GSC Analysis Center Report

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¶ Presenter

GSC Doris Delivery for May 2011

Solution Series	Satellites in Solution	Weekly Data Used
wd10	Envisat, SPOT4, SPOT5	Feb. 1 - Mar. 27, 2011
wd11	wd10 + Jason2	Feb. 1 - Mar. 27, 2011
wd12	wd11 + Cryosat2	June 6, 2010 - Mar. 27, 2011
wd12.c2only	Cryosat2-only	June 6, 2010 - Mar. 27, 2011

- Three series delivered with increments of new satellites.
- The current delivery is in an increment over previous deliveries as announced in previous DORISReports.
- At some point, (*to be agreed with the Combination Center*) once the contributions of the new satellites are validated, it would be preferable to deliver only the wd12 series as the operational series.

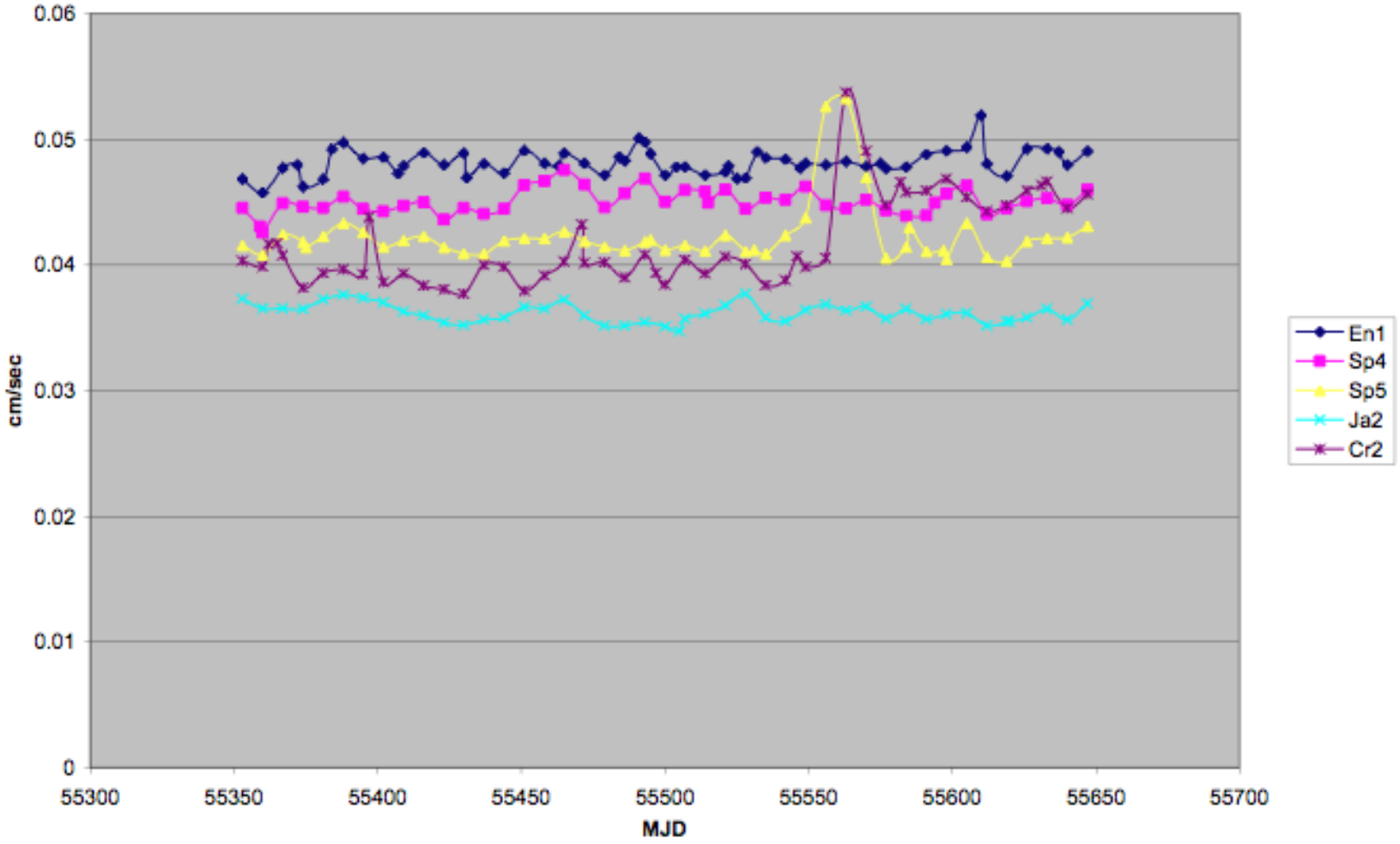
Cryosat 2 Modeling

- 7 day weekly arcs beginning Sunday 00:00:00 (except for maneuvers & data gaps).
- (*In general same modelling as for Jason1-2 SLR/DORIS POD series*)
- ITRF2008 a priori (SLR & DORIS).
- Eigen-Gl04s1 (120x120) gravity with C & S(2,1) from IERS standards
- GOT4.7 (20x20) tide model with ocean loading
- MSIS atmospheric density model
- ECMWF (50x5) 6-hr atmospheric gravity model (from J.P. Boy, EOST, Univ. Strasbourg)
- 10 deg elevation cutoff angle.
- Nieill troposphere mapping function.
- GPT troposphere pressure and temperature model.
- 6-hr Drag coefficients.
- 24-hr once-per-rev along-track and cross-track ACCEL coefficients.
- Pass-by-pass troposphere and range biases.
- 7 plate macromodel + analytical Cryosat2 attitude model coded into GEODYN based on algorithms supplied by L Cerri (CNES).

