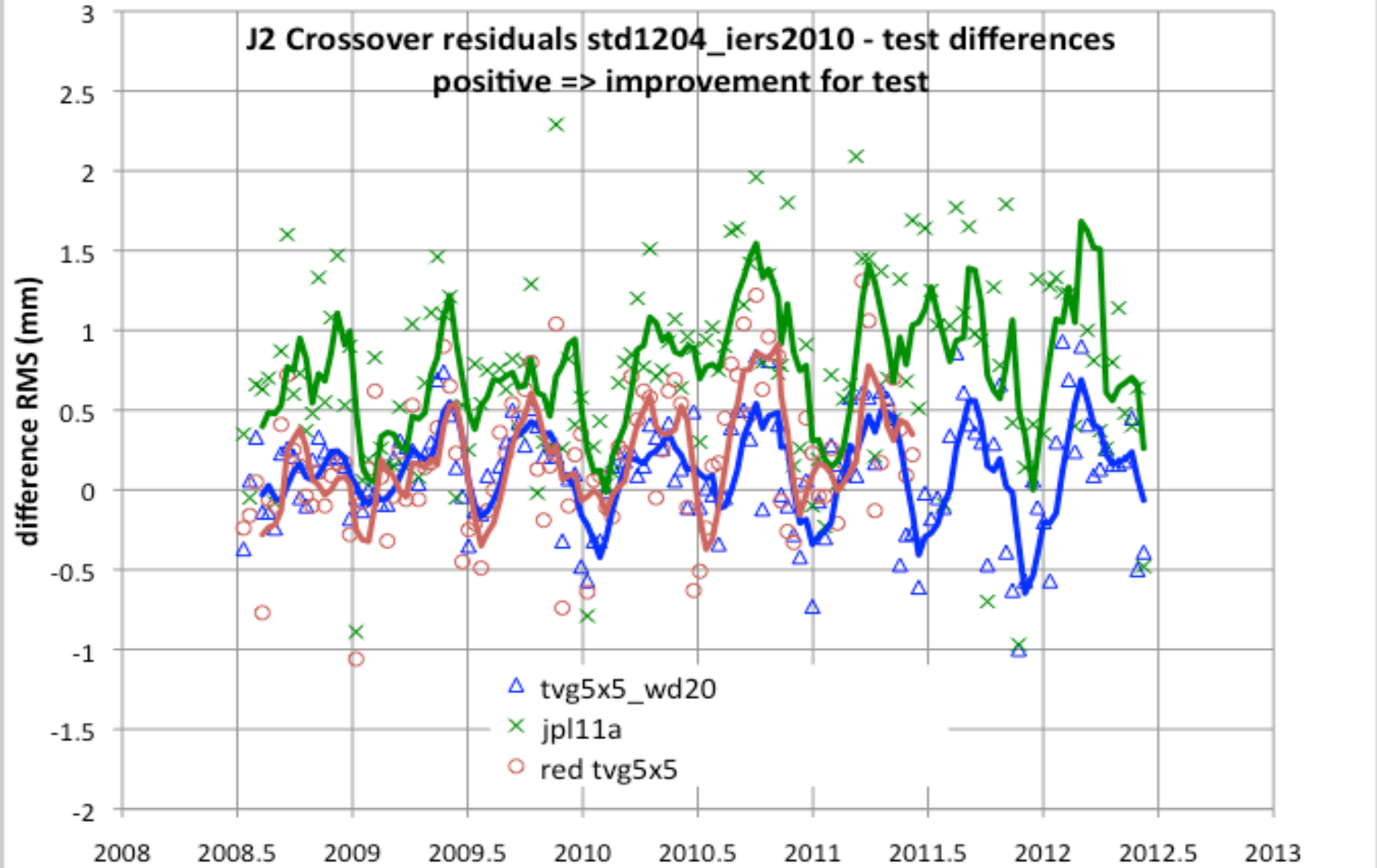
<b>Model changed</b>	<b>Std1007 (old Measures)</b>	<b>std1204 (new Measures)</b>	<b>std_1204_iers2010</b>	<b>tv5x5_wd20</b>	<b>red_tv5x5_wd20</b>
Station coordinates	<b>ITRF2008</b>	<b>SLRF2008, DPOD2008</b>	<b>Same</b>	<b>Same</b>	<b>same</b>
Dynamic tides	<b>GOT4.7</b>	<b>GOT4.8</b>	<b>Same</b>	<b>Same</b>	<b>Same</b>
Ocean loading	<b>GOT4.7</b>	<b>GOT4.8</b>	<b>Same</b>	<b>Same</b>	<b>Same</b>
J2 Cr	<b>Tuned 2008</b>	<b>Tuned 2011</b>	<b>Same</b>	<b>Same</b>	<b>Same</b>
DORIS Troposphere	<b>Niell. Est. wet+ dry</b>	<b>GMF. Est wet</b>	<b>Same</b>	<b>Same</b>	<b>Same</b>
J1/J2 OPR	<b>24-hr</b>	<b>12-hr</b>	<b>Same</b>	<b>Same</b>	<b>Same</b>
Pole Model,	<b>IERS2003</b>	<b>IERS2003</b>	<b>IERS2010</b>	<b>Same</b>	<b>Same</b>
Static gravity	<b>EIGEN-GL04S</b>	<b>GOCO2S_fit2</b>	<b>Same</b>	<b>Same</b>	<b>Same</b>
TVG	<b>5 terms. (C20, C30, C40, C21,S21)</b>	<b>Harmonic fit to 4x4 weekly solutions</b>	<b>Same</b>	<b>New 5x5 weekly solutions</b>	<b>Same</b>



