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GSC ITRF2008P Analysis: Preliminary Report



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Outline of GSC Tests for ITRF2008p

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- So far only analyzed ITRF2008P_IGN (ITRF2008P_DGFI will also be studied).
- Both SLR & DORIS complements tested with altimeter satellite POD.
- Application & Testing of SLR complement is very complicated (due to associated list of applied biases, and list of data to be deleted, etc.).
- DORIS tests conducted over four periods:
 - (1) *Apr. 19, 1993 - Jul 17, 1993 (TOPEX/Poseidon);*
 - (2) *Jan. 15, 2002 - Aug 11, 2002 (Jason-1-tandem period);*
 - (3) *July 11, 2008 - Jan 26, 2009 (Jason-2-tandem period);*
 - (4) *Jan. 26, 2009 - Jan 28, 2010 (Jason-2: Application of ITRF2008P to beyond period of input data).*
- Compare DORIS to DPOD2005 (*Willis et al., 2009*).





**Table 1. DORIS complement performance: Orbit tests by GSC
(N. Zelensky et al.)**

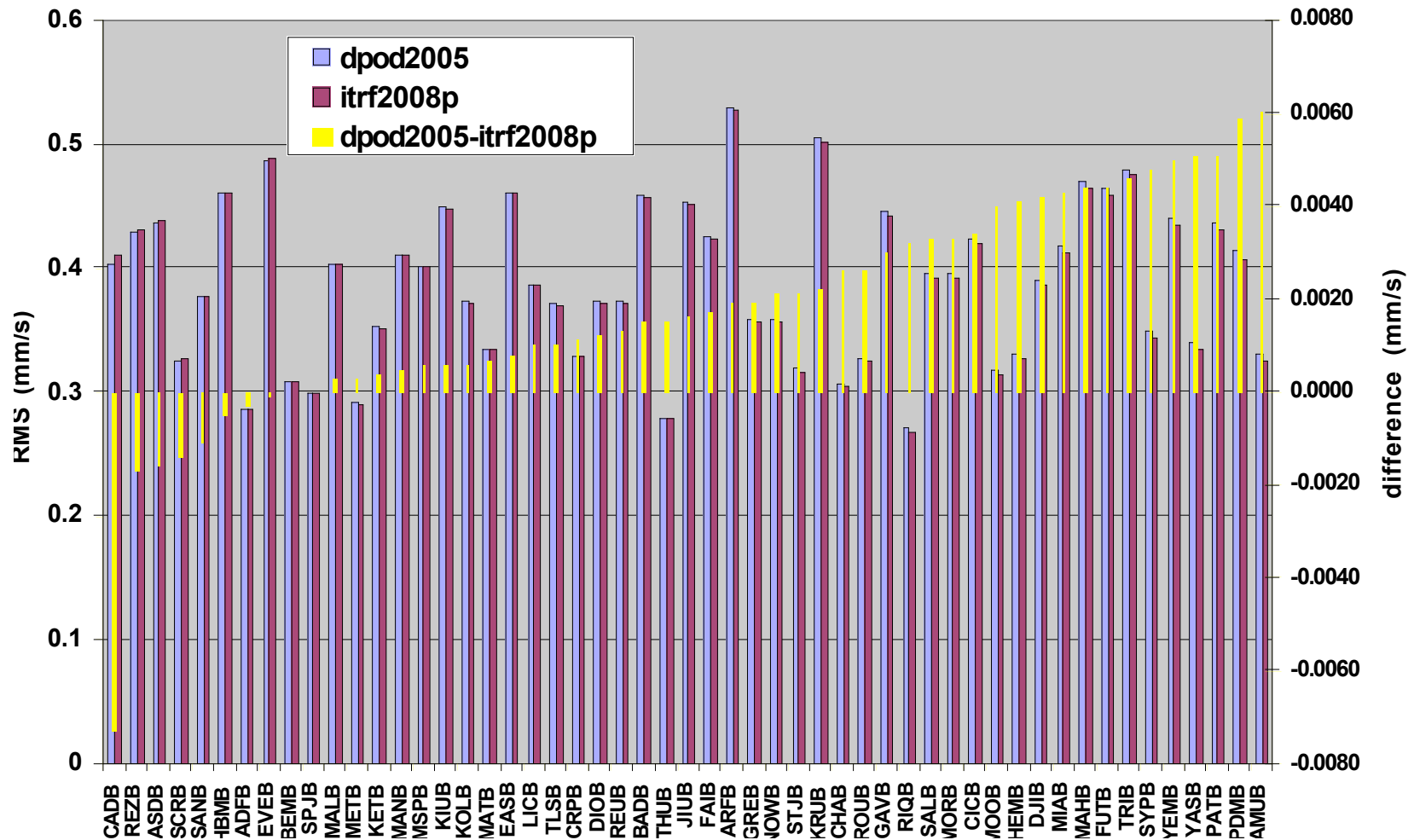
period	test DORIS-only	number stations	average points / cycle	average residuals per cycle		
				doris (mm/s)	slr (cm)	xover (cm)
Apr 19, 1993 - Jul 17, 1993 (TP cycles 22- 30)	TP dpod2005	45	57135	0.5386	4.83	5.936
	TP dpod2005*	42	54342	0.5393	4.94	5.939
	TP itr2008p	42	54342	0.5391	4.97	5.944
Jan 15, 2002 - Aug 11, 2002 (J1 cycles 1-21)	TP dpod2005	53	57365	0.4733	4.16	5.622
	TP itr2008p	52	56117	0.4736	4.19	5.623
	J1 dpod2005	54	113798	0.3628	2.89	5.765
	J1 itr2008p	53	112208	0.3622	2.88	5.771
Jul 11, 2008 - Jan 26, 2009 (J2 cycles 1-20)	J1 dpod2005	55	119026	0.3205	3.36	5.478
	J1 itr2008p	52	113037	0.3155	3.35	5.457
	J2 dpod2005	56	170295	0.3710	2.24	5.559
	J2 dpod2005 *	52	161474	0.3672	2.22	5.560
	J2 itr2008p	52	161474	0.3649	2.18	5.537
Jan 26, 2009 - Jan 28, 2010 (j2 cycles 21- 57)	J2 dpod2005	55	158332	0.3817	2.34	5.570
	J2 dpod2005 *	51	151295	0.3774	2.38	5.577
	J2 itr2008p	51	151293	0.3762	2.41	5.555

