

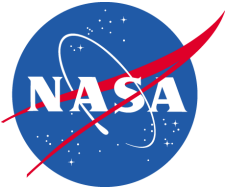
GSC Analysis Center Report

F.G. Lemoine & GSC Analysis Team

IDS Analysis Working Group Meeting

Toulouse, France

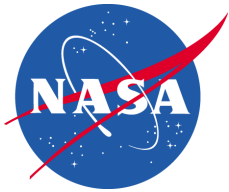
April 4, 2013



Outline



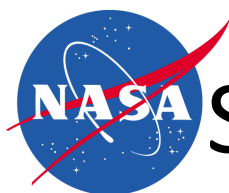
- I Summary of POD and Other Improvements:
 - A. Gravity modelling.
 - B. Updated Macromodels.
 - C. Station frequency changes.
 - D. New Data & Satellites
- II Summary of SINEX Series Delivered. (wd15, wd18-in progress)
- III Future Work and Improvements.



Summary of GSC Sinex Series



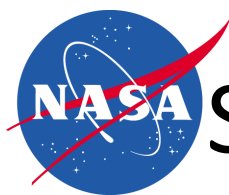
Series.	Description
gscwd12	Previous operational series. Continuation of ITRF2008 modelling and standards.
gscwd13	Test series in response to IERS call. Apply atmospheric loading at observation level (2006-2011 only). (<i>See Xavier Collilieux paper @ EGU2013</i>)
gscwd15	Complete new time series (1992-2012) with new modelling standards. Many updates. DORISReport 3258 (28-Feb-2013)
gscwd17	Internal series. Test of macromodel-related changes only (SPOT-2, SPOT-3, Envisat)
gscwd18	New complete time series (1992-2012) with macromodel updates (SPOT-2, SPOT-3, Envisat) + implementation of modelling to handle DORIS station frequency changes.



Summary of Modelling Changes (1)



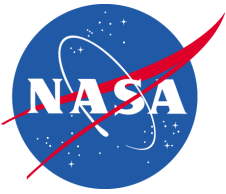
Change		New series
Static gravity model	GOCO2s vs. EIGEN-GL04S1	wd15, wd18
Time-variable gravity	Fit to SLR-DORIS-derived 4x4 time series	
Troposphere (1)	GMF/Saastmoinen vs. Niell/Hopfield	
Troposphere (2)	Adjust wet-only vs. Adjust dry+wet	
Ocean Tides	GOT4.8 vs. GOT4.7	
Ocean pole tide	Applied.	
Station coordinates	DPOD2008v1.9 (<i>for SLR updates to SLRF2008, including bias modelling</i>)	
New Data	Envisat (2002-2006; <i>DORISMAIL 0823</i>) SPOT-4 (1998-1999; <i>DORISMAIL 0801</i>)	
New data for GR3B, GAVB	Imported for Cryosat2, Jason2 (<i>DORISMAIL 0750</i>)	



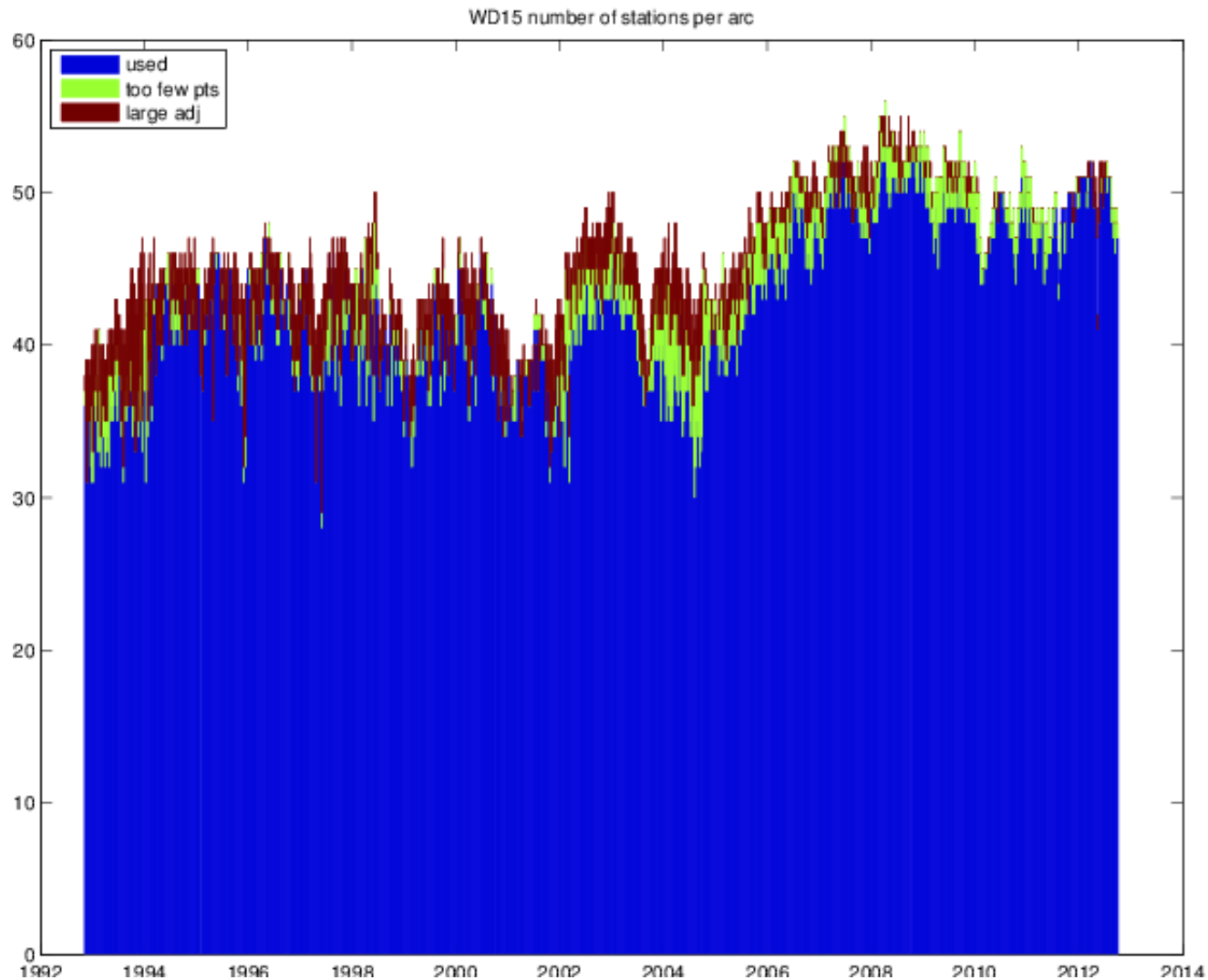
Summary of Modelling Changes (2)