# Orbit Comparisons (1), External Ephem. SLR/Xovers, Jason2, Cycles 1-181

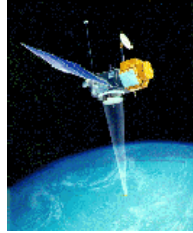


J2 summary cycles 1-169 (7/08-5/13) <i>external ephemeris</i>	SLR RMS average residuals (cm)	Xover RMS average residuals (cm)
std1007	1.194	5.448
std1204	1.071	5.376
std1204_iers2010	1.074	5.378
tv5x5_wd20	1.053	5.364
red_tv5x5_wd20		
gdrd	1.312	5.378
jpl11a	1.201	5.301
jpl13a	1.175	5.307





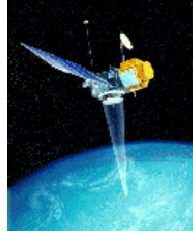
## Orbit Comparisons (2), External Ephem. SLR/Xovers, Jason1, Cycles 1-374



J1 summary cycles 1-374 (1/02-2/13) <i>external ephemeris</i>	SLR RMS average residuals (cm)	Xover RMS average residuals (cm)
std1007	1.082	5.507
std1204	0.932	5.458
std1204_iers2010	0.933	5.460
tvg5x5_wd20	0.931	5.457

