GSC Analysis Center Report

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Outline

I	Tests to update DORIS SINEX series gscwd12.
II	Implemention of VMF1 in GEODYN.
III	Preliminary Tests: Application of Atmospheric Loading on Jason2

DORIS SINEX series tests

I. Update mapping function to GMF from Niell (*Niell used in ITRF2008; gscwd12 continues this to avoid data series discontinuities*)

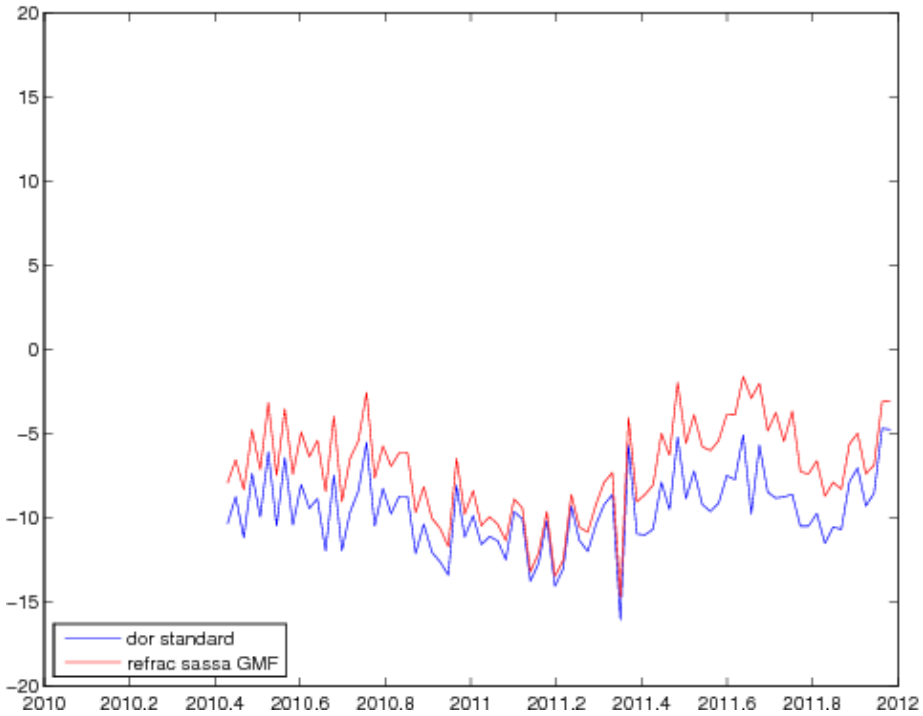
II.Use opr-12hrs on Jason-2 vs. opr-24hrs. (*Zelensky et al., 2011, AGU, showed reduction of 118-day signal in SLR+DORIS dynamic orbits when compared to JPL red-dyn or CNES/GDR-D orbits*)

III. SPOT5-SAA test (remove four SAA stations on SPOT5, Adjust separately) *test needs to be redone).*

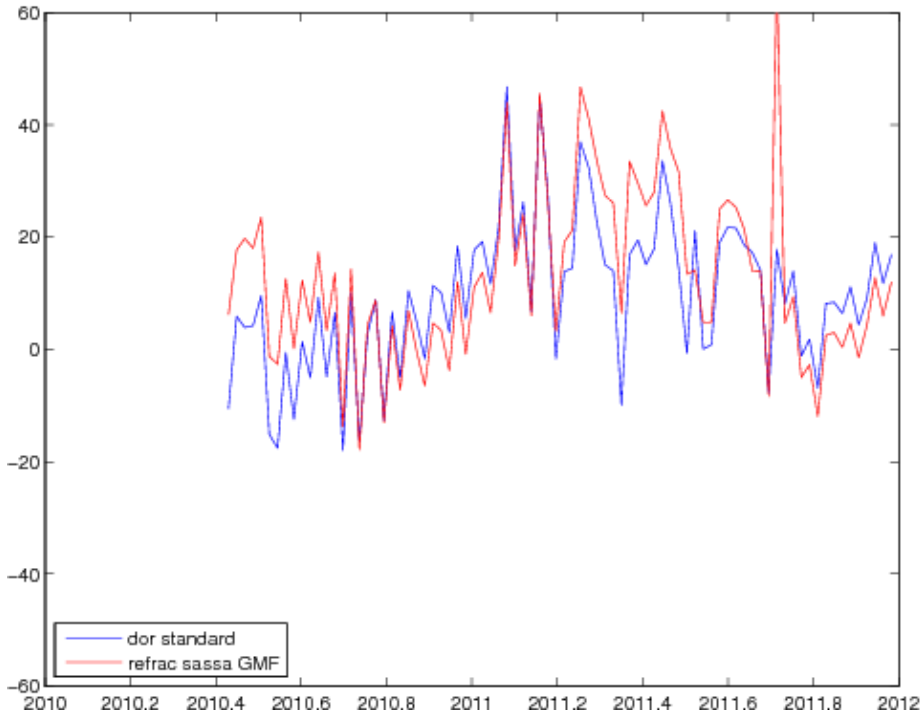
--->For each test examine impact on Scale, Tx,Ty,Tz and WRMS of weekly solutions for 2010-2011 (using all DORIS satellites).