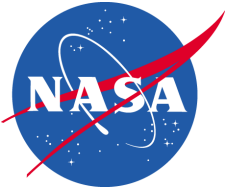


Change		New series
Weekly Station editing	More rigorous editing at weekly SINEX Level. 1. Edit stations with large adjustments; 2. Edit stations with < 250 obs/wk.	wd15, wd18
SPOT-5 attitude modelling	Model pitch of Solar array (-40 deg after Jan 2008). No more Cr tuning.	wd15, wd18
New Macromodels	SPOT-2, SPOT-3	wd17, wd18
Corrected Macromodel	Envisat. (Applied for drag & Planetary Radiation Pressure)	wd17, wd18
Correction to UCL model	Surface Area for Solar Array Thermal Re-Radiation (Envisat)	wd17, wd18
Station Frequency change modelling	Partial derivatives and bias estimation modified in GEODYN	wd18

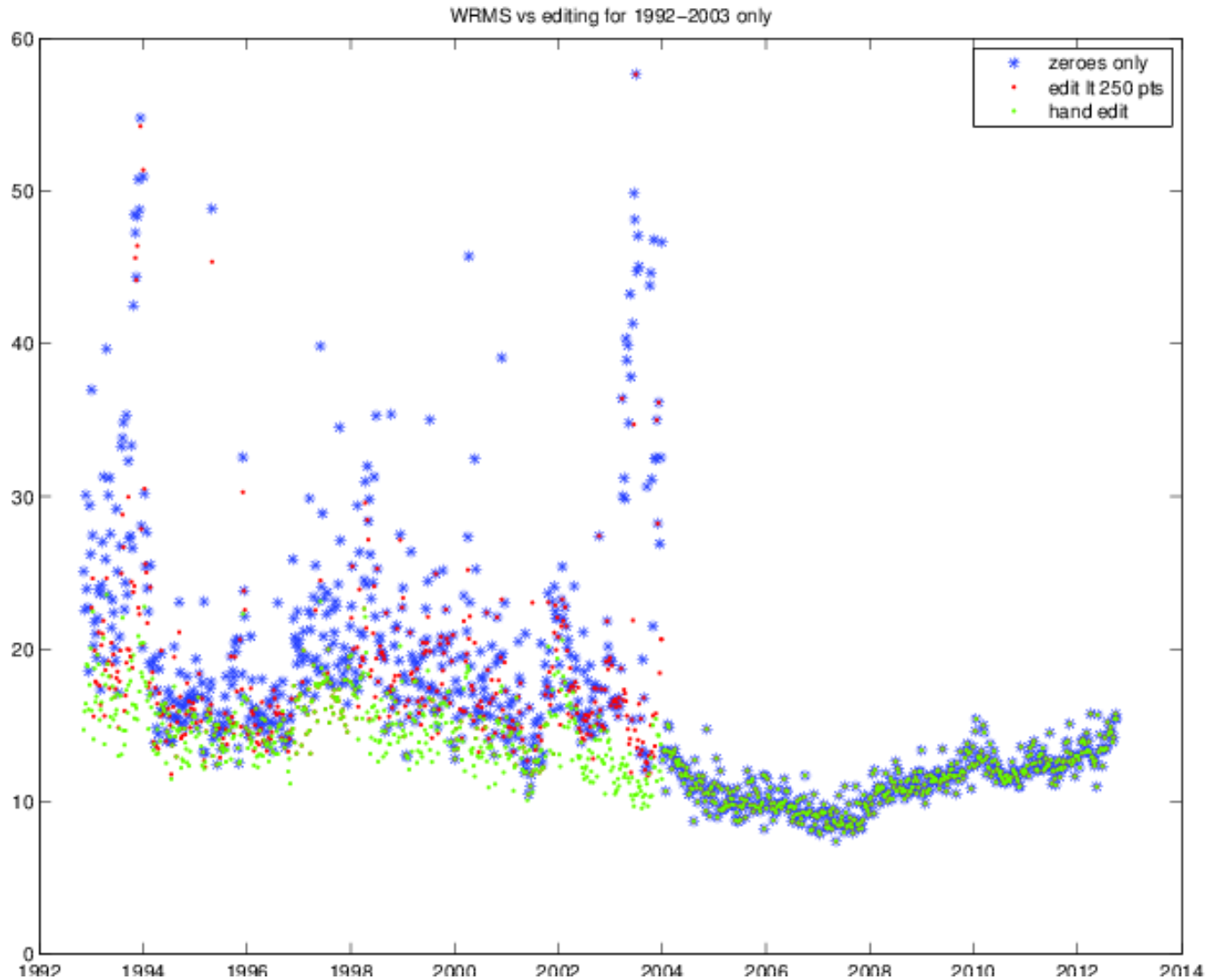


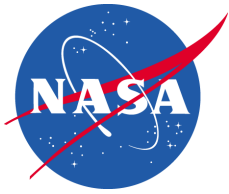
SINEX Station Editing (wd15)





WRMS: Editing Impacts (wd15)



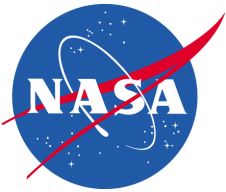


POD RMS of fit Summary

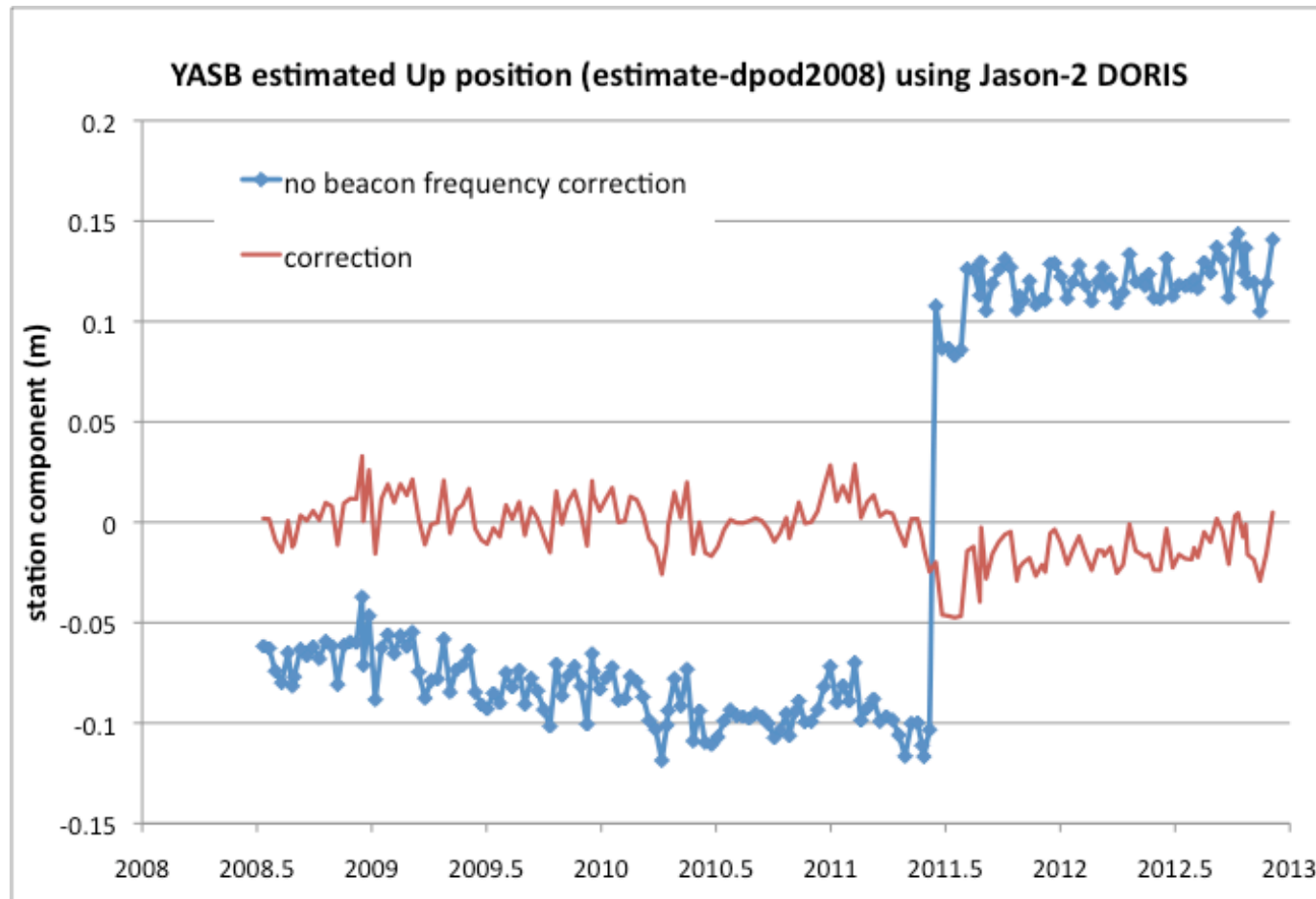
(cm for SLR, mm/s for DORIS)



