Issues and Lessons Learned from ITRF2014

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2015 IDS AWG Meeting

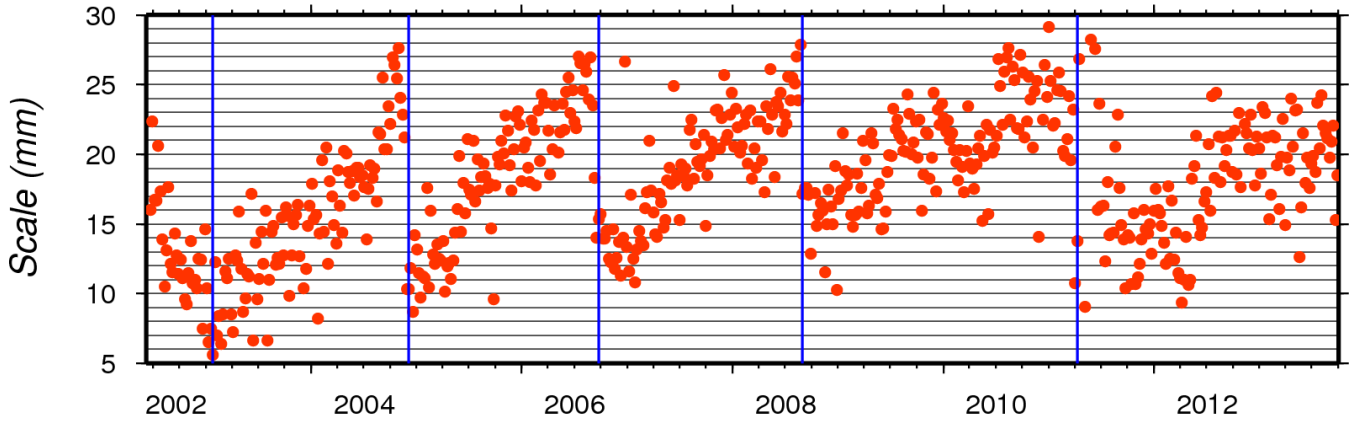
Toulouse, France

May 28-29, 2015

Considerations for future work (—).

1. Scale Issues (2012 and later).

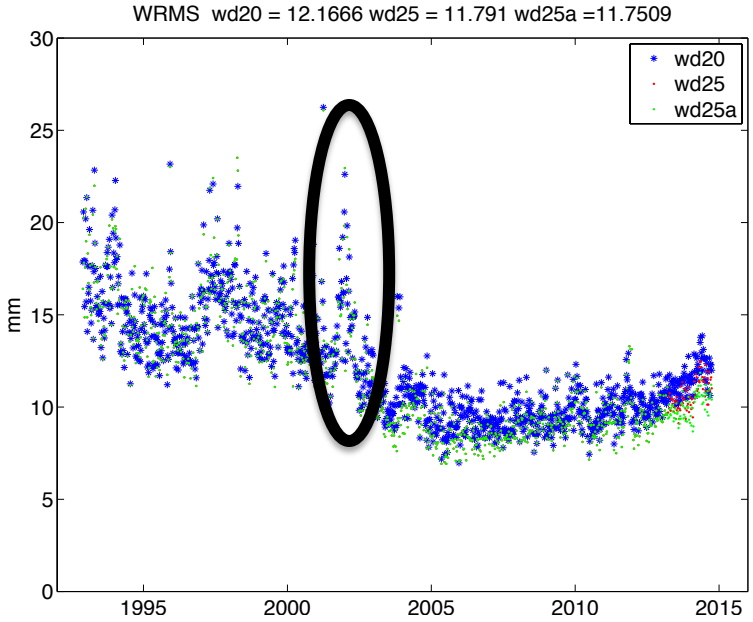
2. Scale Issues SPOT-5 (Sawtooth pattern).