Update to GMF from Niell

Scale

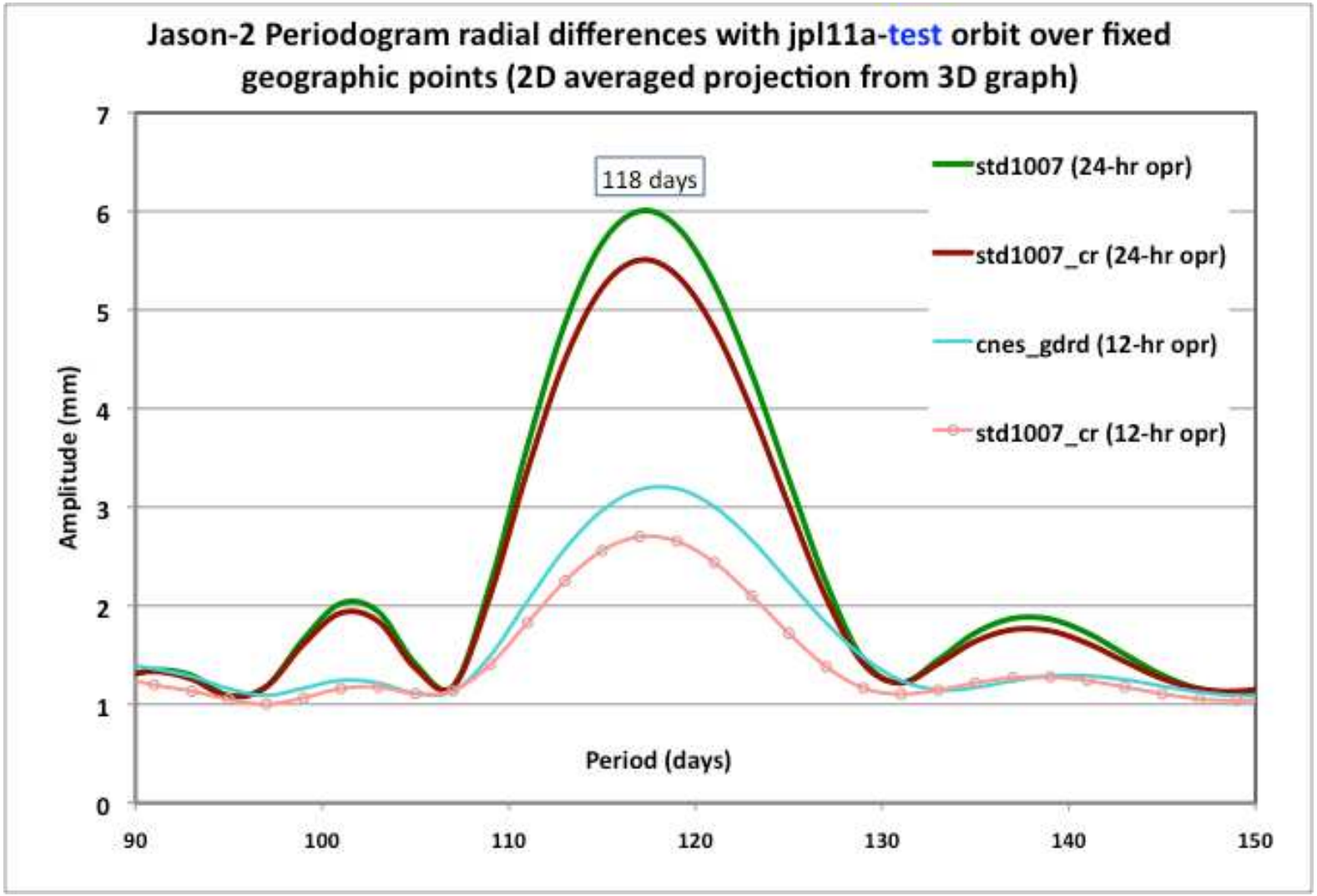


Tz



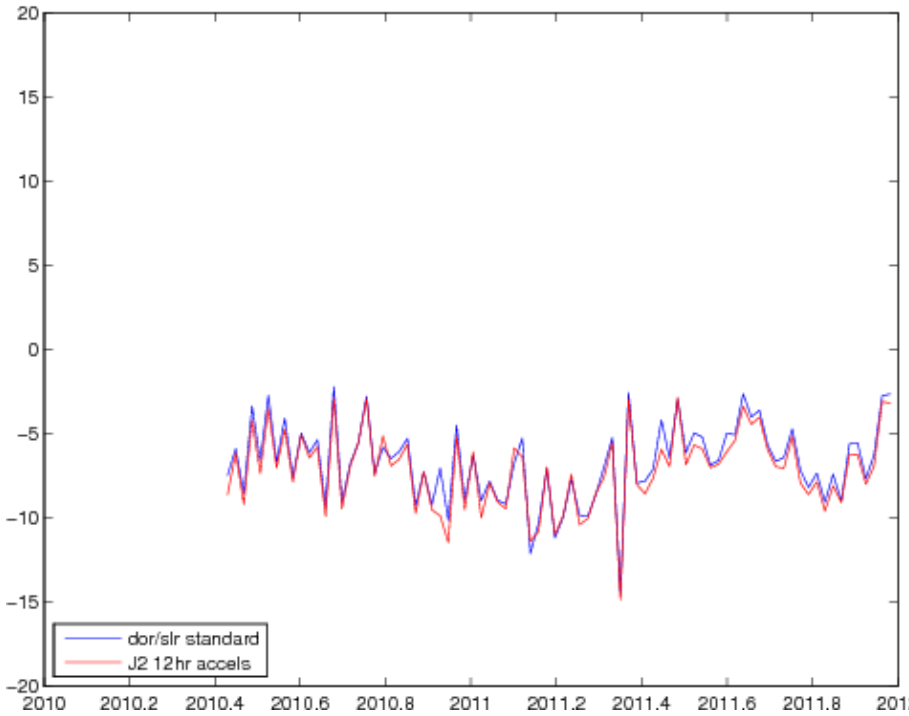
- +2-4 mm in scale;
- Semiannual change in Tz.