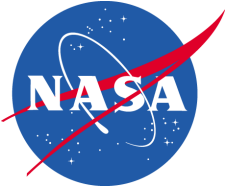
Satellite & Data	1203/wd12	wd15	wd17	wd18
Lageos-1	0.900	0.871		
Lageos-2	0.881	0.842		
Stella	1.600	1.496		
Starlette	1.586	1.506		
Larets	1.607	1.434		
Envisat (SLR) (slr+dor arcs)	1.272	1.289	1.162	1.165
(DORIS)	0.494	0.492	0.492	0.492
TOPEX (SLR) (slr+dor arcs)	1.701	1.679		1.677
(DORIS)	0.513	0.514		0.514
Jason2 ((SLR) (slr+dor arcs)	1.215	1.165		1.159
(DORIS)	0.361	0.376		0.375
Cryosat-2 (SLR) (slr+dor)	2.131	1.850		
(DORIS)	0.437	0.445		
SPOT-2	0.471	0.471	0.471	



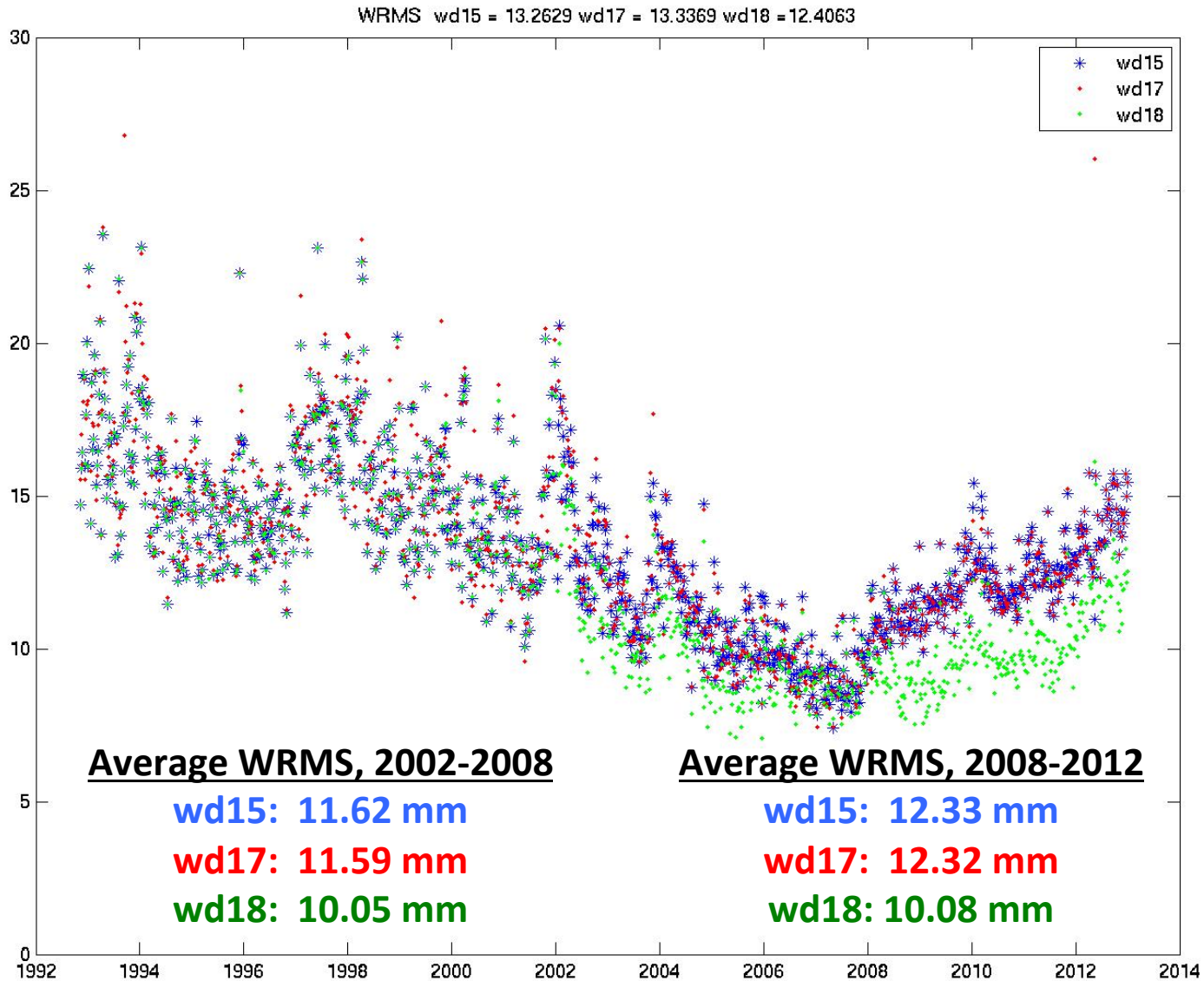
GEODYN Test: DORIS Station Frequency Correction

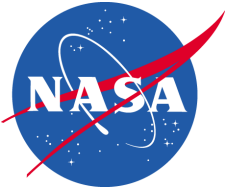


Spurious jump in Vertical Position Time Series Removed.