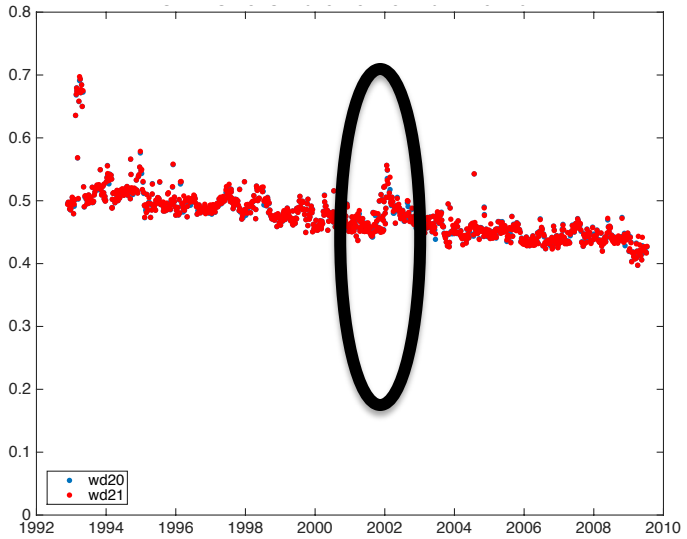


Moreaux et al. (2015), Figure 10: Scale of gsc23 spot5 single-satellite solutions.

Considerations for future work (二).

3. Degradation near solar maximum of Solar Cycle 23 (2001-2002); Seen in WRMS (~2X), and in RMS of fit to SPOT data.



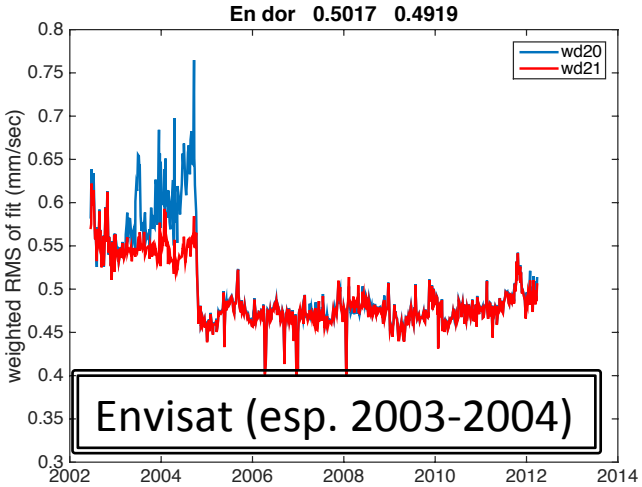


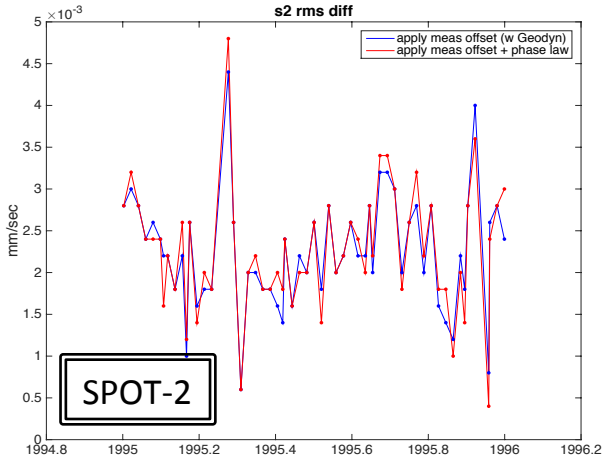
WRMS (wd20, wd25): 2X degradation

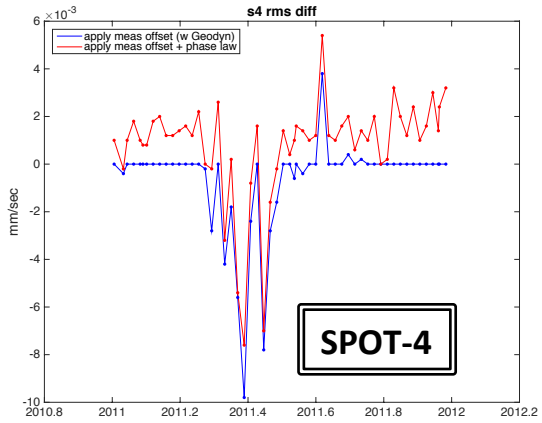
RMS of fit degrades (SPOT-2, SPOT-4): from 0.49 mm/s to 0.58 mm/s at peak.