N.B. SLR & Xover fits are independent.



Jason-2 DORIS Residuals, (Cycles 1-57; July 11, 2008 - Jan. 28-2010)

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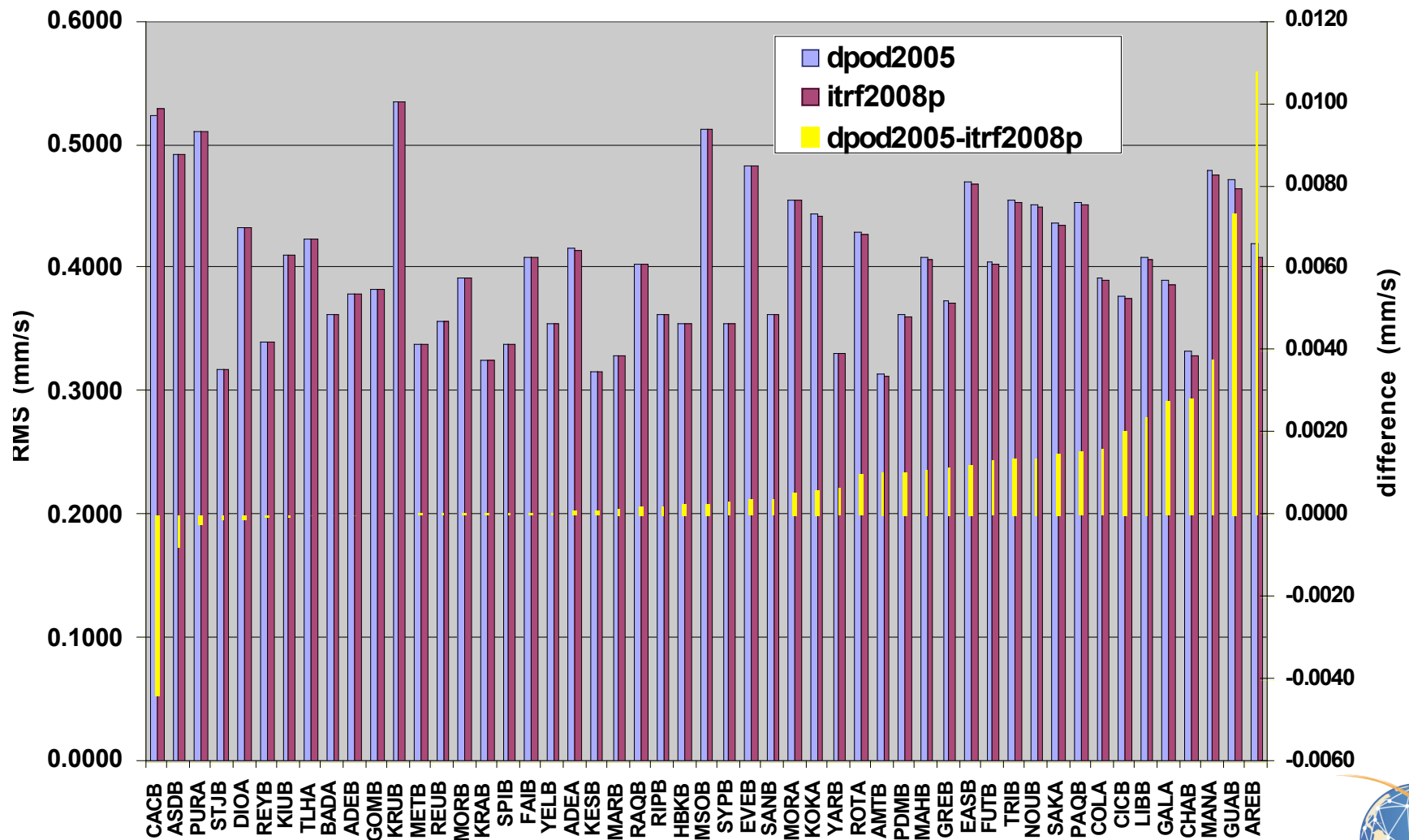
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Jason-1 DORIS