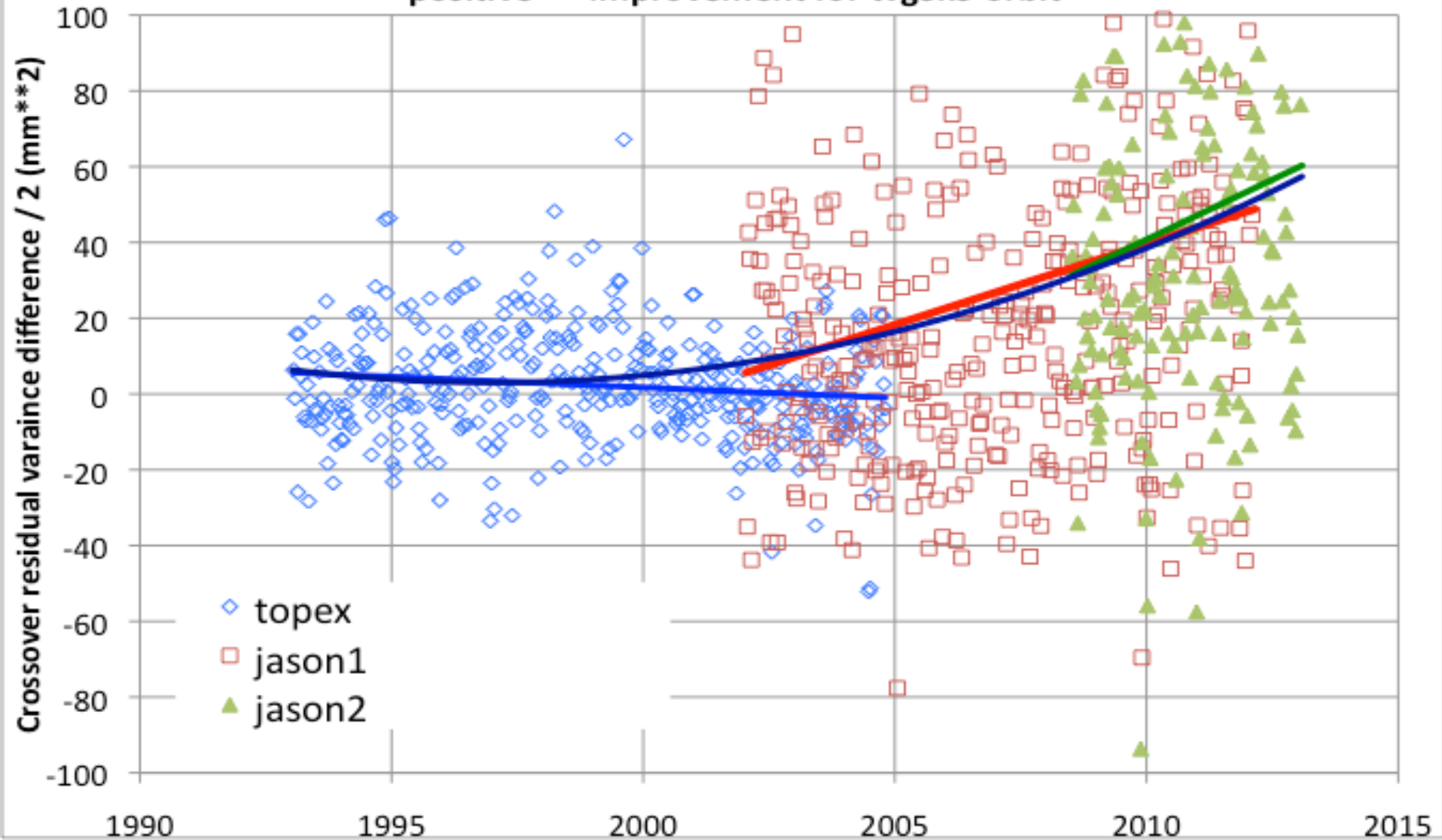


# Orbit Comparisons (3), External Ephem. SLR/Xovers, TOPEX, Cycles 13-446

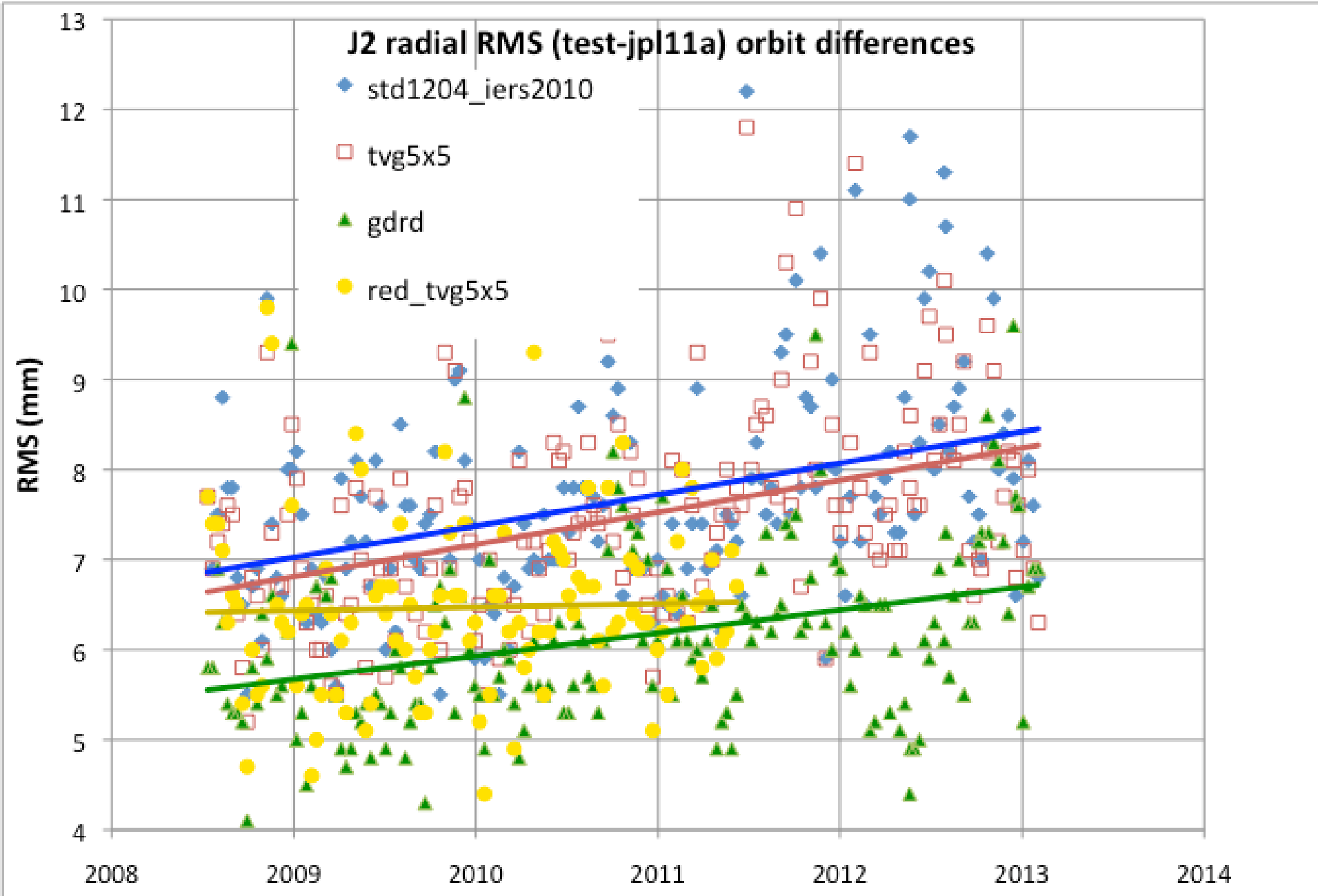


TP summary cycles 13-446 (1/93-10/04) <i>external ephemeris</i>	SLR RMS average residuals (cm)	Xover RMS average residuals (cm)
std1007	1.820	5.611
std1204_iers2010	1.817	5.604
tv5x5_wd20	1.796	5.593