Avg. RMS of Fit for SLR-DORIS & DORIS-only orbits

(*June 6, 2010 - March 27, 2011)*

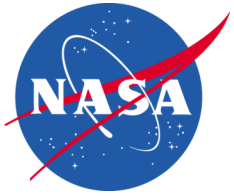
Satellite	SLR / Doris (cm) (mm/sec)	Doris-only (mm/sec)
Envisat	1.4 / 0.47	0.48
Jason2	1.3 / 0.36	0.36
Cryosat2	2.0 / 0.43	0.42


Doris RMS of fits
0.06
0.05
0.04
0.03
0.02
0.01
0
cm/sec
55300
55350
55400
55450
55500
55550
55600
55650
55700
MJD
En1
Sp4
Sp5
Ja2
Cr2

RMS of Orbit Differences (cm)
SLR/Doris vs. Doris-only

(*June 6, 2010 - March 27, 2011)*

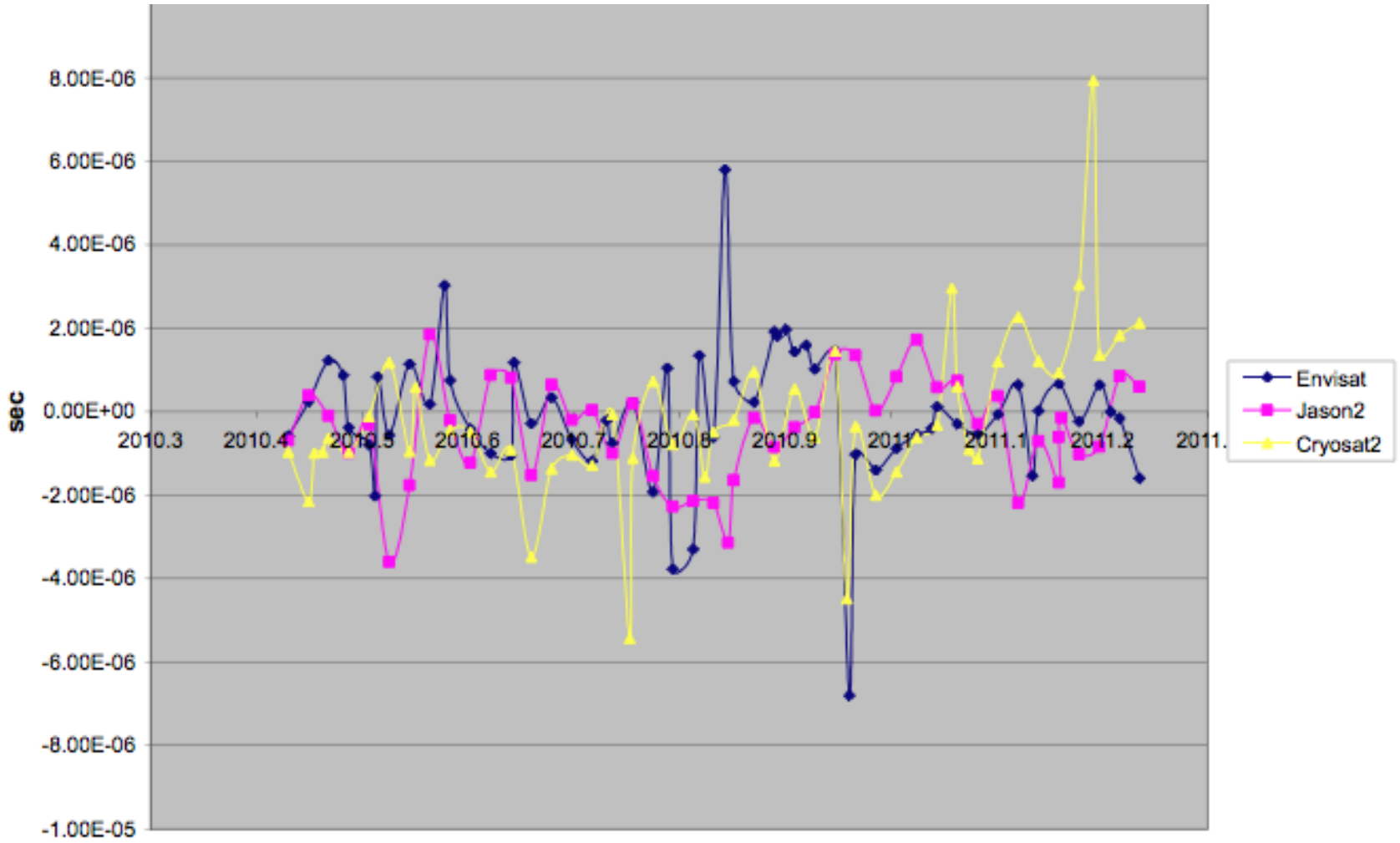
Satellite	Rad	Crs	Alg	Total
Envisat	0.50	2.13	2.15	3.07
Jason2	0.49	1.40	1.53	2.13
Cryosat2	0.61	2.44	2.36	3.45