Apply 12-hr opr on Jason2

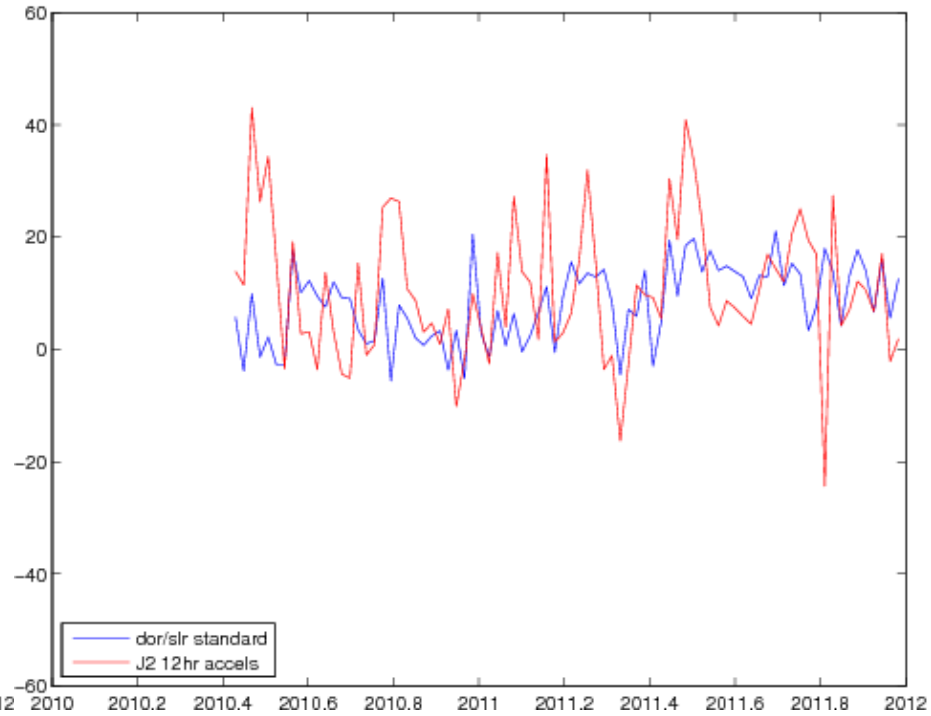


Apply 12-hr opr on Jason2 (1)

Scale

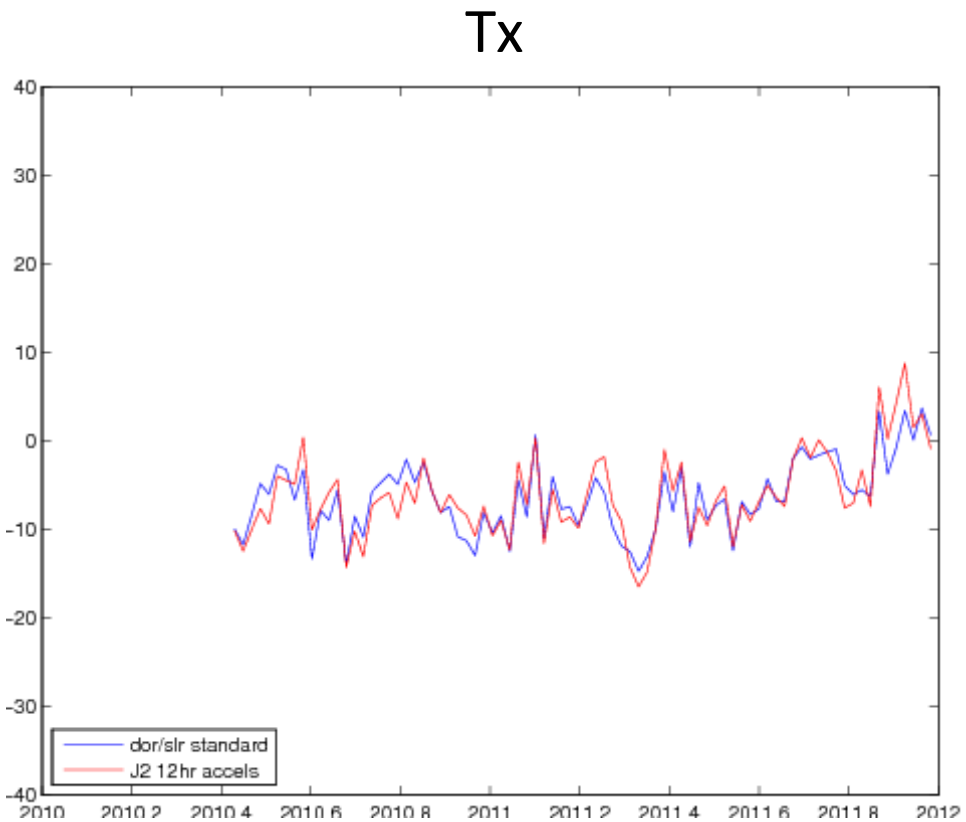


Tz



- Negligible effect on scale;
- Deterioration in Tz (more scatter)

Apply 12-hr opr on Jason2 (2)



- ~118-day difference in Tx, Ty differences?
- Need longer time series in order to be able to do spectral analysis and verify if beta prime signal reduced in Tx and Ty.
- Further testing necessary. Would time-correlated opr's adjusted more frequently stabilize Tz and still remove Tx & Ty signal?