Residuals, (Cycles 1-21; Jan. 15 2002 – Aug. 11, 2002)

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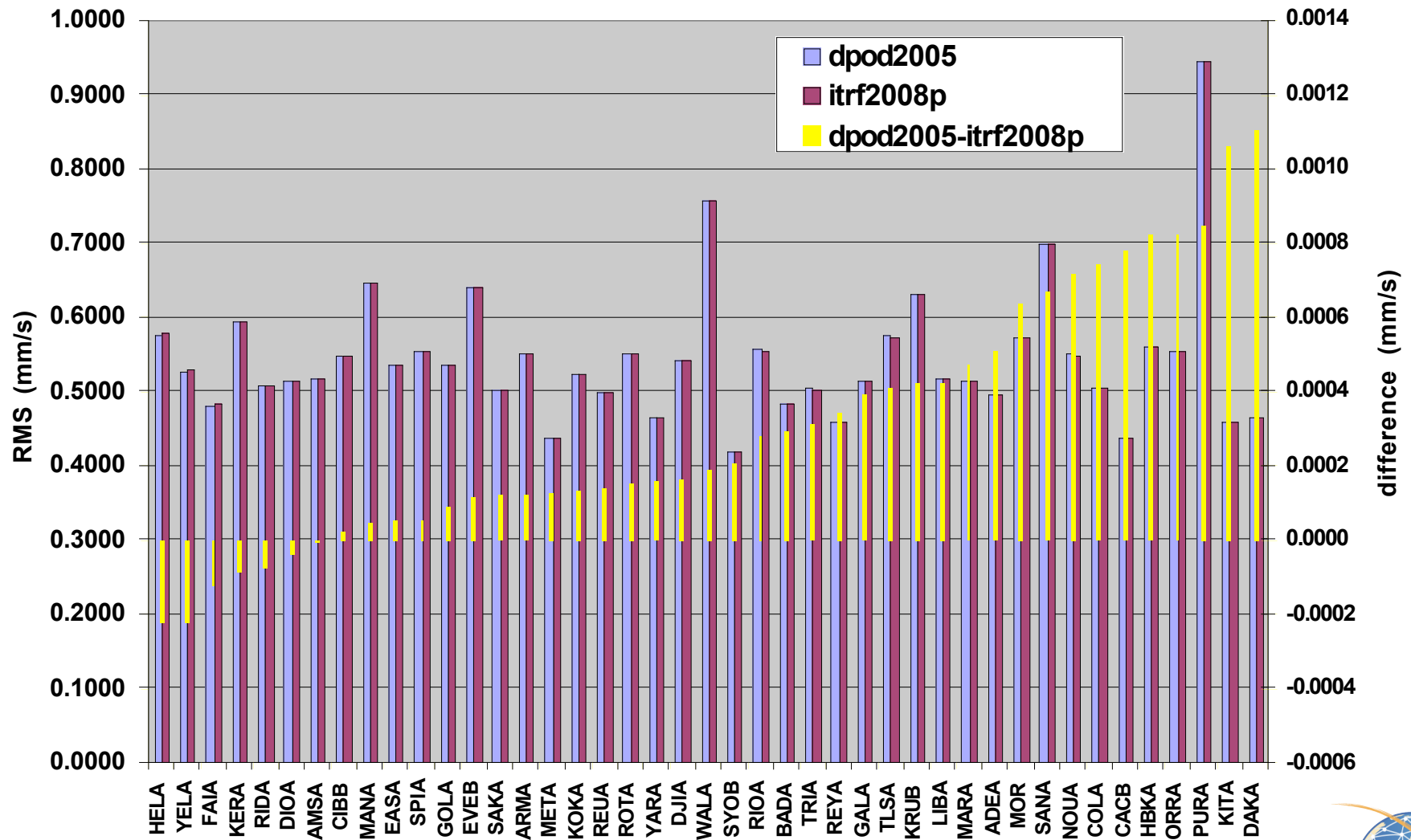
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TOPEX DORIS Residuals, (Cycles 1-30; Sept. 1992- July 17, 1993)