Avg. DORIS System Timing Biases from SLR-DORIS arcs *(millisecs)*

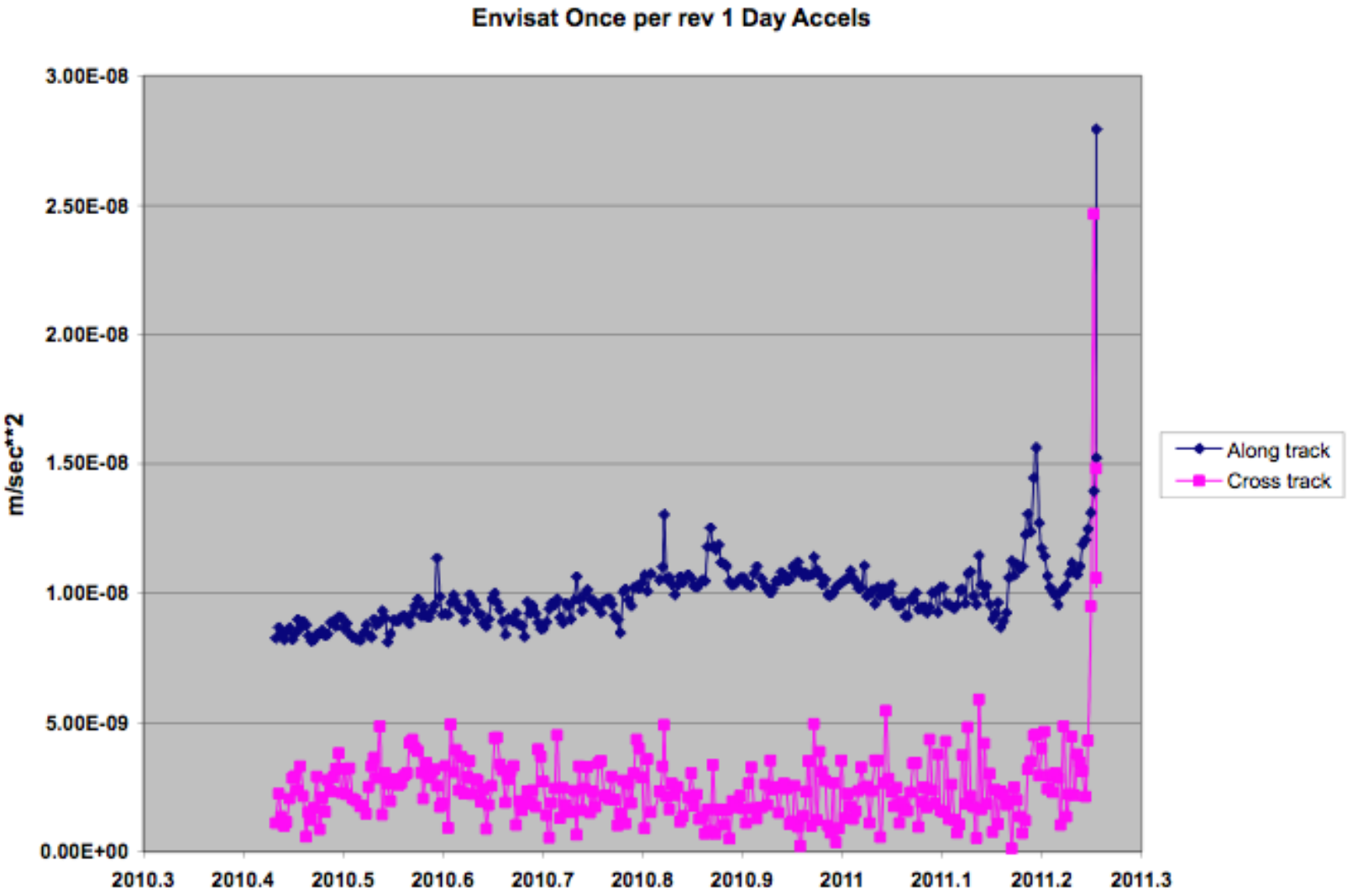
Satellite	Mean	SDev
Envisat	-1.09	0.72
Jason2	-0.05	0.91
Cryosat2	0.59	2.18