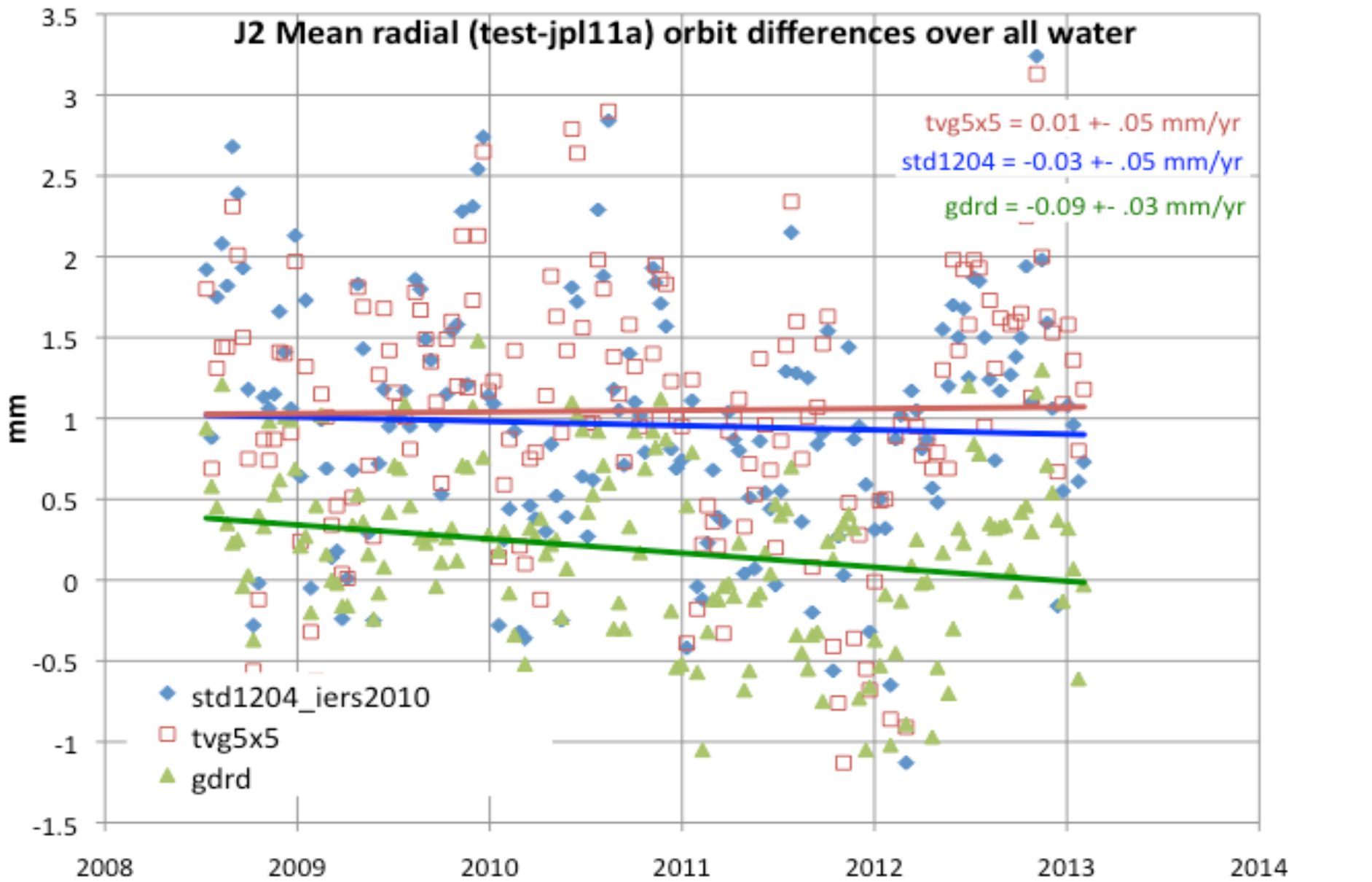
Radial error reduction to std1007 (previous Measures) orbit  
positive => improvement for tvg5x5 orbit