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DORIS/ITRF2008P: Preliminary Conclusions

- Improvement in POD performance for majority of stations: (*e.g. especially notable from J1 tests: Arequipa (post-earthquake), Manilla, Guam*).
- Certain stations in the tests appear anomalous w. higher RMS of fit: (**CADB** (Cachoeira Paulista, Brazil), **ASDB** (Ascension), **REZB** (Reykjavik, Iceland) and **SCRB** (Santa Cruz, Galapagos, Ecuador)).
 - The slightly larger TP SLR residuals (even with improved DORIS residuals) are due to untreated biases in the earlier data (*see next slides*).



SLR Complement Performance

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Table 4. SLR complement + bias strategy performance over the march of time

period	test SLR-only	number stations	average points / cycle	average residuals slr	rms (cm) xover
Sep 25, 1992 - Jul 17, 1993 (TP cycles 1 -30)	TP lpod 2005	36	4623	2.219	6.010
	TP itr2008p	36	4623	2.136	5.982
	TP lpod 2005	35	4102	1.537	5.565
Jan 15, 2002 - Aug 11, 2002 (J1 cycles 1 -21)	TP itr2008p	34	4095	1.446	5.549
	J1 lpod 2005	35	2972	1.053	5.906
	J1 itr2008p	34	2970	1.031	5.908
Jul 11, 2008 - Jan 26, 2009 (J2 cycles 1 -20)	J1 lpod 2005	32	2690	1.029	5.555
	J1 itr2008p	32	2690	1.014	5.530
	J2 lpod 2005	32	2471	0.863	5.635
Jan 26, 2009 - Jan 28, 2010 (j2 cycles 21 -57)	J2 itr2008p	32	2471	0.835	5.614
	J2 lpod 2005	32	5149	0.999	5.649
	J2 itr2008p	32	5146	0.950	5.637