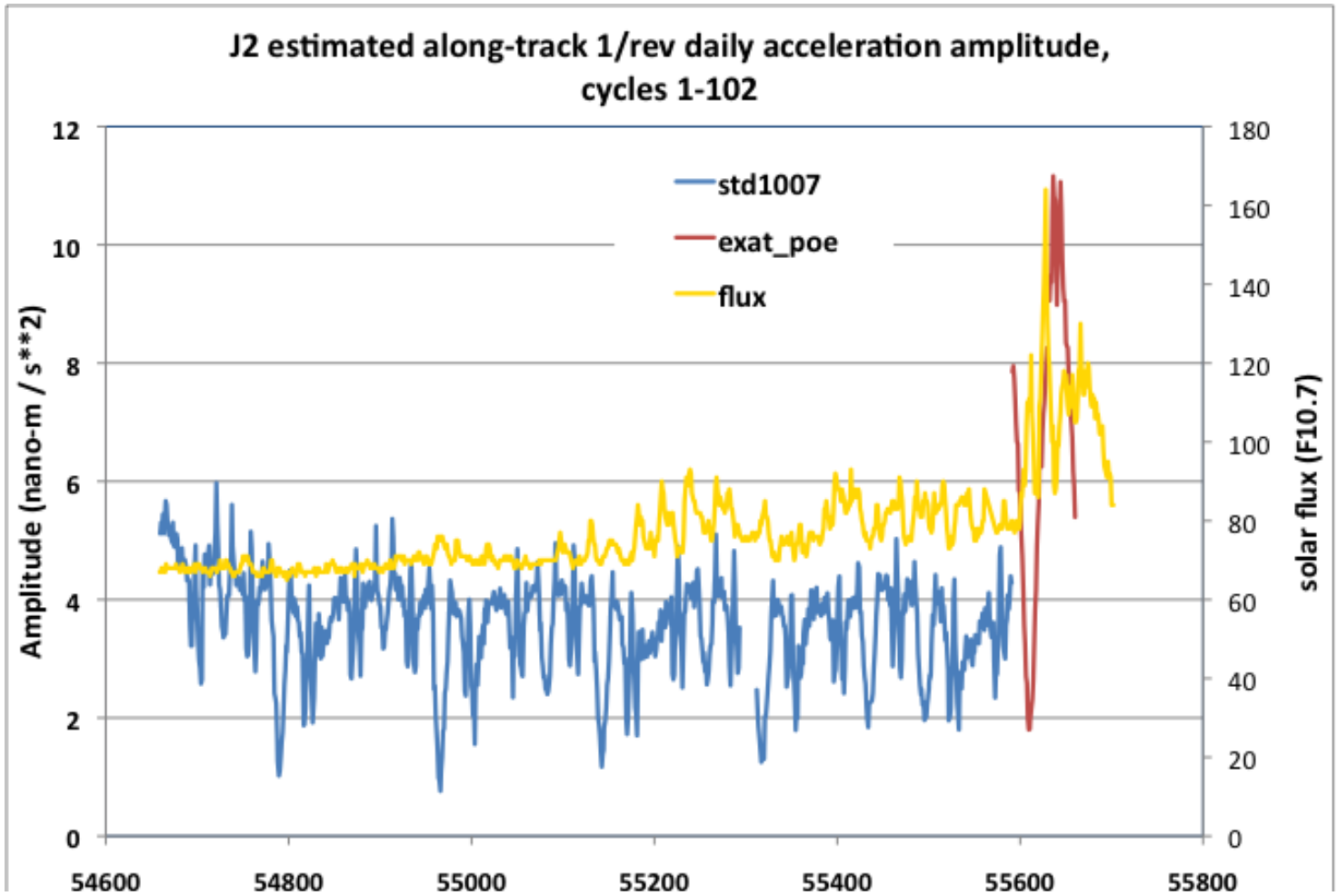
DORIS System Timing Biases from SLR-DORIS arcs



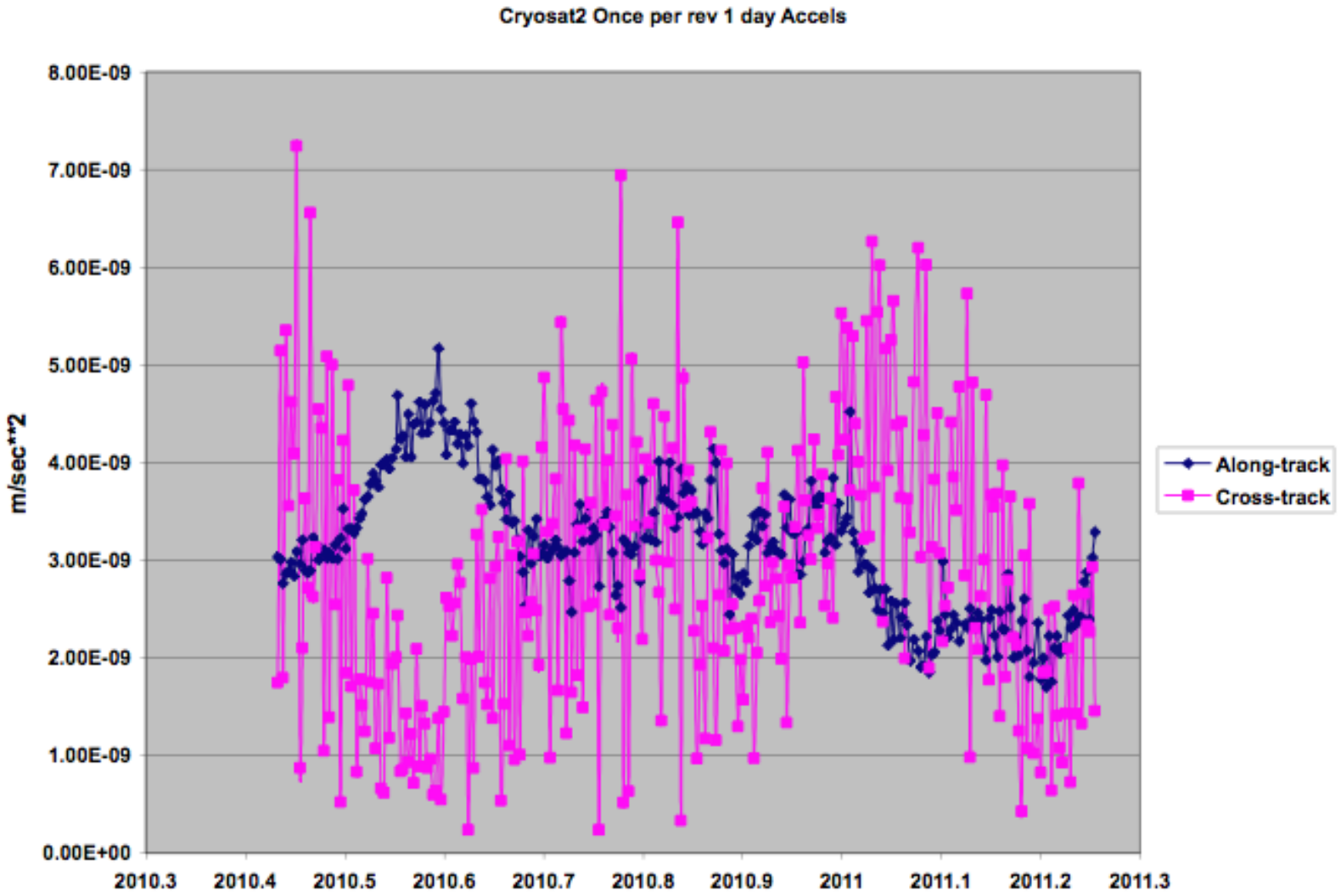
Residual OPR Acceleration Daily Amplitude (1e-08 m/s^2)