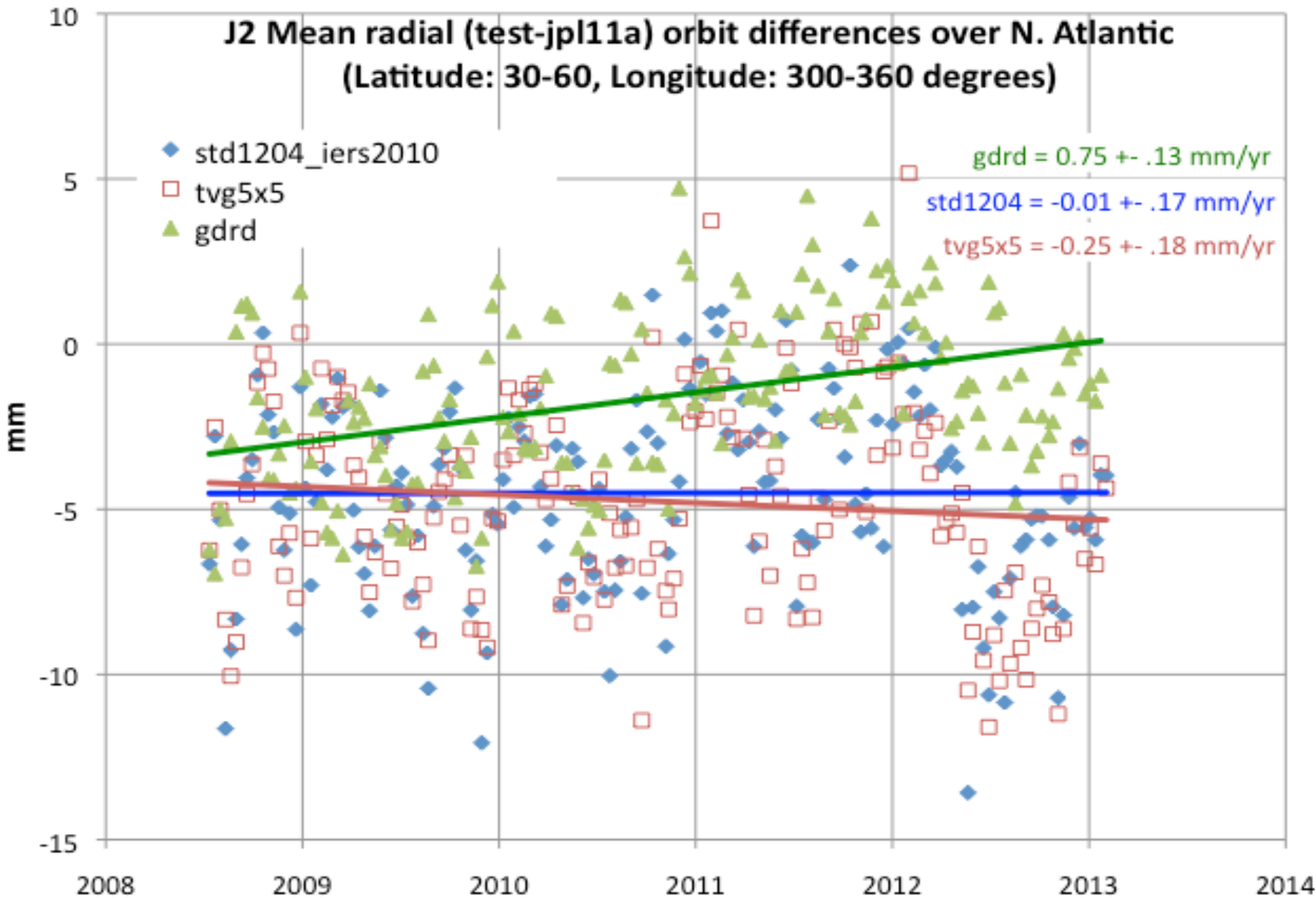




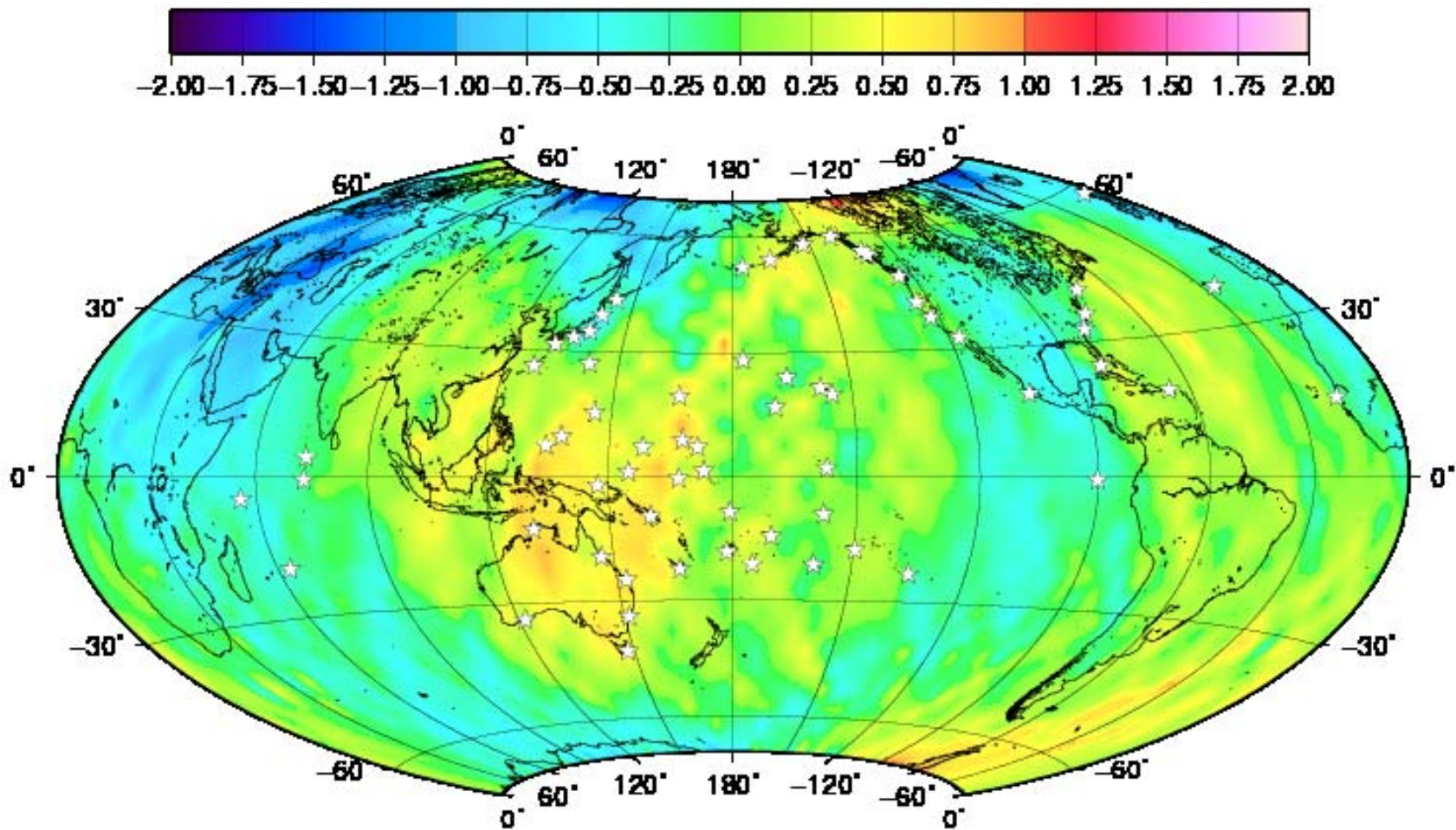
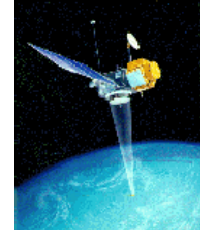
# J2 Mean radial (test-jpl11a) orbit differences over all water