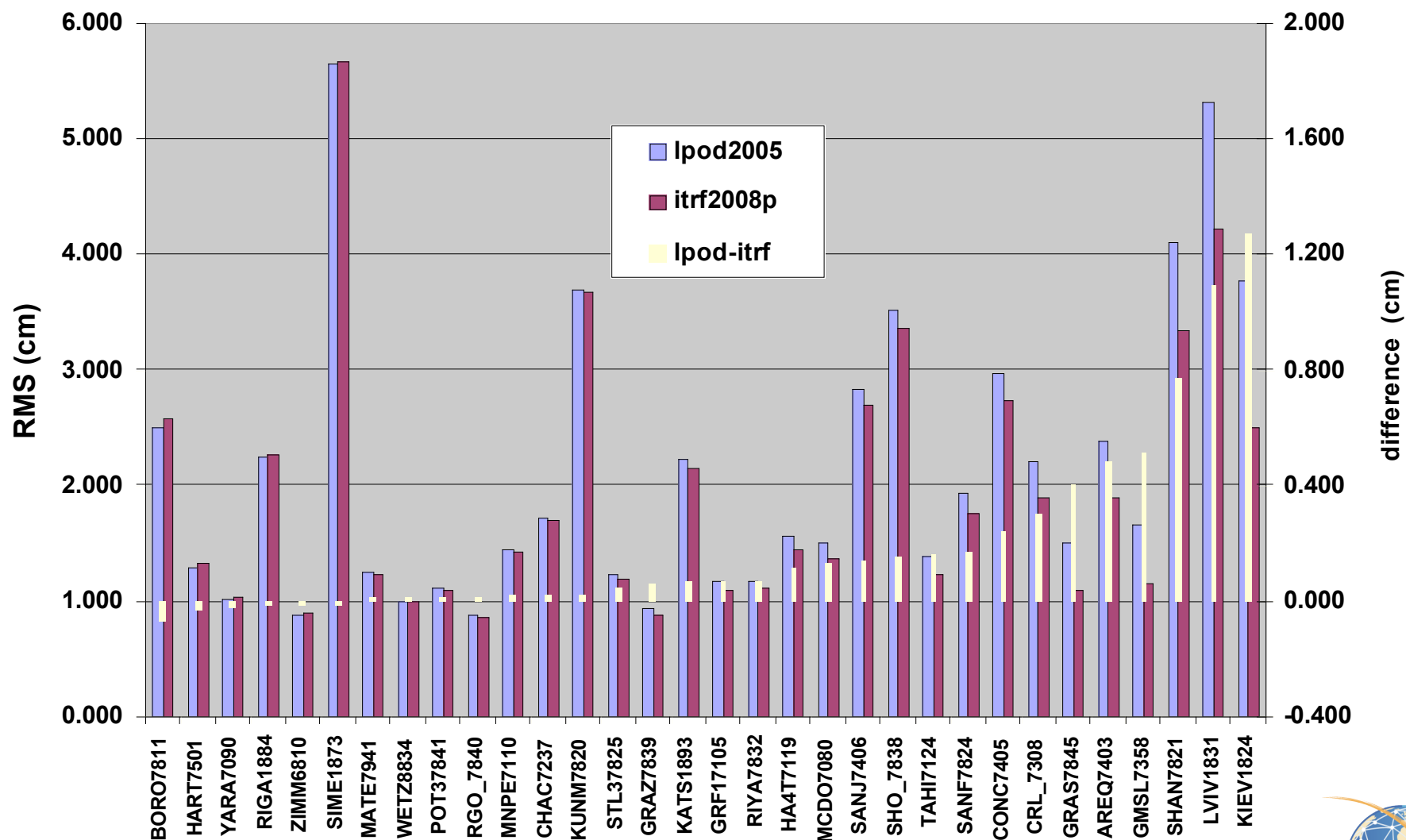
N.B. Xover fits are independent.



SLR station performance: 2008-2010

Jason-2 SLR residuals cycles 1-57 (32 stations)