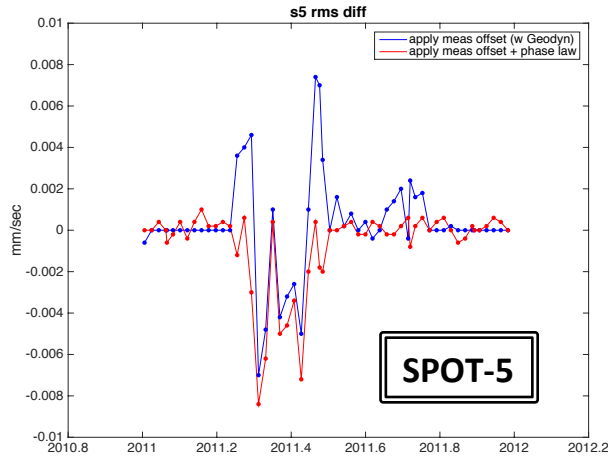
Considerations for future work (三).

4. Improvement (degradation) in RMS of fit when tracking point offsets applied in POD software (GEODYN) instead of using data corrections supplied with DORIS data.









Considerations for future work (四).

5. In view of previous results, consideration should be given to having quaternions available for all DORIS satellites to handle off-nominal attitude situations for the measurement model, and to model properly the non-conservative forces.

→ **ACs must verify that quaternions can be implemented in their POD Software.**

AC	Software	Handle Quaternions.
ESA	NAPEOS	At present body quaternions only.
GOP	Bernese	Software not yet capable.
GRG	GINS	Yes.
GSC	GEODYN	Body and solar array quaternions.
IGN & INA	GIPSY	Handle quaternions in single-satellite, but not multi-satellite mode.

Considerations for future work (五).

6. **<u>Error in Center of Mass of Saral</u>**. Discrepancy between ACs that use data-supplied corrections, and those that apply corrections in the POD software. Which value of CM to adopt? Should the DORIS offset be updated as well? **Processing must be consistent for all DORIS ACs!**

2.1 Initial DORIS and SLR antenna offset estimates and correction of satellite center of mass position				
Initial DORIS and SLR antenna offset estimates over 130317-131222 data.		X (m) (nadir)	Y (m) (along-trk)	Z (m) (cross-trk)
Correction to a-priori antenna offsets	DORIS	0.0031	0.0000	-0.0406
	SLR	0.0158	0.0000	-0.0456
Satellite CM	CNES a-priori	-0.0112	-0.0067	-0.6583
	Corrected	-0.0112	-0.0067	-0.6152
Note. Initial antenna offset estimates suggest SARAL CM cross-track (Z) position is in error by 4.31 cm				

Table 2.1, Zelensky et al. (2015).
Both SLR & DORIS data show ~ 4cm adjustment in Z.

2.2 Estimate DORIS and SLR antenna offsets in two iterations using corrected satellite CM and data spanning 130317-131215 iteration1: GMF/GPT troposphere model iteration2: VMF1 troposphere model, DORIS beacon phase center correction						
Iteration	DORIS antenna offset (m)			SLR antenna offset (m)		
	X	Y	Z	X	Y	Z
a-priori (CNES)	0.805	-0.304	-1.129	0.4735	0.0000	-0.9400
iteration1	0.808	-0.304	-1.127	0.4892	0.0000	-0.9425
iteration2	0.825	-0.304	-1.127	0.4859	0.0000	-0.9409
estimate sigma	±0.0012	---	±0.0019	±0.0016	---	±0.0014
CM: X= -.0112, Y= -.0067, Z= -.6152 (m); LRA correction = -0. 03748 m						

Table 2.2, Zelensky et al. (2015).
DORIS & SLR offsets readjusted.

2.3 Evaluate corrections to CM and DORIS / SLR antenna offsets with independent tracking data residuals (131222-140810)			
Antenna offset / CM positions	DORIS (mm/s)	SLR (cm)	
		Mean	RMS
pre-tune (pre-launch positions)	0.4324	-0.149	1.849
post-tune (corrected positions iteration 2)	0.4313	0.070	1.384

Table 2.3, Zelensky et al. (2015).
Improvement on Independent data.

Considerations for future work (六).