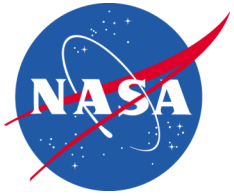
Satellite	Along-track	Cross-track
Envisat	1.81 ± 1.39	0.80 ± 0.97
Jason2	0.51 ± 0.35	0.60 ± 0.20
Cryosat2	0.32 ± 0.02	0.16 ± 0.02


Envisat Once per rev 1 Day Accels
3.00E-08
2.50E-08
2.00E-08
1.50E-08
1.00E-08
5.00E-09
0.00E+00
m/sec**2
2010.3
2010.4
2010.5
2010.6
2010.7
2010.8
2010.9
2011
2011.1
2011.2
2011.3
Along track
Cross track



Increase in OPR amplitude for Envisat & Jason-2 may be due to recent increase in solar flux -

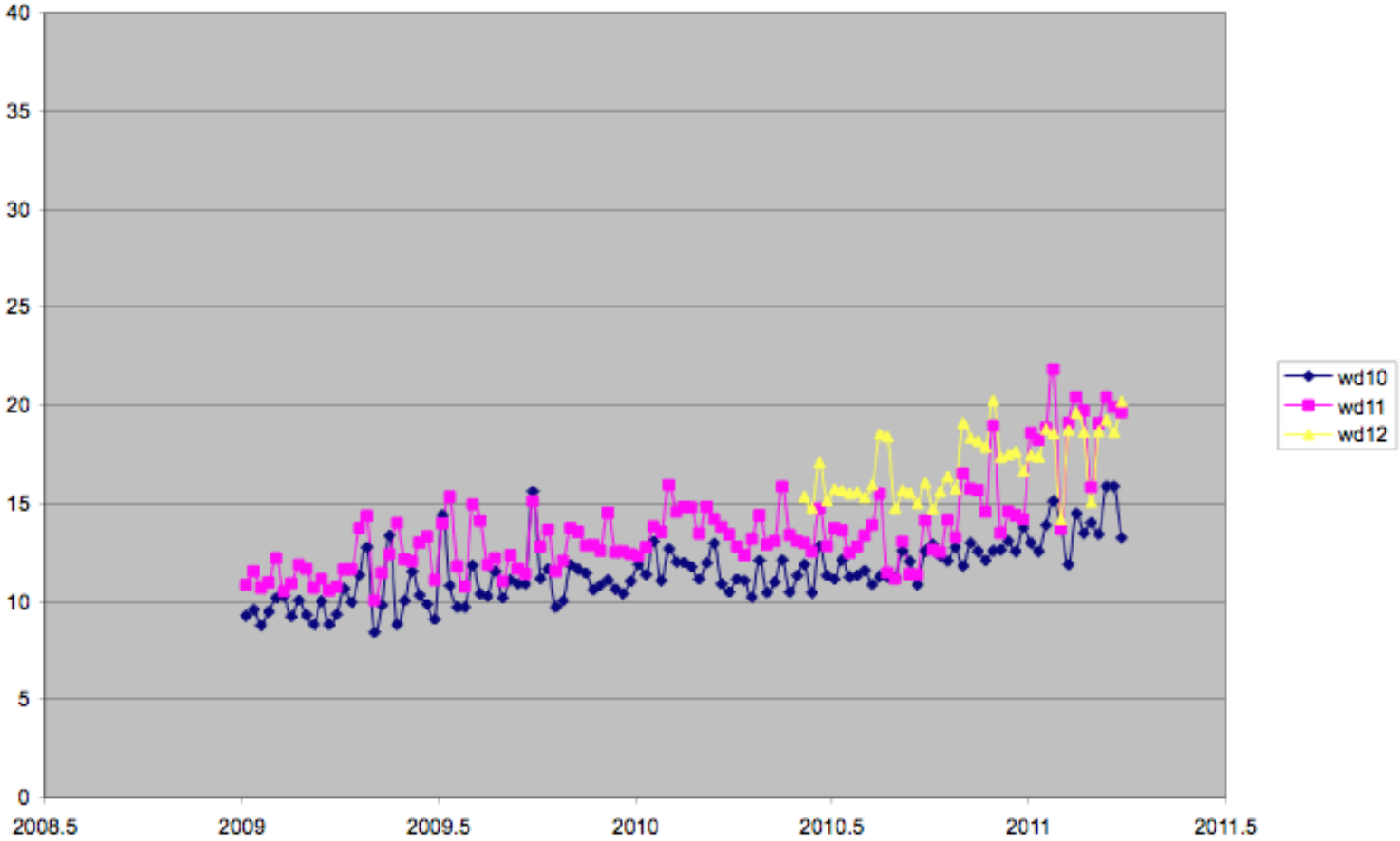

Cryosat2 Once per rev 1 day Accels
8.00E-09
7.00E-09
6.00E-09
5.00E-09
4.00E-09
3.00E-09
2.00E-09
1.00E-09
0.00E+00
m/sec**2
2010.3
2010.4
2010.5
2010.6
2010.7
2010.8
2010.9
2011
2011.1
2011.2
2011.3
Along-track
Cross-track