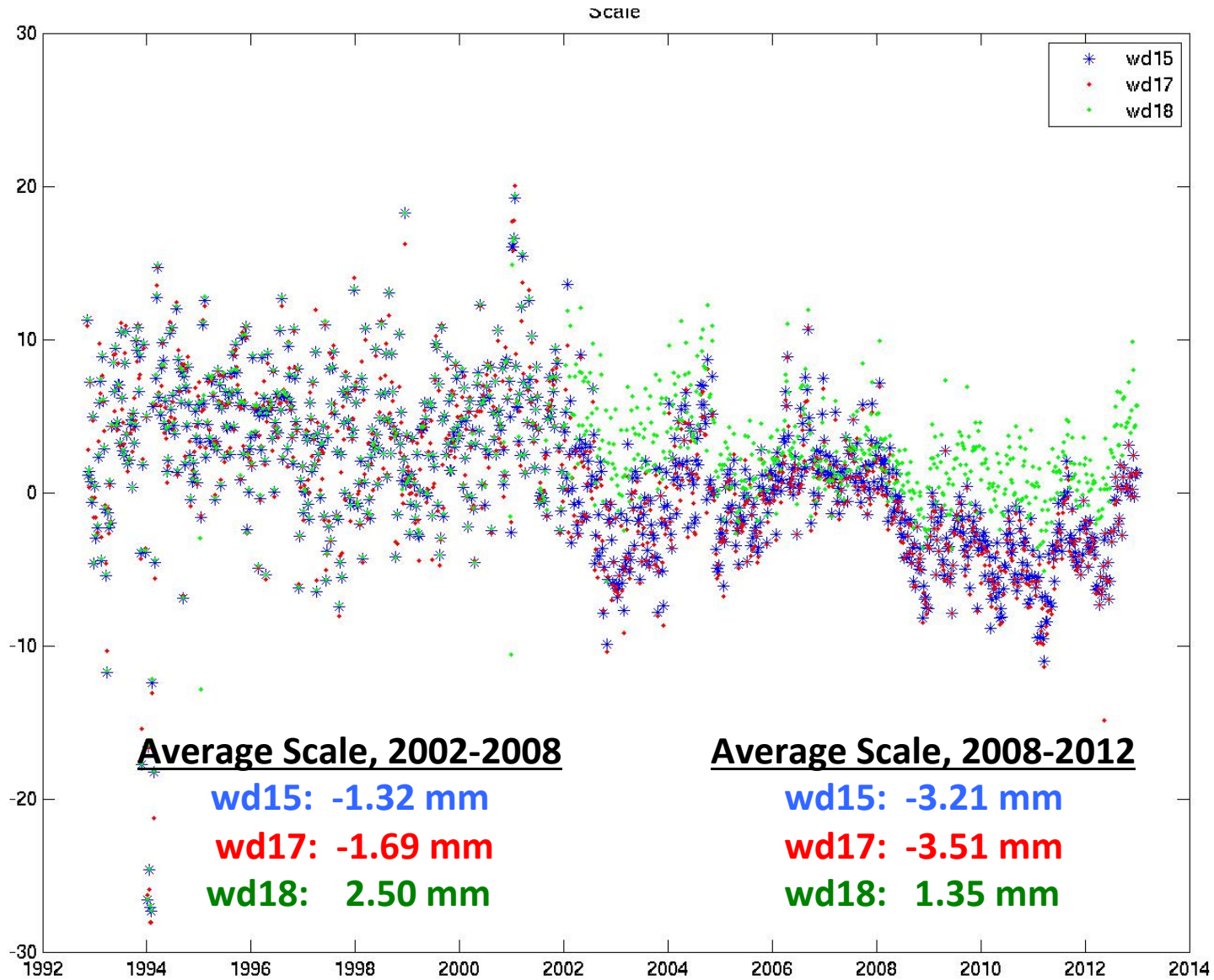


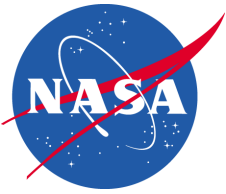
WRMS Comparison



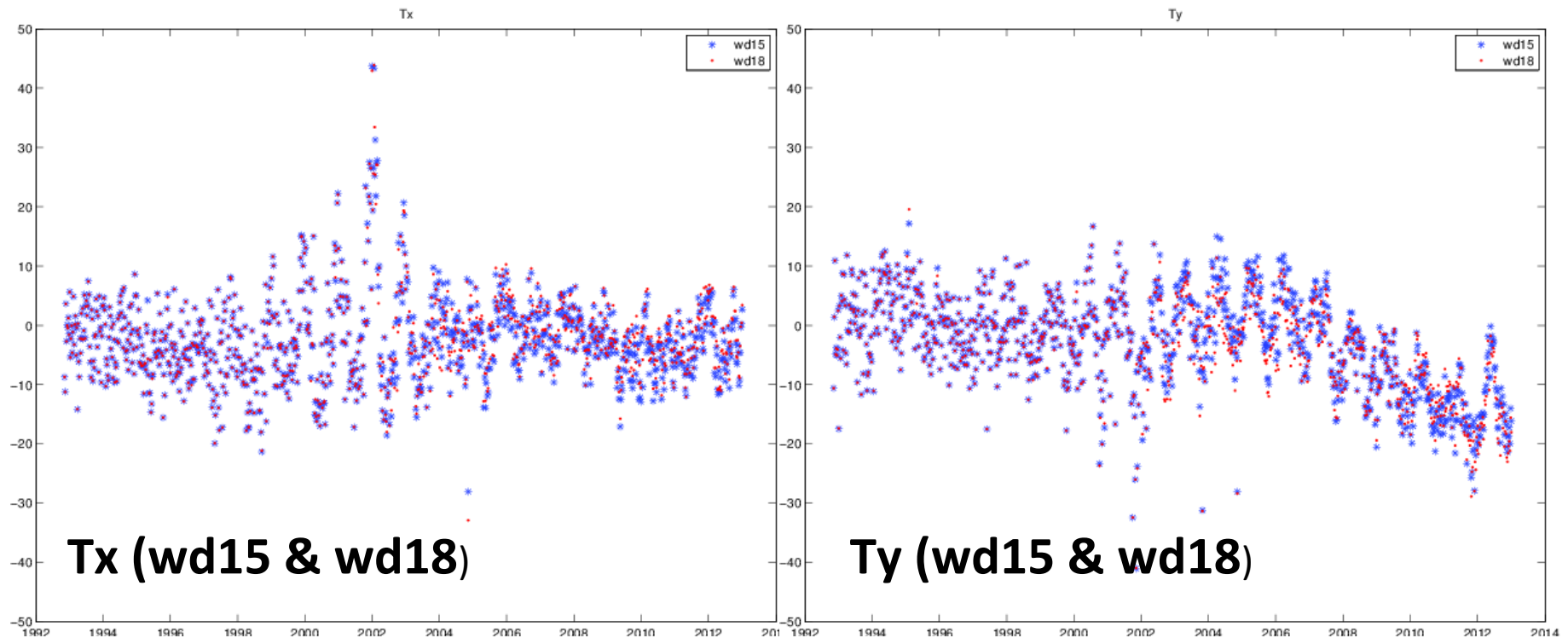


Scale Comparison

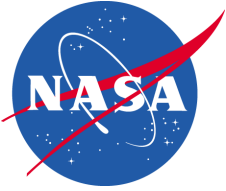