7. **<u>Implementation (and evaluation) of ITRF2014:</u>**

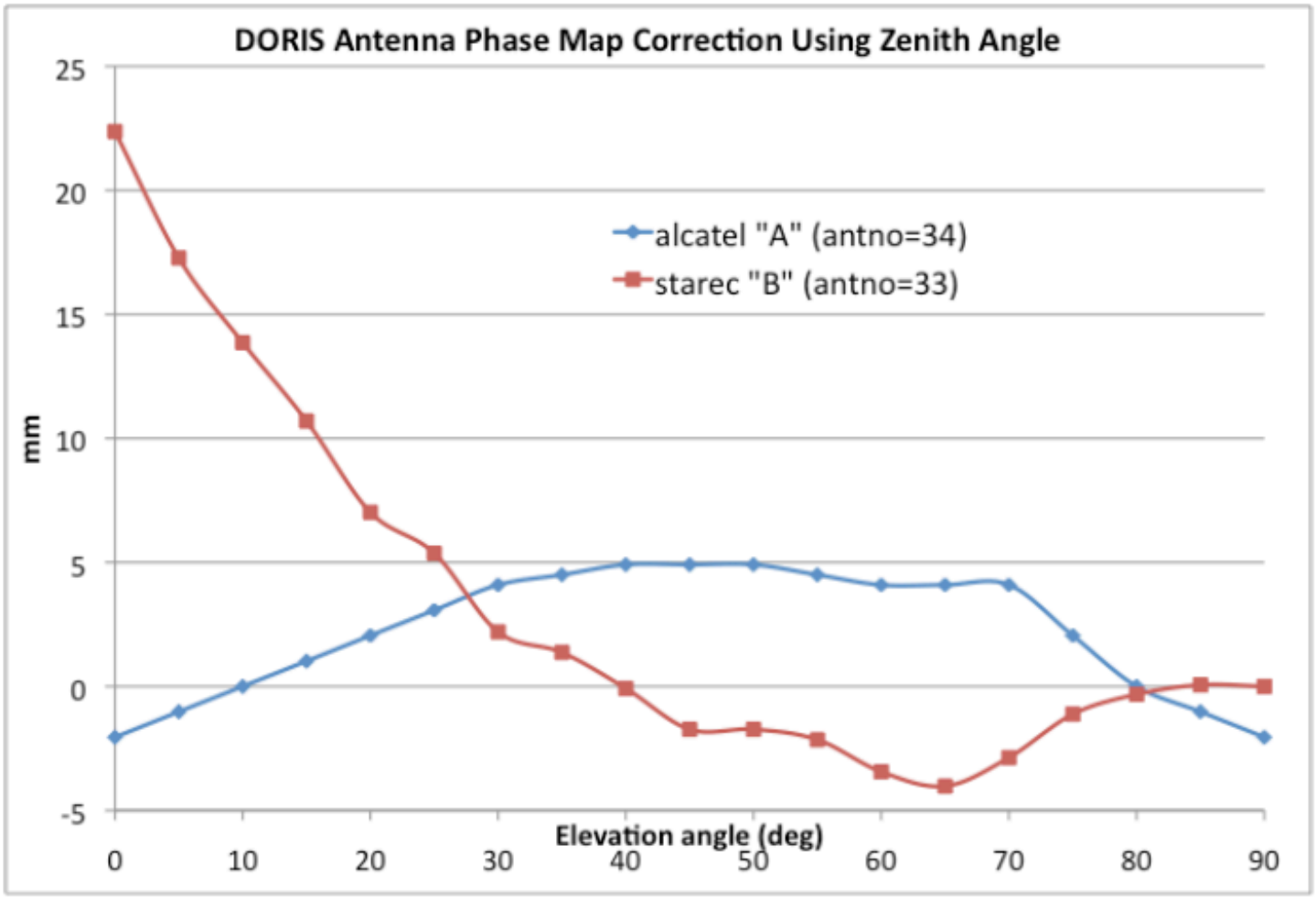
New parameterization will be provided to handle post-seismic deformation at sites with large earthquakes. This must be implemented in the POD software. We need examples and documentation in order to begin planning implementation.

8. <u>Continue evaluation of phase laws for DORIS & Alcatel antenna</u>. Is the manufacturer's phase law for Alcatel adequate? Should it be tuned empirically?