Next GSC IDS SINEX Series Plans

- Update to GMF/Saastoimonen.
- More opr adjustments Jason2?
- New geopotential model

  static field: GOC02S (*GRACE+GOCE+Lageos+CHAMP*)?

  Time-varying: TBD. Must be valid 1993-2012.
- New Annual+ Semiannual harmonics

  GRACE-derived, multi-year fit.
- New ocean tide model:

  -->tides and ocean loading & tidal geocenter.

  Consider: EOT11a; TPX072atlas; GOTxx.
- Participate in IERS APLOAD campaign (hopefully by August 2012).
- Further improvements (2013). VMF1; Improved non-conservative force modelling; Improved planetary rad. pressure

Implementation of VMF1 in GEODYN

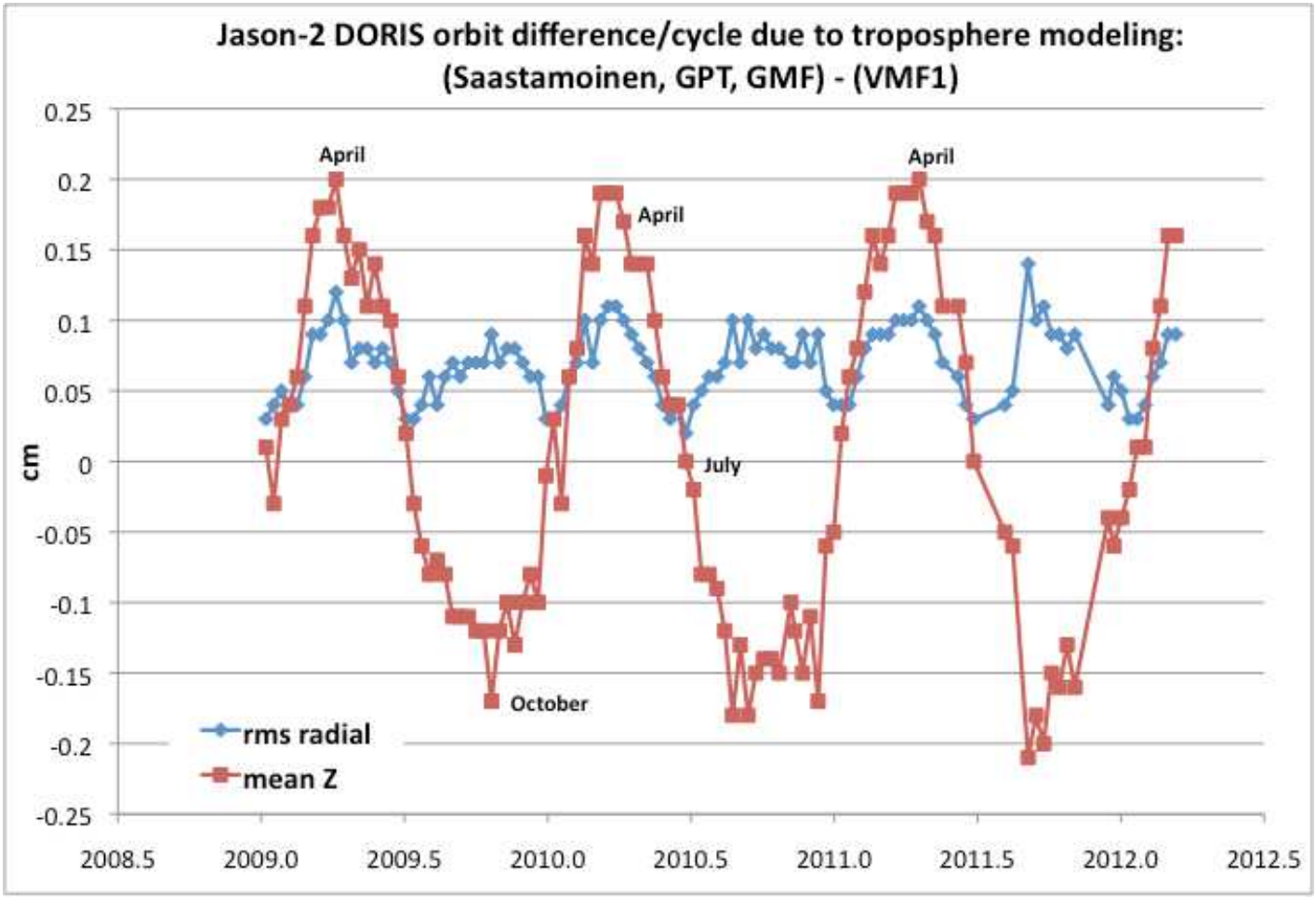
- Implementation underway to support GPS, VLBI & DORIS processing (all radiometric data types).
- Use 6-hrly grids; Retrieve hydrostatic & wet delays + mapping function; convert Zenith delays to station height according to Kouba (2009, JoG).
- Use of the grids gives more flexibility than using station-specific files.
- Preliminary testing on Jason2 (*results next slide*).
- Further validation will be done:

(1) Intercomparison of total zenith delays with independent GPS-troposphere product @ co-located sites.

(2) Assess impact on GEODYN processing of VLBI data; Are agreement with CALC/SOLVE of estimation of VLBI-related parameters improved?