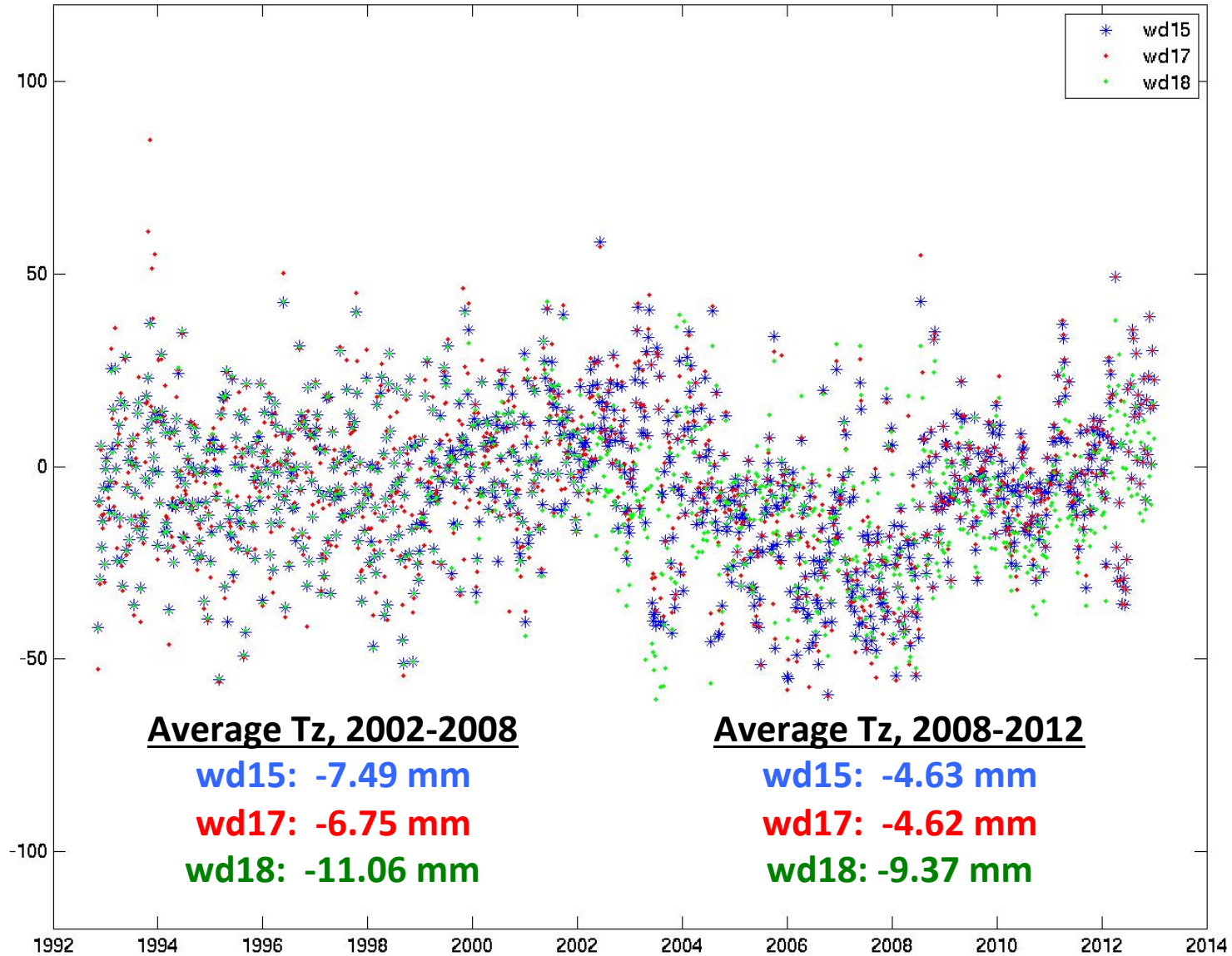
Tx and Ty Comparison

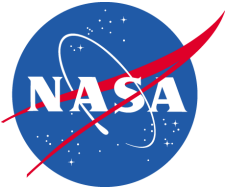


Main period in Tx, Ty oscillations is annual, with a secondary peak in frequency spectrum at ~240 days.



