



# GSC Analysis Center Update

#### <u>F.G. Lemoine</u>, D.S. Chinn, N.P. Zelensky, J.W. Beall, K. Le Bail IDS AWG Meeting Greenbelt, Maryland, NASA GSFC Oct. 15-16, 2015



Lemoine et al., GSC AC Report, IDS AWG, Greenbelt, Maryland, Oct. 15-16, 2015



## OUTLINE



- Recent Data POD Summary

   (1) RMS of fit
   (2) Empirical Accelerations
   (3) Orbit Diffs. (SLR/DORIS vs DORIS-only)

   Single-satellite Scales
- HY-2A offset Adjustments







## Doris OFFSETs (gscwd25/26)

Satellite	Х	Y	Z	source	
C2	1.848	-0.200	-0.751	(Cerri & Ferrage, 2014)	
En	-7.052	-1.085	-1.725	(Cerri & Ferrage, 2014)	
Ну	0.850	-0.750	1.306	(Cerri & Ferrage, 2014)	
J2	1.194	-0.598	1.022	(Cerri & Ferrage, 2014)	
Sa ¶ 😂	0.805	-0.304	-1.129	(Cerri & Ferrage, 2014)	
<ul> <li>¶ Satellite not included in gscwd25/gscwd26.</li> <li>To be updated with values from Zelensky et al. (2016, Adv. Space Res), along with updated Center-of-mass values.</li> </ul>					







#### Summary of Recent DORIS Data, RMS of fit Summary (gscwd26)

Satellite	Time Span	Narcs	Avg. Nobs	Avg. Fit (mm/s)
Cryosat2	2010/06 2015/06	337	48569	0.4023
HY-2A	2011/11 2015/06	225	61462	0.3990
Jason-2	2008/07 2015/06	377	109563	0.3832
Saral	2013/03 2015/06	149	52244	0.3968
SPOT-5¶	2008/07 2015/03	387	55003	0.4073
¶ Jason-2 time period only; Use SAA data.				



匹





#### Daily Amplitude Acceleration Summary for Recent Data Arcs

Satellite	Time Span	Ν	Along- track OPR (median nm/s <sup>2</sup> )	Along- track constant (median nm/s <sup>2</sup> )	Cross- track OPR (median, nm/s <sup>2</sup> )
Cryosat2	2010/06 2015/06	1835	2.49	-	1.98
HY-2A	2011/11 2015/06	1248	2.75	-1.64	2.39
Jason-2	2008/07 2015/06	2472	1.24	-	2.42
Saral	2013/03 2015/06	149	1.40	-	1.42
SPOT-5¶	2008/07 2015/03	387	0.86	-	0.76

¶ Jason-2 time period only; Use SAA data.



Note for gscwd26, cross-track oprs adjusted once/arc, whereas along-track adjusted once/day.









Lemoine et al., GSC AC Report, IDS AWG, Greenbelt, Maryland, Oct. 15-16, 2015

六





七





Lemoine et al., GSC AC Report, IDS AWG, Greenbelt, Maryland, Oct. 15-16, 2015







Lemoine et al., GSC AC Report, IDS AWG, Greenbelt, Maryland, Oct. 15-16, 2015



八









Lemoine et al., GSC AC Report, IDS AWG, Greenbelt, Maryland, Oct. 15-16, 2015

九



• Peak accelerations occur during eclipse periods (Nov-Dec). (See Zelensky et al. (2016, Adv. Space Res) for more details.

Lemoine et al., GSC AC Report, IDS AWG, Greenbelt, Maryland, Oct. 15-16, 2015

+



**Modified Julian Date** 

- Tuning of macromodel (Le Bail et al., 2010) results in lowest amplitude of OPR.
- Possible signature of higher drag periods near solar maximum?
- Setup error after 2014/06 (omission of modeling of proper Solar array pitch bias).

+-





#### Orbit Differences (gscwd25) (DORIS vs SLR/DORIS)

	Median orbit Differences (cm)			
Satellite	Radial	Cross	Along	
C2	0.19	1.32	3.81	
Hy2a	0.18 +-	1.89	1.56	
J2	0.34	1.91	1.60	
Sa	0.19	1.13	1.18	







### Impact of HY2A offset adjustment

#### Apriori: Z = 1.306; Adjusted Z=1.356





# Single Satellite scales (w.r.t. DPOD2008)



(gscwd26, unsmoothed)





Lemoine et al., GSC AC Report, IDS AWG, Greenbelt, Maryland, Oct. 15-16, 2015

十四





## Single Satellite scales (w.r.t. DPOD2008)

(gscwd26, smoothed, 5-week running mean)





Lemoine et al., GSC AC Report, IDS AWG, Greenbelt, Maryland, Oct. 15-16, 2015

十五



## Future work