(3) Compare grid-values of delays with point values at certain stations (e.g. VLBI observation times).

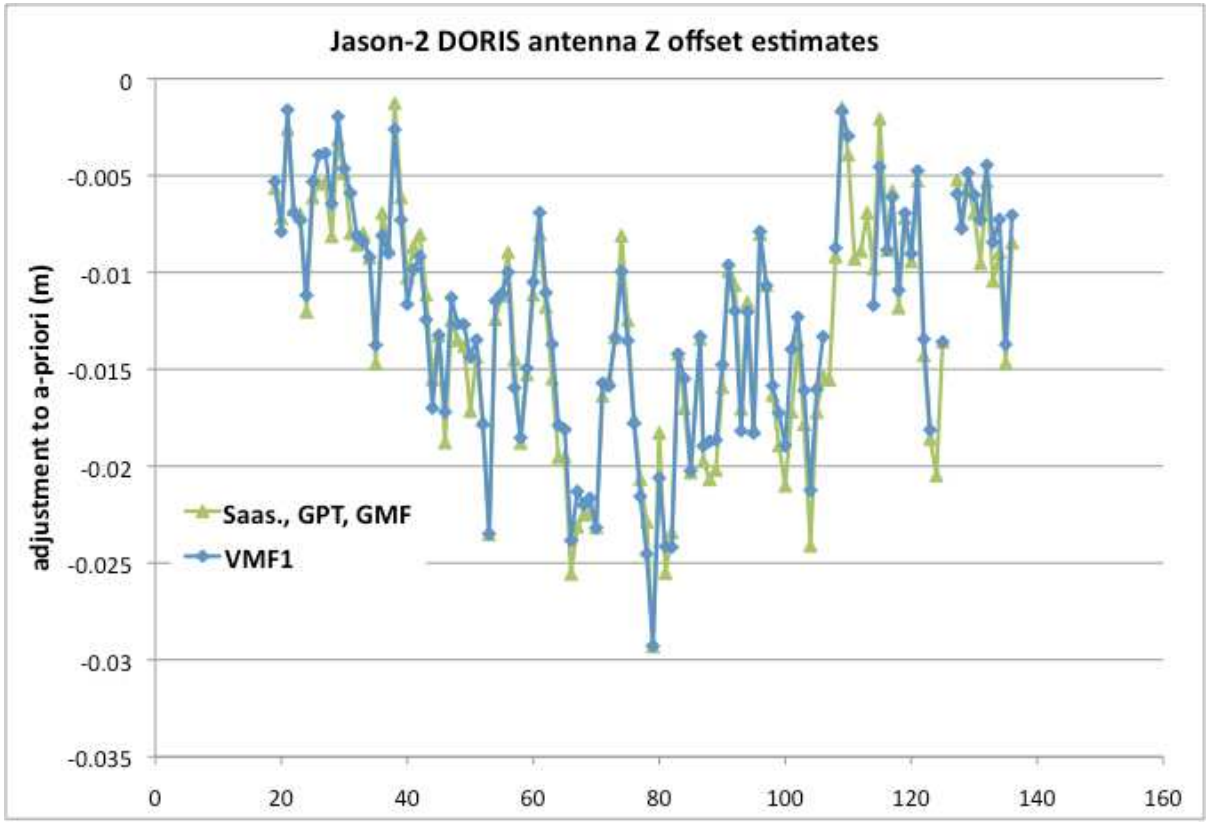
Impact on Jason-2 POD



- 1 mm RMS signal in radial orbit differences;
- Annual signal in Z orbit differences – peak-to-peak of up to 3-4 mm.

Impact on Jason-2

DORIS Z-Offset Correction



- Little difference between GMF/GPT & VMF1.
- There is another effect on Jason2 that requires explanation or it is a still-unknown artifact of our processing..