Tz Comparison

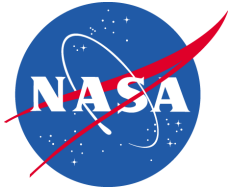




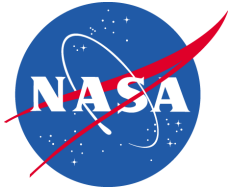
Further Improvements



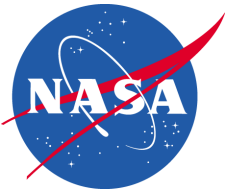
- Determine cause of large T_x & T_y oscillations in wd15 & wd18 series. (*Associated with Drag modelling constraints? Residual nonconservative model error?*)
- Reprocess SPOT-5 with SAA-corrected files.
- Update to VMF1 Mapping Function?
- Update geopotential model:
 - static field:
 - Time-varying: New time series.
- Apply DORIS time biases derived from SLR+DORIS arcs.



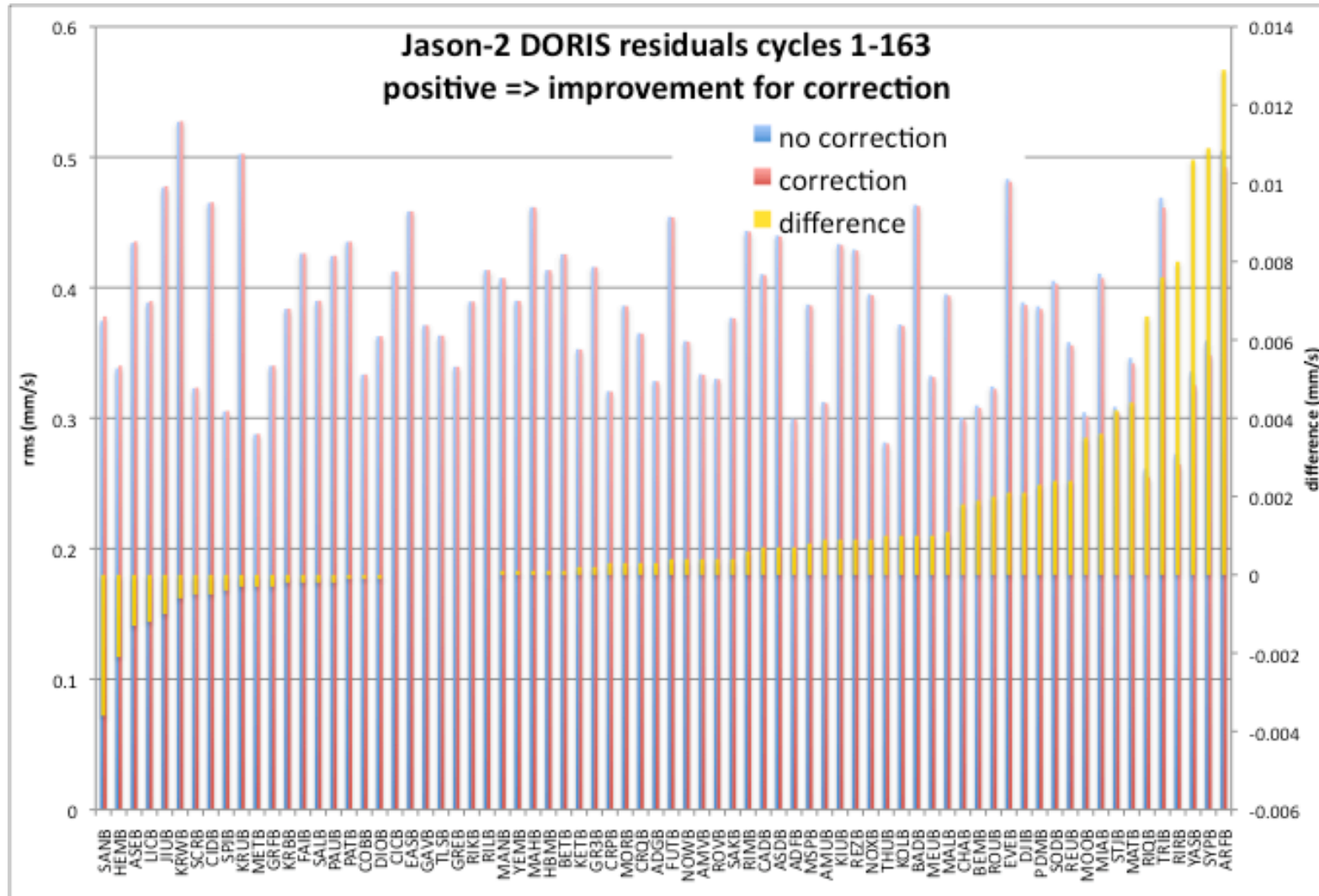
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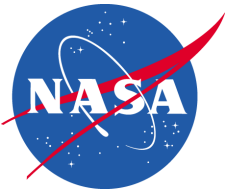