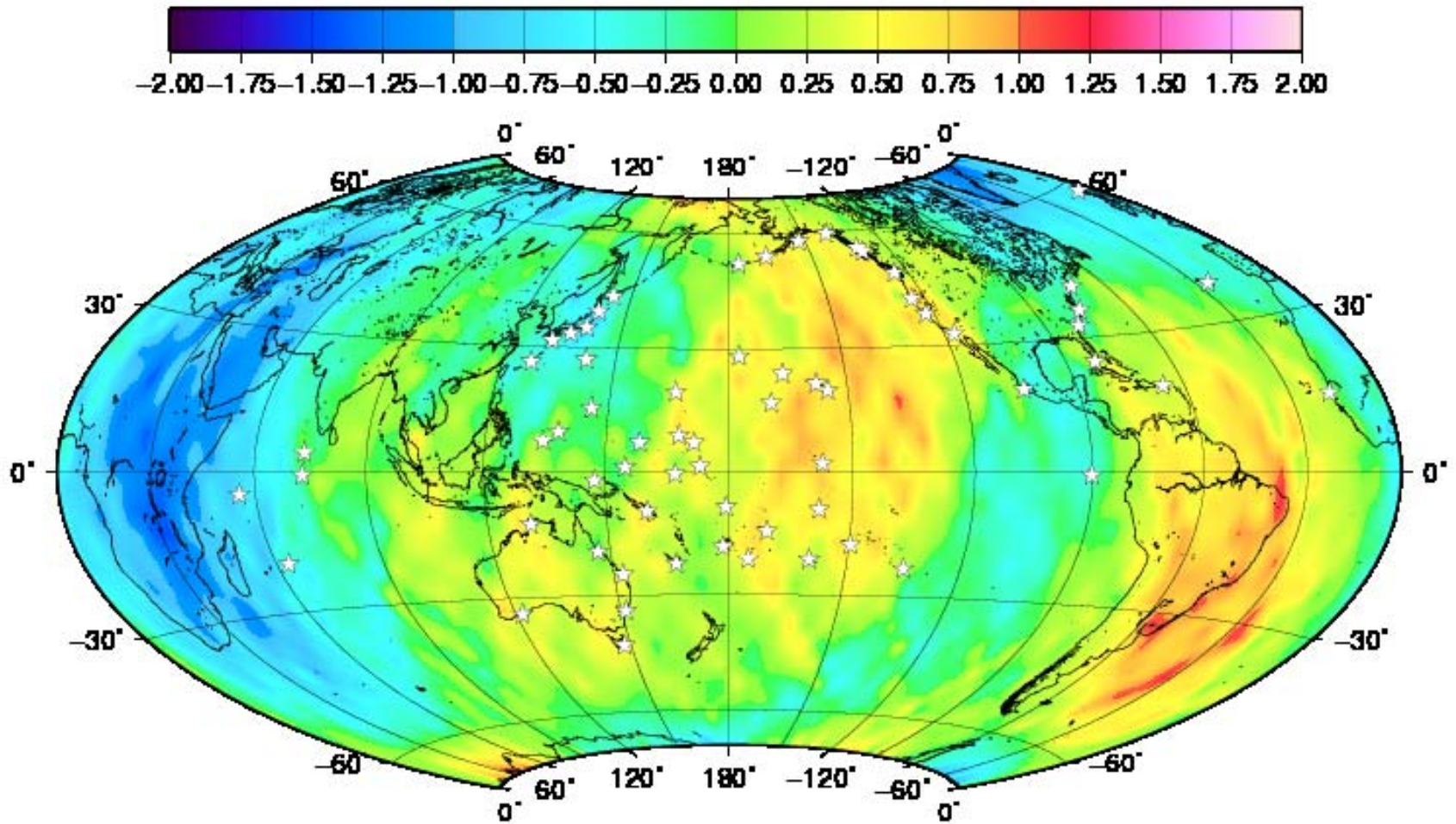
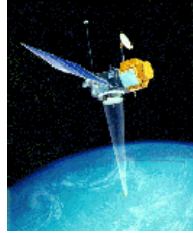
# J2 Mean radial (test-jpl11a) orbit differences over N. Atlantic (Latitude: 30-60, Longitude: 300-360 degrees)



**J2 std1204\_iers2010-jpl11a orbit radial difference  
linear rates (mm/yr) estimated July 2008 –  
February 2013 after removing annual, semi-  
annual, and 118-day terms.**