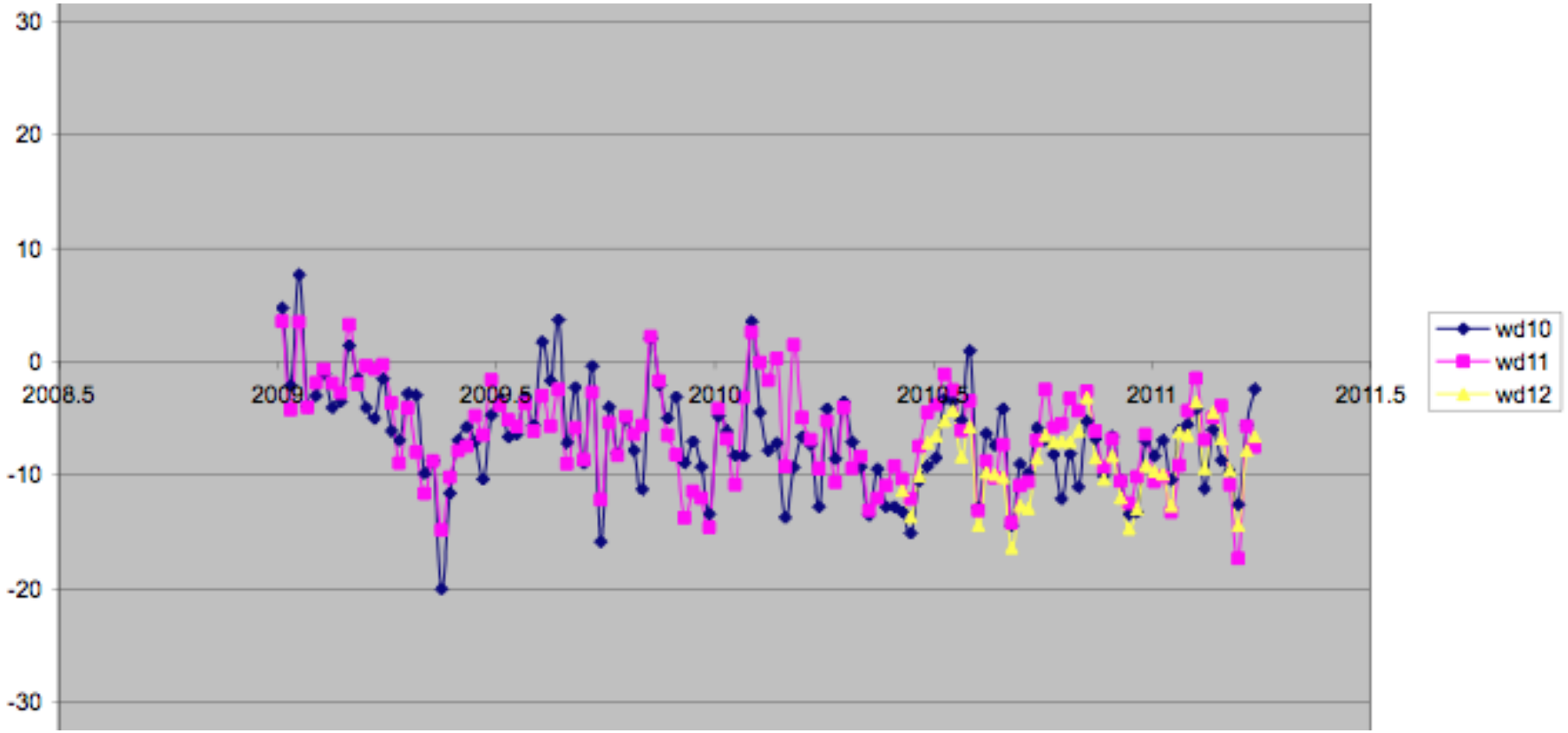
Weekly solution Helmert differences vs. ITRF2008 average values in mm (without SANB 4269000 after Feb 27, 2010)

Doris series		WRMS	Tx	Ty	Tz	Scale
wd10	avg	11.5	-6.7	-16.4	-20.2	-6.1
	stdev	1.5	4.5	6.1	17.3	2.6
wd11	avg	13.7	-6.3	-14.1	0.0	-9.8
	stdev	2.4	4.3	6.0	10.4	3.1
wd12	avg	17.0	-9.0	-16.8	-0.8	-12.5
	stdev	1.7	3.2	4.4	12.0	2.0