Backups

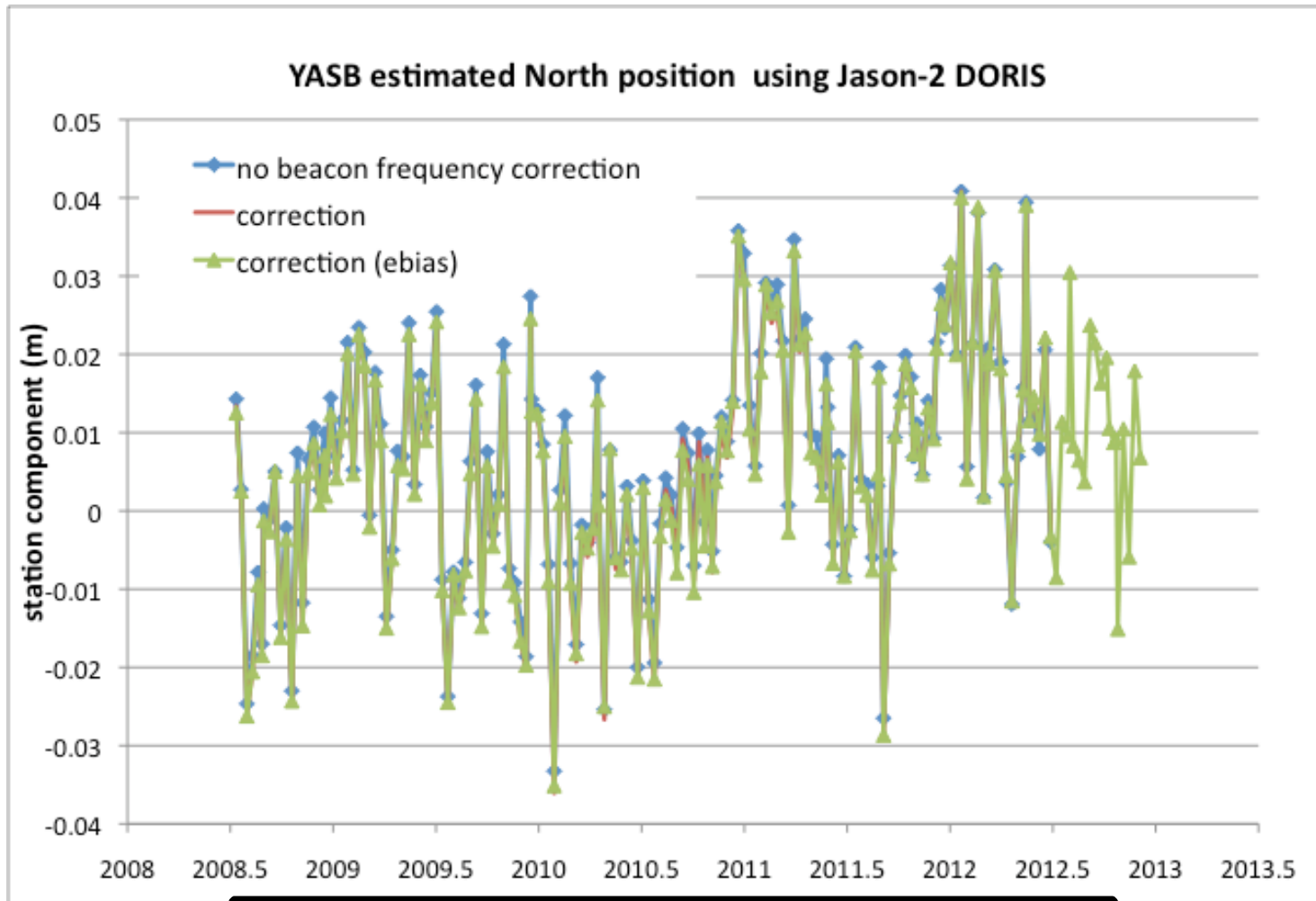


GEODYN Test: DORIS Station Frequency Correction (2)

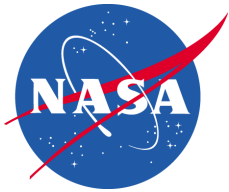




GEODYN Test: DORIS Station Frequency Correction (3)



No change in North+East Position Time Series .



Summary

(mean, std. dev, mm)



Time Interval	Solution	WRMS	Tx	Ty	Tz	Scale
2002-2008	wd15	11.62 / 1.91	-2.12 / 6.72	-5.00 / 8.65	-7.49 / 20.43	-1.32 / 3.62
	wd17	11.59 / 2.06	-2.43 / 6.75	-4.88 / 8.61	-6.75 / 20.54	-1.69 / 3.58
	wd18	10.05 / 1.62	-1.67 / 6.62	5.74 / 8.04	-11.06 / 17.14	2.50 / 2.92
2008-2012	wd13	12.33 / 1.29	-3.65 / 4.71	-10.80 / 6.13	1.34 / 21.03	-3.12 / 3.01
	wd15	12.33 / 1.33	-3.74 / 4.46	-11.35 / 5.88	-4.63 / 17.89	-3.21 / 2.83
	wd17	12.32 / 1.56	-3.99 / 4.45	-11.21 / 5.87	-4.62 / 18.64	-3.51 / 2.91
	wd18	10.08 / 1.37	-2.86 / 4.33	-11.31 / 6.06	-9.37 / 16.26	1.35 / 2.36