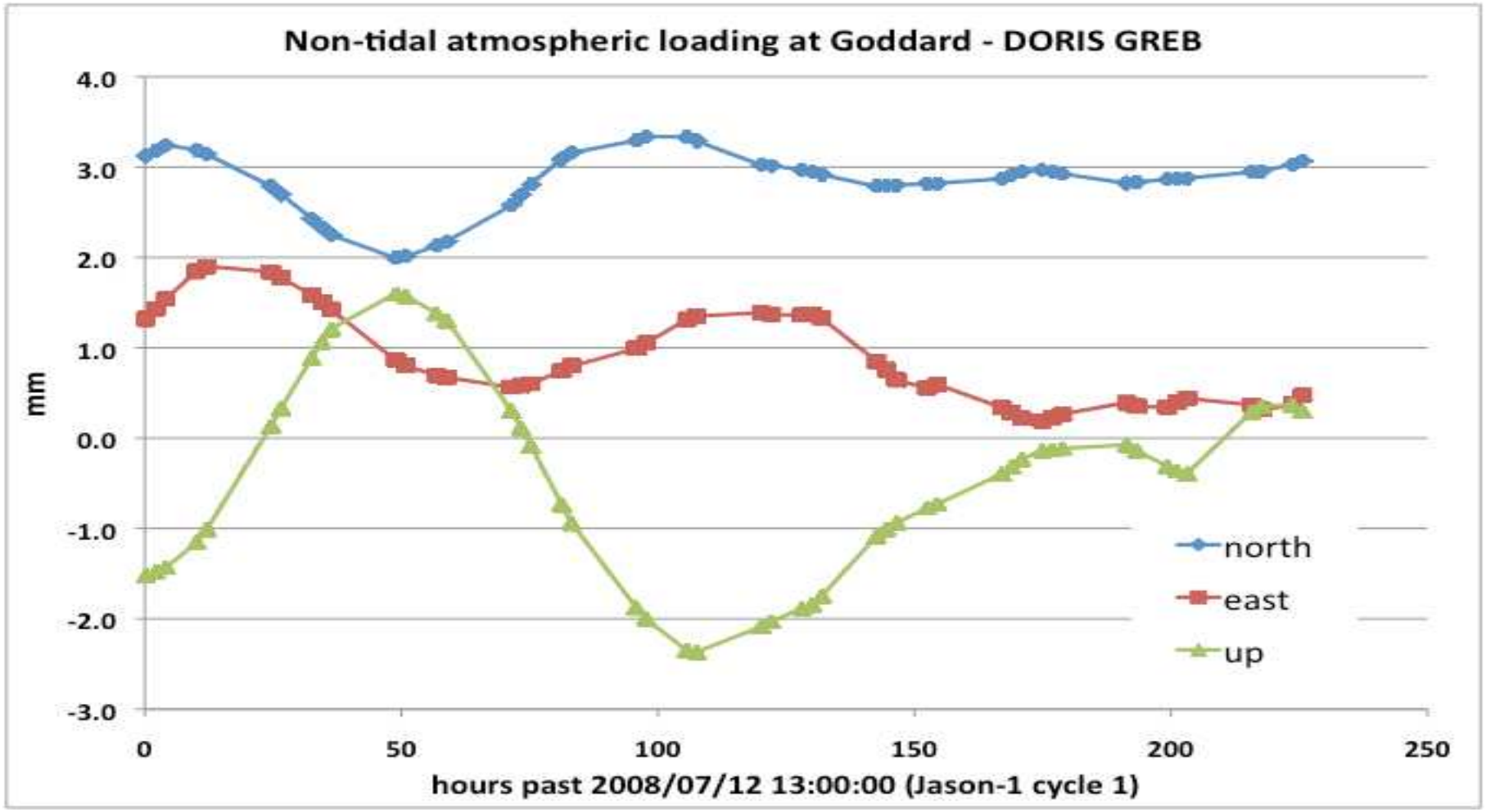
Evaluation of non-tidal atmospheric station loading on SLR/DORIS Jason-2 POD with GEODYN @ NASA GSFC. Apply Atmospheric Loading at the observation Level on Jason-2, for 57 cycles (~2008.5-2010) and evaluate orbit differences using SLR+DORIS data.

• "nominal" orbit strategy includes SLRF2008 / DPOD2008 stations, and the Eigen_gl04s gravity field (*std1007 parameterization*)

• "apload_nos1s2" non-tidal atmospheric station surface displacements from ECMWF 6-hour pressure data (*from Jean-Paul Boy, EOST/Strasbourg, 2012*).

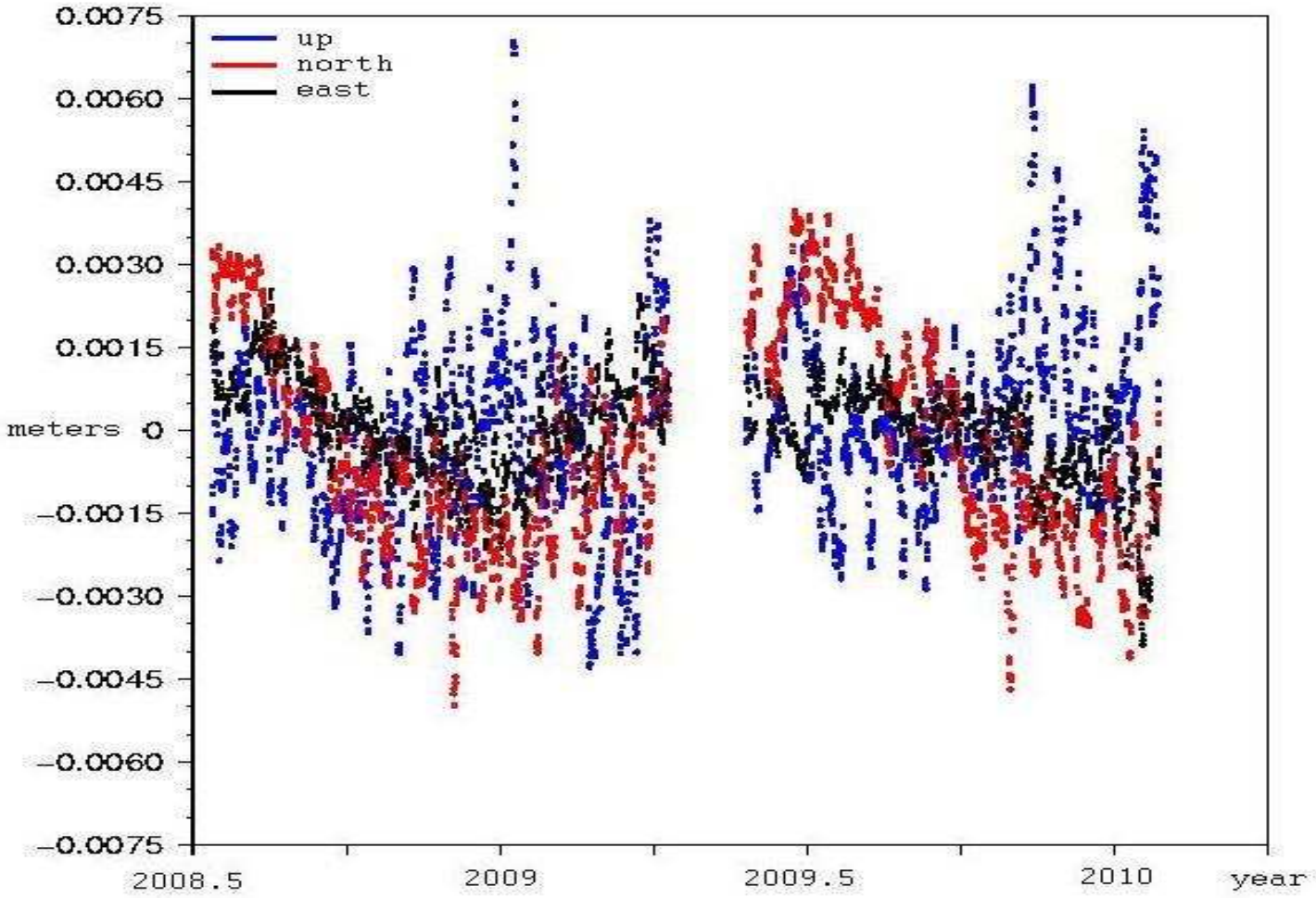
APLOAD Correction at Greenbelt (from ECMWF-6hr)