9. Based on the ITRF2014 experience, decide on schedule for next ITRF. How far in advance should the processing begin?

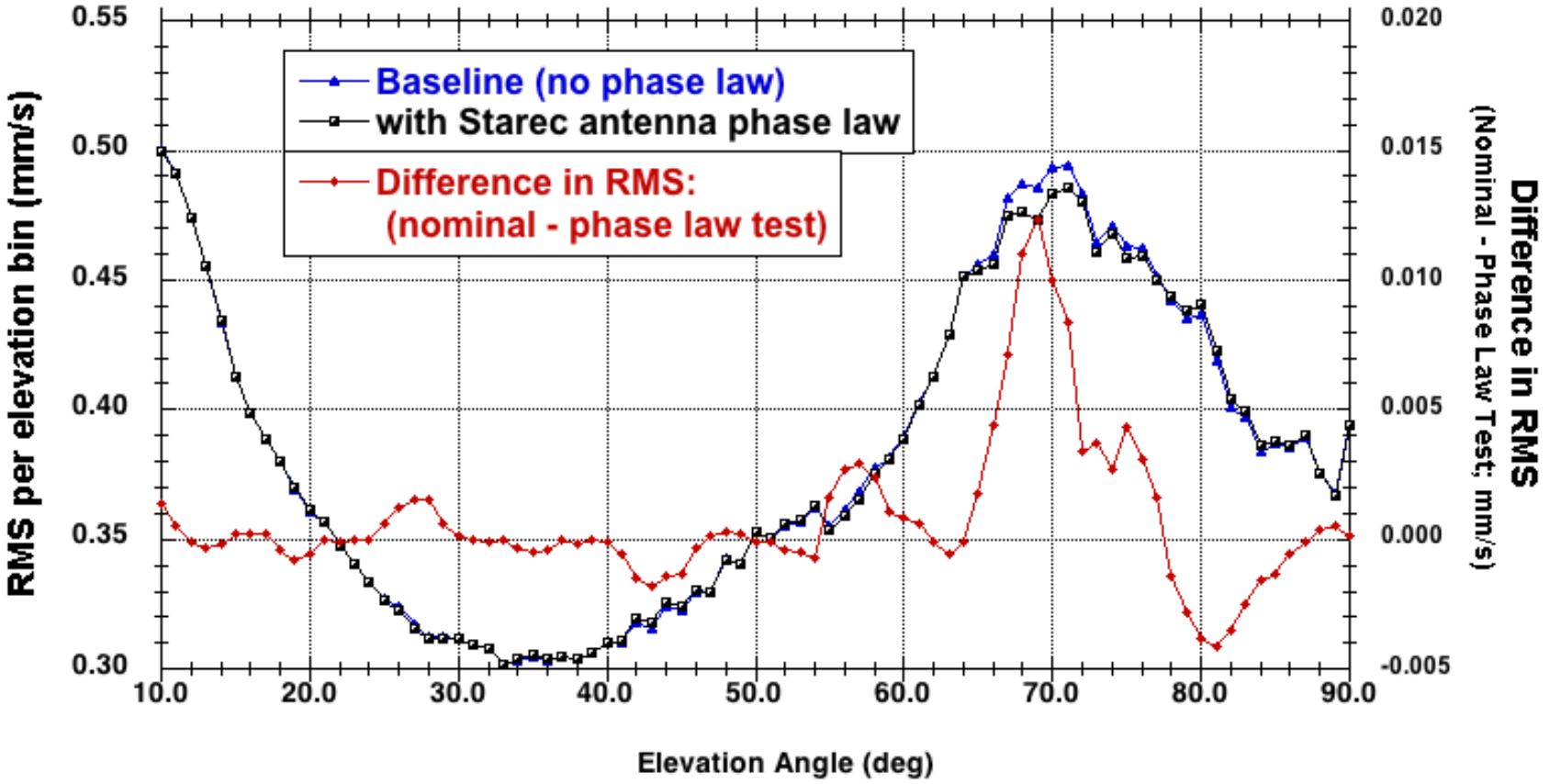
Backups

DORIS Antenna Phase Laws



Lemoine et al., GSC AC Report, IDS AWG, Toulouse, France, May 28-29, 2015

DORIS Antenna Phase Laws (Jason-2)



DORIS Antenna Phase Laws (TP)