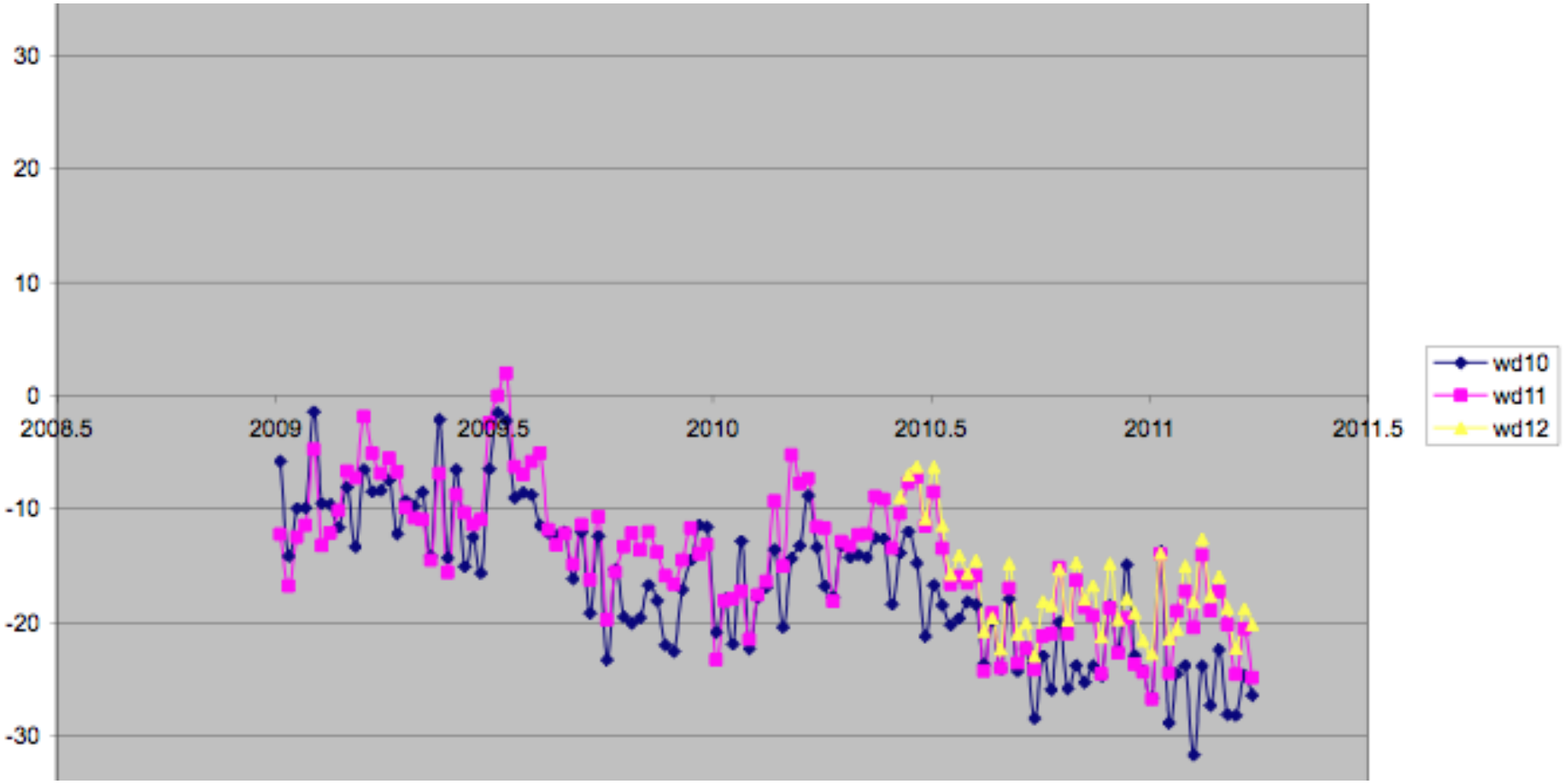
WRMS for GSC SINEX series wrt. ITRF2008



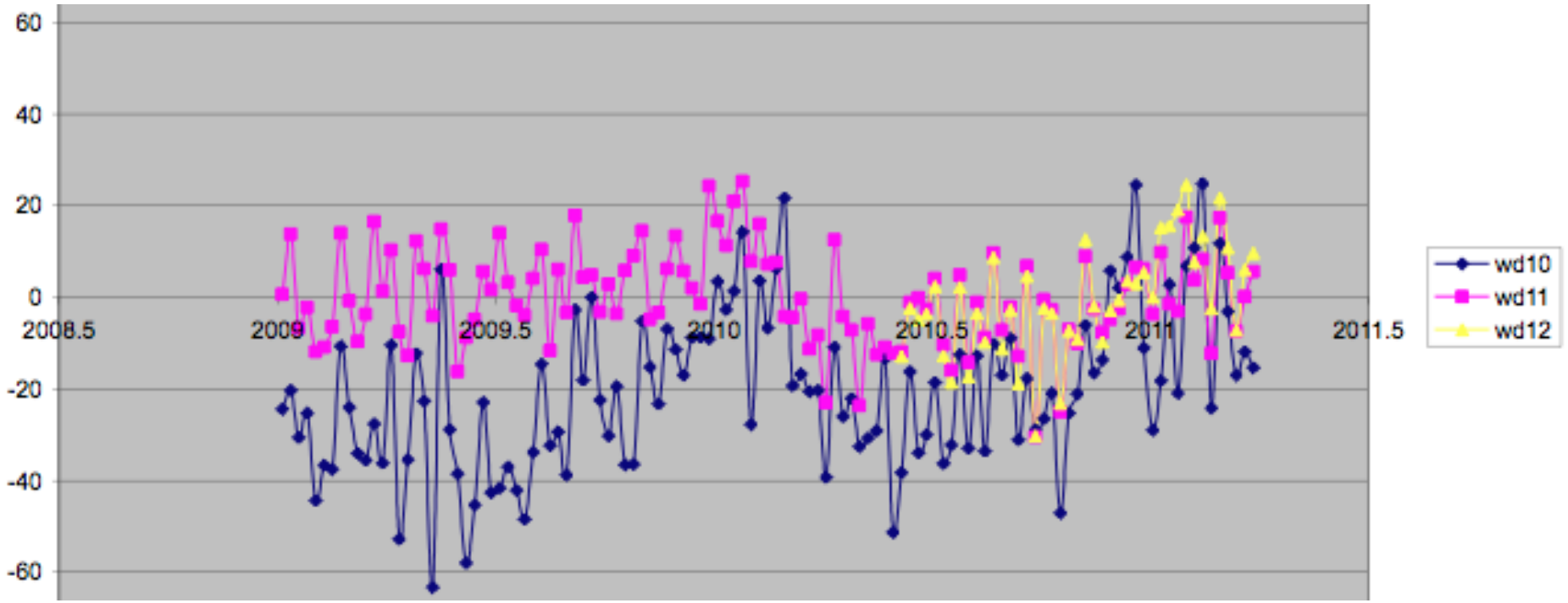
Tx for GSC SINEX series wrt. ITRF2008



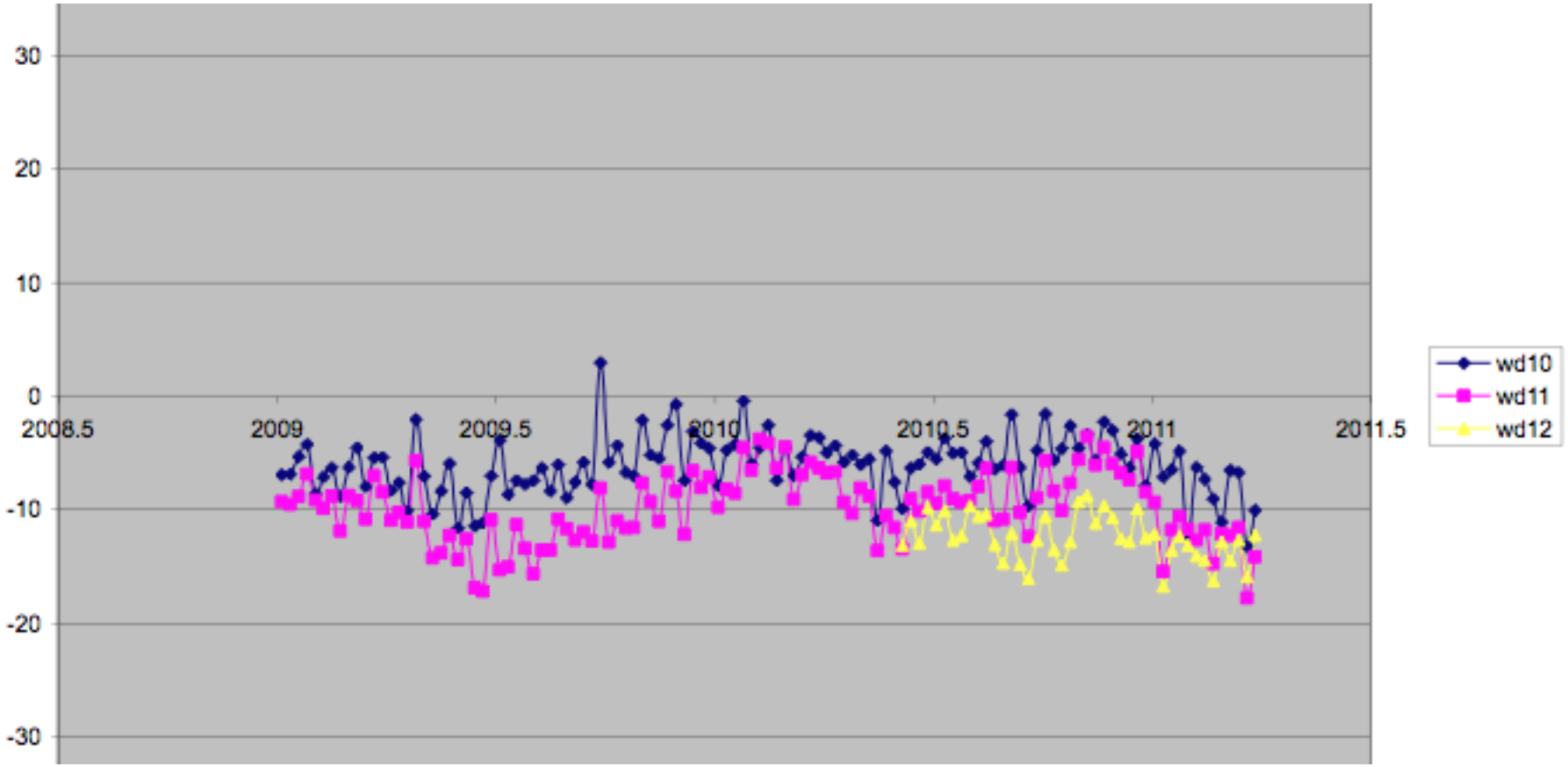
Ty for GSC SINEX series wrt. ITRF2008



Tz for GSC SINEX series wrt. ITRF2008



Scale for GSC SINEX series wrt. ITRF2008



Summary

• All DORIS satellites have been successfully processed through March 2011.
• Jason2 series show 120-day, beta prime signals in Tx & Ty, and help to stabilize the Tz.
• Cryosat-2: Preliminary solutions look interesting; Change in scale of -10 mm. (Actually Jason2 and Cryosat2 both cause a noticeable scale change when added to the SINEX solutions).
• Further improvements and some fix-ups are underway before we make final delivery of newest SINEX files.

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• Long term improvements:
(1) Tuning of Cryosat-2 macromodel?
(2) Application of improved troposphere modelling (e.g. GMF vs. Niell).
(3) Improvements to scripts to simplify processing and improve validation and checking of results before submission.