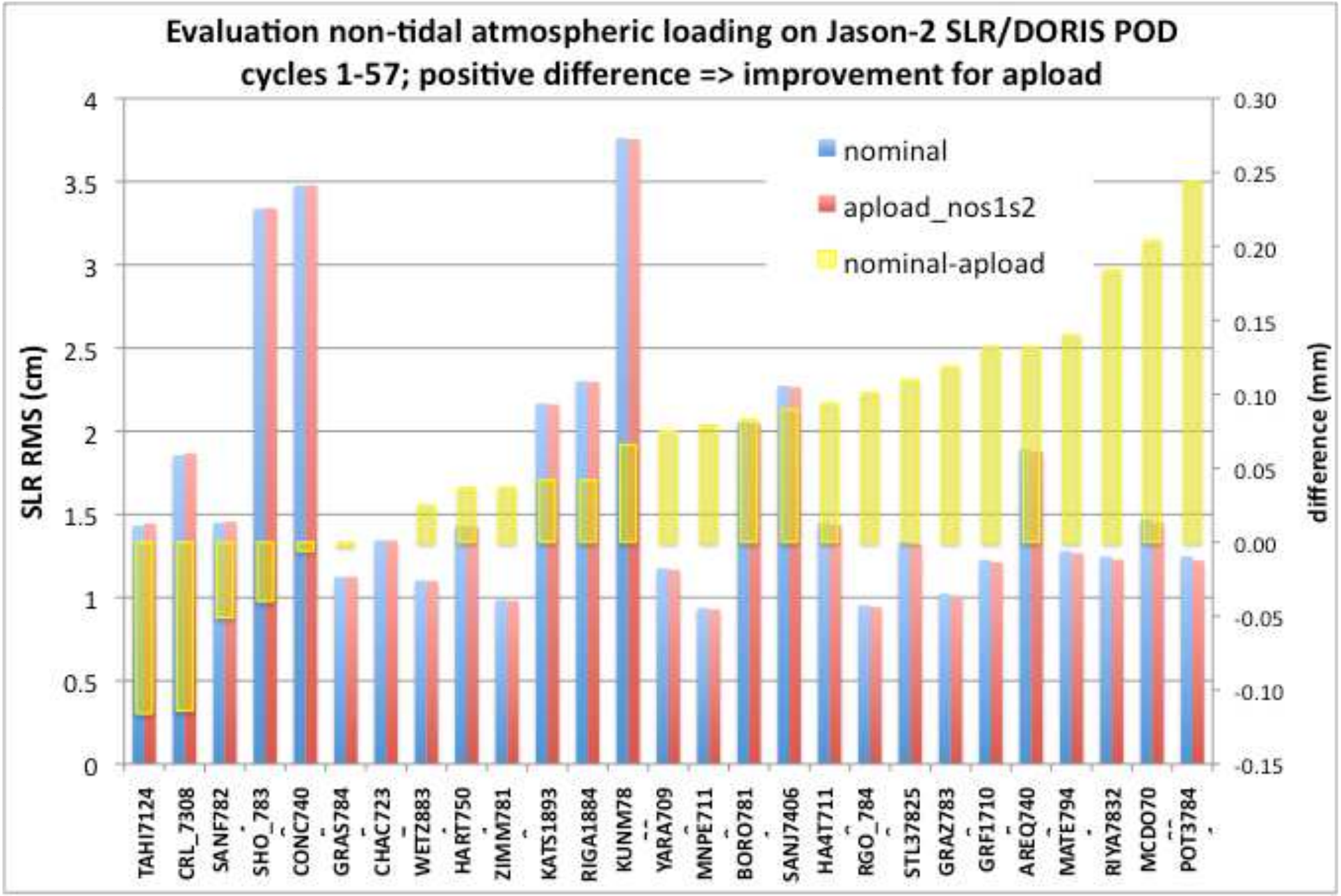
(for Jason2 Cycle 1, July 2008)



APLOAD Correction at Greenbelt

(from ECMWF-6hr) (for Jason2 Cycles 1-57)