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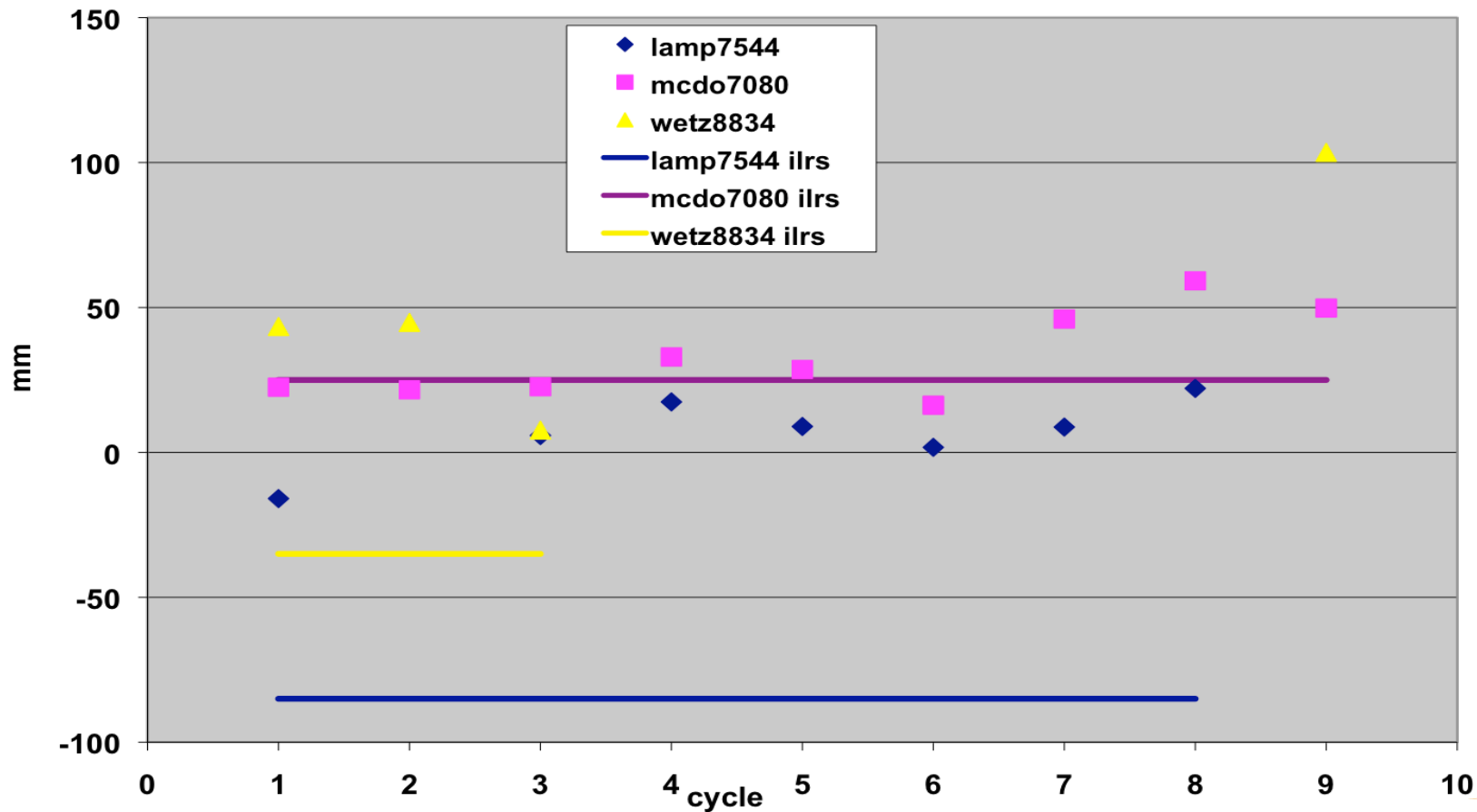
SLR station Bias Strategy Evolution

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GSFC SLR bias strategy evolution			
Number station biases ¹	GSFC LPOD2005	ILRS ² ITRF2008p	GSFC ITRF2008p (May 2010)
Biases applied	14	503	278
Biases estimated	68	43	300
Total	72	546	578
1) consist of largely range biases, but include timing and troposphere zenith scale biases			
2) ILRS_Data_Handling_File.snx document			

Example of Suggested Biases not Appropriate for TP POD

TP SLR core station range bias estimated / cycle





TP SLR & Crossover RMS Summary

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Towards an SLR ITRF2008P GSFC bias strategy: TP SLR-only solution residuals, cycles 1-30					
SLR complement / bias strategy	SLR	SLR residuals (cm)		Xover rms (cm) residuals	
	points	mean	rms	cycles 1-30	cycles 11-30
lpod2005	4623	0.437	2.219	6.010	6.099
1) itr2008p ilrs biases+deletes	4362	0.847	2.679	6.154	6.182
2) itr2008p merge ilrs+lpod biases	4364	0.679	2.514	6.118	6.152
3) itr2008p merge ilrs+lpod biases, no ilrs deletes	4626	0.641	2.462	6.116	6.154
4) itr2008p merge ilrs+lpod biases, no ilrs deletes, update merged biases (adopted strategy May 2010)	4623	0.297	2.136	5.982	6.066