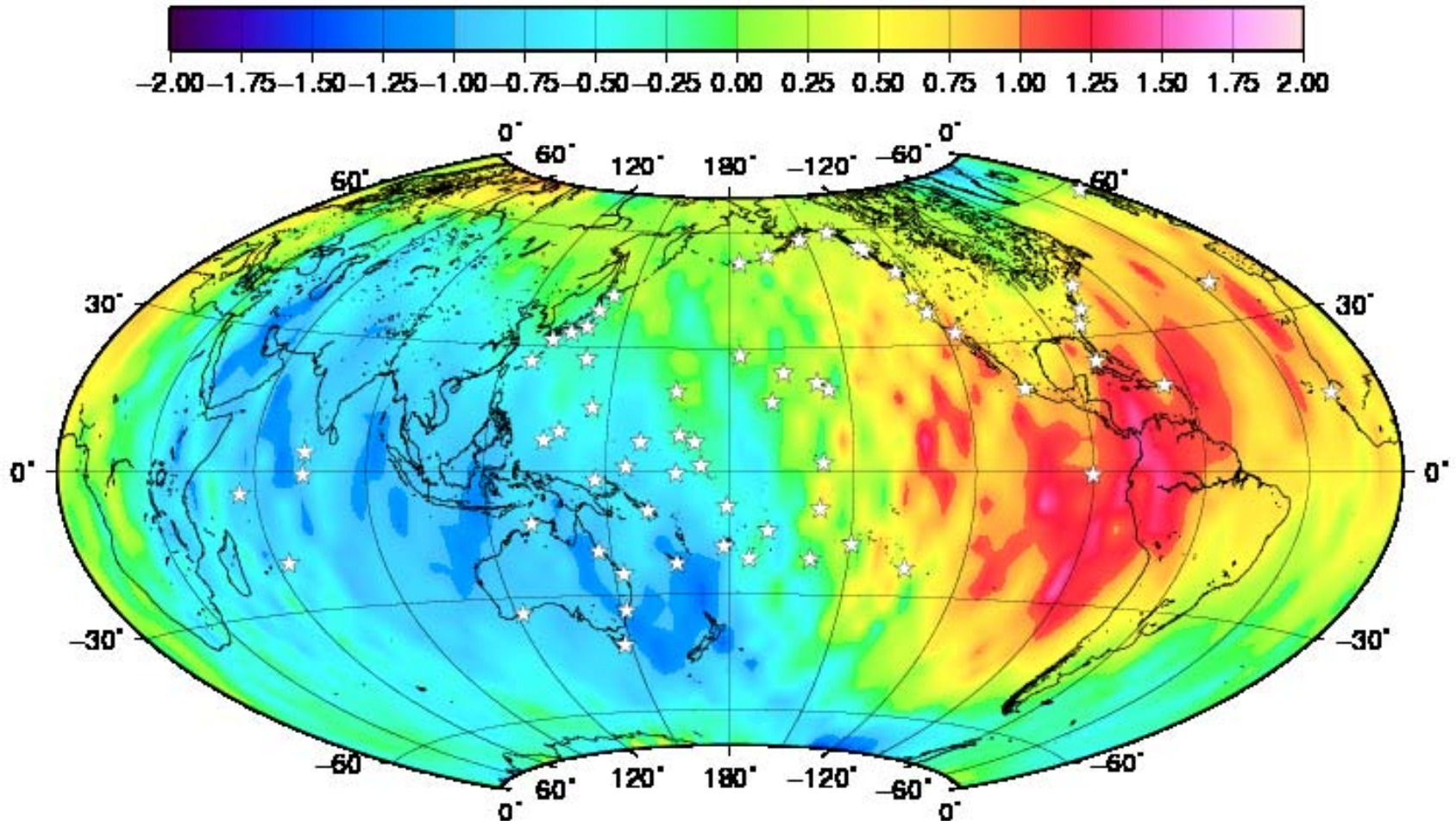
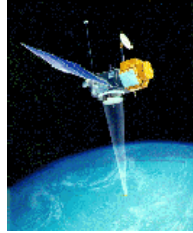


**J2 tv<sub>g</sub>5x5-jpl11a orbit radial difference linear rates (mm/yr) estimated July 2008 – February 2013 after removing annual, semi-annual, and 118-day terms.**