Evaluation non-tidal atmospheric loading on Jason-2 SLR/DORIS POD
cycles 1-57; positive difference => improvement for apload
SLR RMS (cm)
difference (mm)
nominal
apload_nos1s2
nominal-apload
0
0.5
1
1.5
2
2.5
3
3.5
4
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
TAHI7124
CRL_7308
SANF782
SHO_783
CONC740
GRAS784
CHAC723
WETZ883
HART750
ZIMM781
KATS1893
RIGA1884
KUNM78
YARA709
MNPE711
BORO781
SANJ7406
HA4T711
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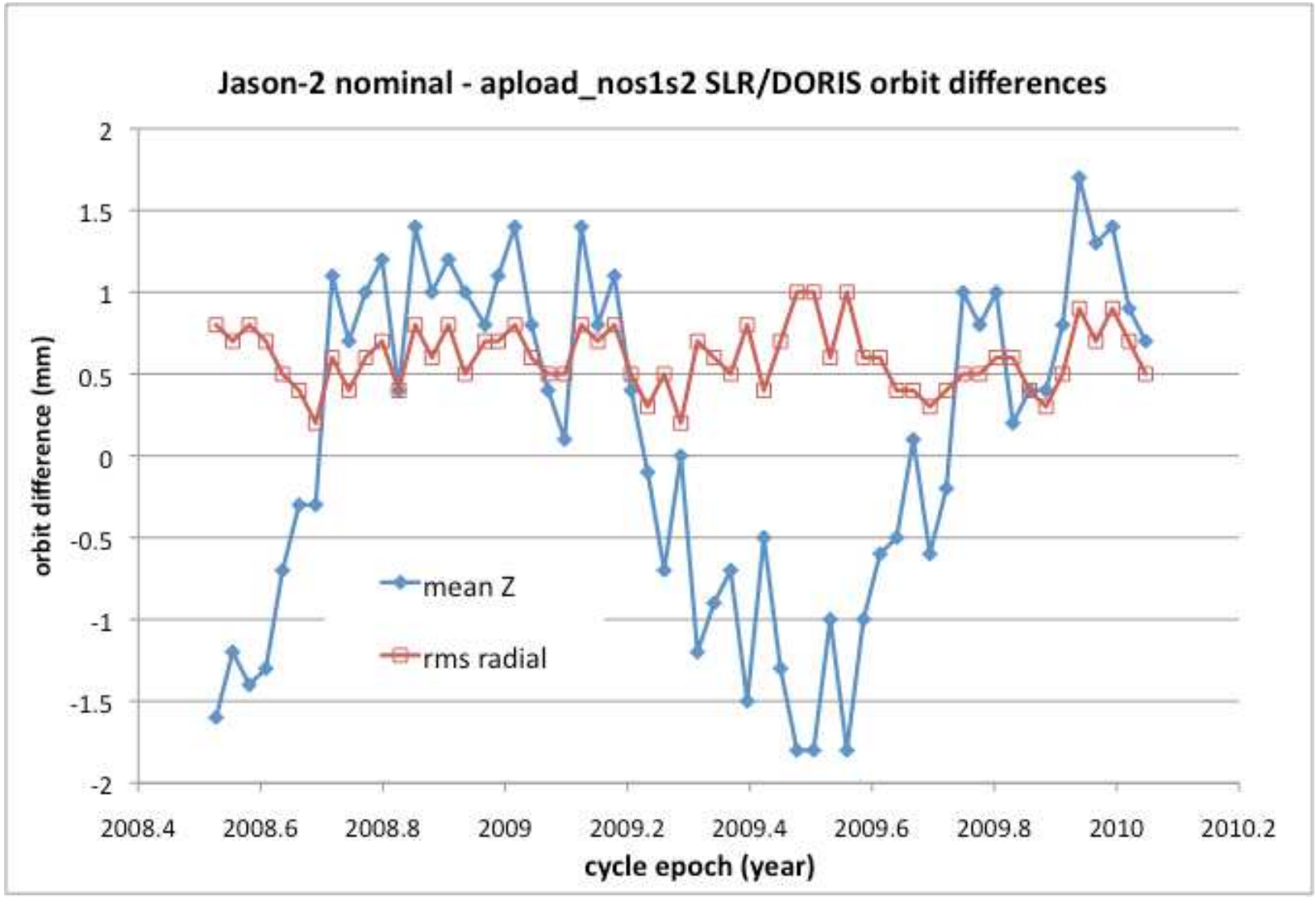
STL37825
GRAZ783
GRF1710
AREQ740
MATE794
RIYA7832
MCDO70
POT3784


Jason-2 nominal - apload_nos1s2 SLR/DORIS orbit differences
orbit difference (mm)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
mean Z
rms radial
2008.4
2008.6
2008.8
2009
2009.2
2009.4
2009.6
2009.8
2010
2010.2
cycle epoch (year)

Other GEODYN Improvements Underway

VLBI

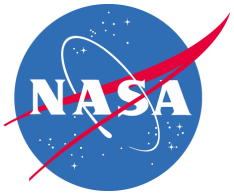
- Addition of ability to estimate nutations into GEODYN.
- Continue inter-calibration of CALC/Solve & GEODYN.

GPS

- Add capability to fix ambiguities.
- Edit half-cycle slips (Jason2)
- Improve radiation pressure modelling (probably implement macromodel, rather than GPSM04).
- Jan Kouba (2009) attitude model is implemented.

DORIS & SLR

- Improved radiation pressure modelling. Self-shadowing for altimetric & DORIS satellites.
- Improved planetary radiation pressure models.



Thank you for your attention.