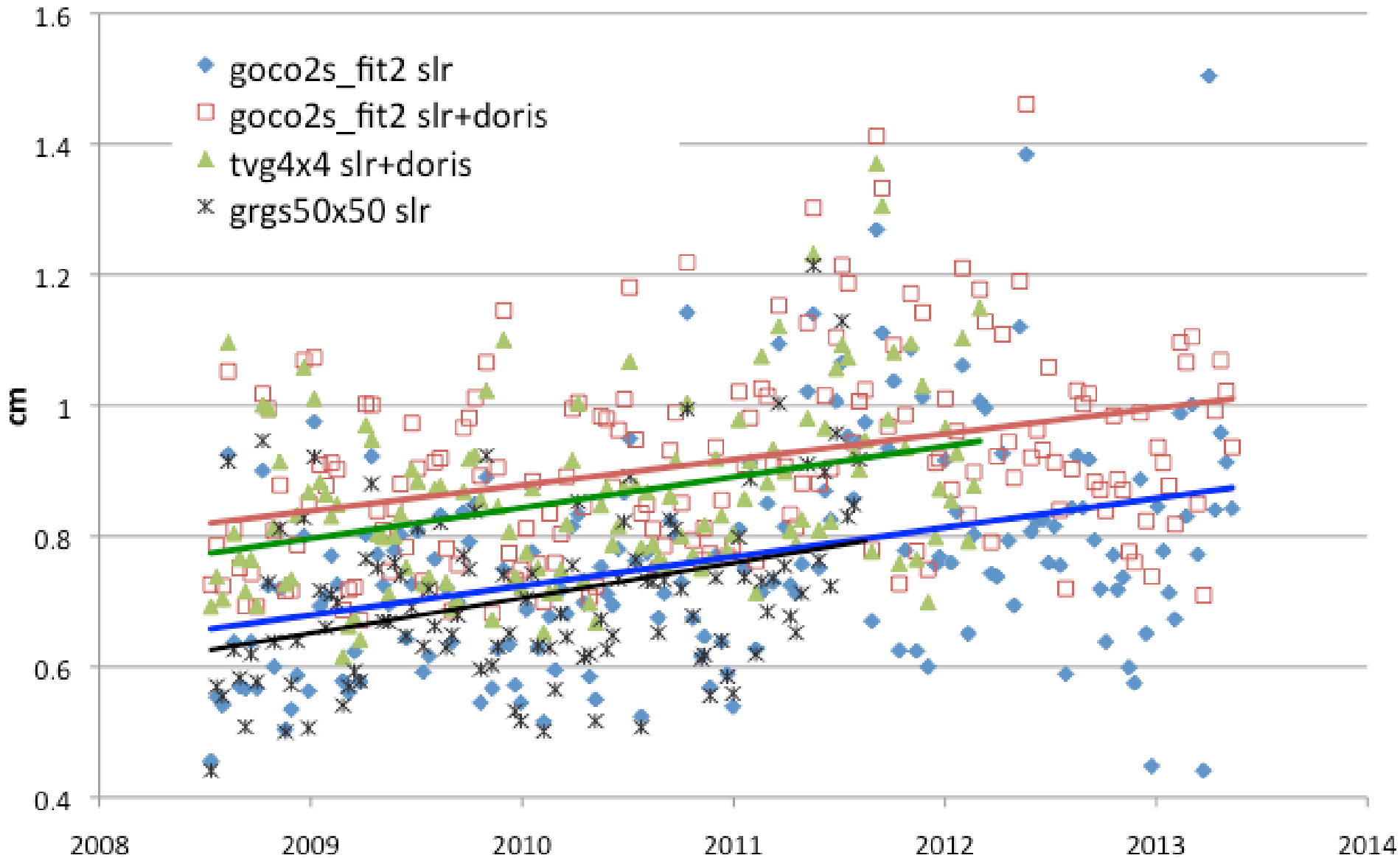


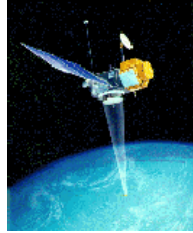


**J2 gdrd-jpl11a orbit radial difference linear rates  
(mm/yr) estimated July 2008 – February 2013  
after removing annual, semi-annual, and 118-day  
Which orbit shows the larger regional trend error?**



# Jason-2 SLR RMS residuals / cycle





## GSFC Release of std1204 (Measures) orbits \*

The SLR+DORIS ITRF2008-based orbits are in POE format  
October 2013

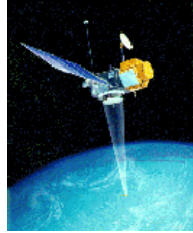
satellite	cycles	anonymous ftp: <a href="ftp://dirac.gsfc.nasa.gov">dirac.gsfc.nasa.gov</a> <i>file name</i>
TOPEX/Poseidon	001 - 446	pub/earth/repro_topex/swt13/ gsfc_tp_poe_ld_std1204.\$cycle.Z
Jason-1	001 - 259	pub/earth/repro_jason/swt13/ gsfc_ja1_poe_ld_std1204.\$cycle.Z
Jason-2	001 - 188	pub/earth/repro_jason/ostm/swt13/ gsfc_ja2_poe_ld_std1204.\$cycle.Z

**\* The orbits will become available when the government shutdown ends and government computers become accessible**





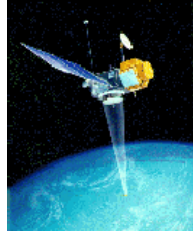
# Summary



- 1. The std1204 (*New Measures*) orbit to be released to OSTST, as soon as an ftp orbit depot is available. GSFC? PODAC?**
- 2. New series of orbits are under development based on IERS2010 standards and other improvements, including new IERS2010-based 5x5 time-variable gravity series. When validation of these orbits is completed, they will be released to OSTST.**
- 3. The outstanding challenge we face in POD is how to deliver a consistent & stable orbit using a combination static + time-variable gravity model with minimal latency.**
- 4. Future improvements: VMF1 mapping function, atmosphere loading, ITRF2013 (expected some time in 2014)**



# GSFC POE's: SLR/DORIS fits, Jason2, Cycles 1-181



J2 summary cycles 1-181 (7/08-5/13)	DORIS RMS average residuals (mm/s)	SLR RMS average residuals (cm)
std1204	0.3771	0.920
std1204_iers2010 (tvg5x5 a-priori)	0.3770	0.927
tvg5x5_wd20	0.3770	0.892
red_tvg5x5_wd20		