GSC Analysis Center Update

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IDS AWG Meeting

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Status of Modelling in preparation for ITRF2020 re-processing (1)

1	**Update to GEODYN version 1810 that includes many different updates**: (for details see next slide).	✓
2	Adopt new offset for HY-2A	Tested gscwd32
3	Adopt new background gravity model (GOCO05s) and 3-hr de-aliasing models for atmosphere & oceans from GFZ (Includes new modeling of air tides) (*same models as for RL06 processing of GRACE Follow*-On)	✓
4	Adopt updated troposphere refraction model & corrections (e.g. VMF1) and more recent ocean tide model (e.g. GOT4p10c), for dynamical model and for ocean loading.	✓
5	Adopt & Implement IERS2014 Linear mean pole.	✓
6	Adopt new (2017) Alcatel phase law for DORIS antennae.	✓
7	Reprocess all DORIS Data for current satellites with new background models and new GEODYN version 1810, removing all previously-generated deletes.	In progress.
8	Test new USO models for Jason-2 & Jason-3 based on Results from T2L2.	In progress. (A. Belli & NPZ)
9	Further improve non-conservative force modeling for DORIS satellites	In progress.
10	Adopt new IERS model for diurnal/sub-diurnal tidally-driven variations in Earth rotation.	TBD after EGU2019
11	Switch to RINEX processing for all RINEX-compatible DORIS satellites (other than J2 & J3).	TBD
12	Add new satellites (Sentinel-3A, 3B).	TBD

Status of Modelling in preparation for ITRF2020 re-processing (2)

Upgrade of GEODYN to new version (1810).

- The new version has many changes. Its objective was to remove "difficult-to-follow" parts of the code, implement processing improvements for GNSS, make subtle changes to the background tidal modeling (Earth & Ocean tides), implement the IERS2014 linear mean pole in GEODYN, as well as other satellite-specific changes.

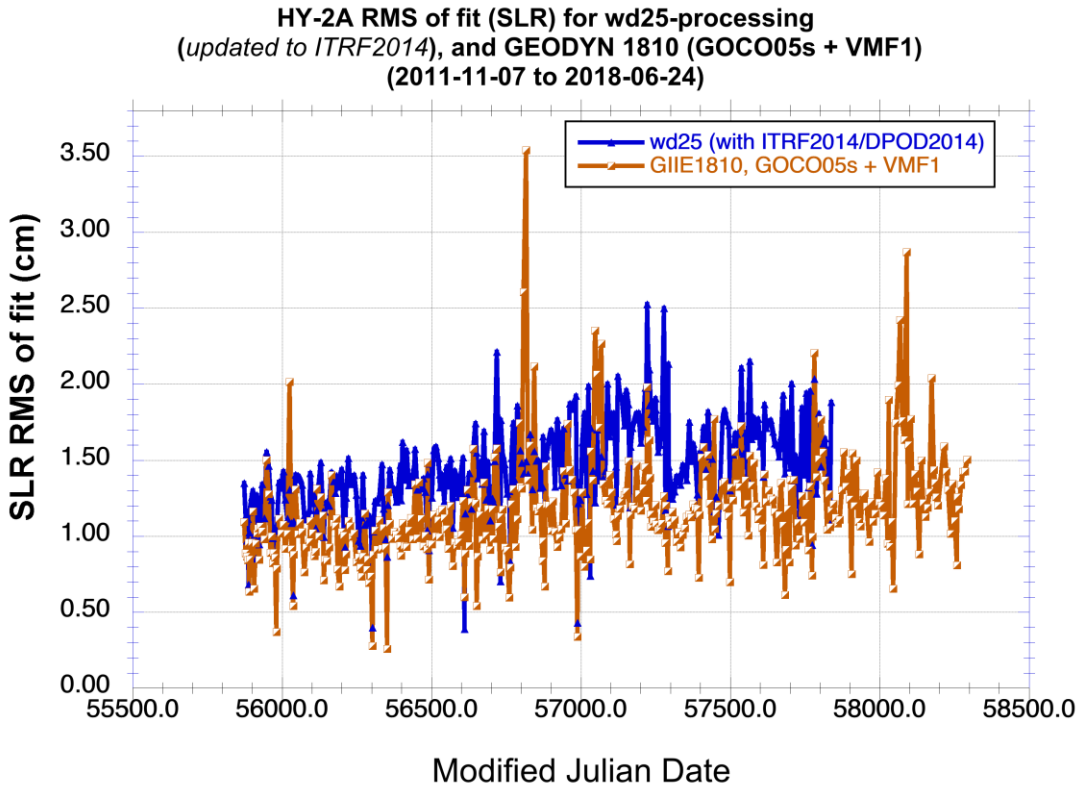
- **The new GEODYN version 1810 completely reconfigures how we process DORIS data in GEODYN.**

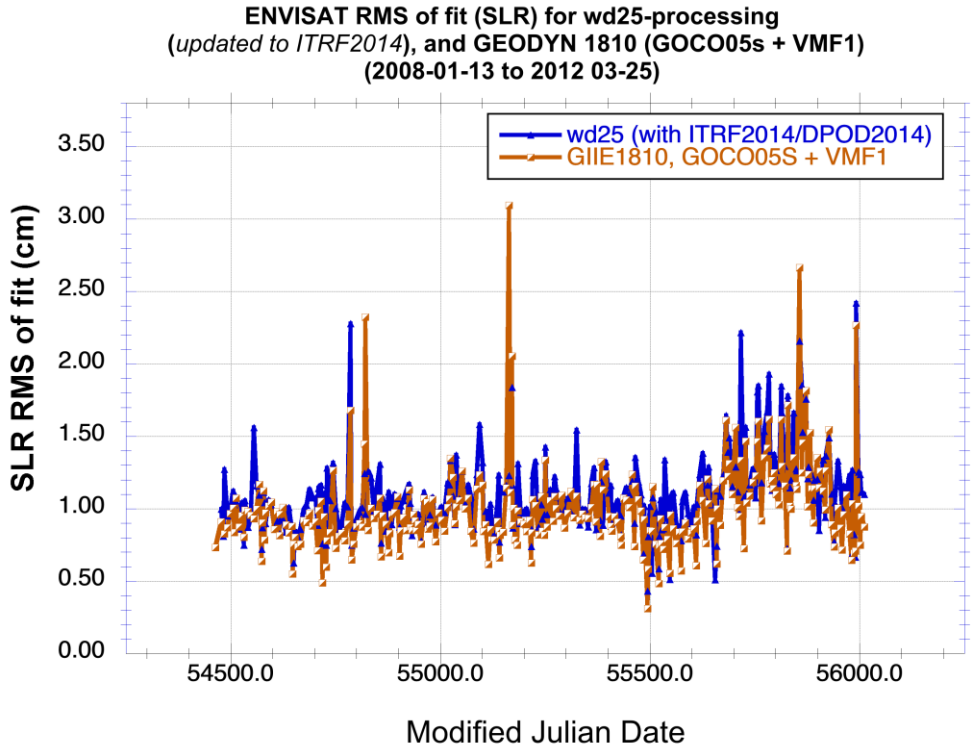
- The specification of biases is now explicit, rather than "implicit". In the previous "implicit" processing it was possible that data at the start & end of passes were deleted because the implicit definition of the time span of the biases did not always include all the data. In addition, badly determined troposphere and range-rate parameters (*e.g. < 5 observations*) were included when they should have been deleted.

This would have been invisible to us in most instances, but probably means that a small percentage of data was systematically deleted for every satellite, or conversely in the second case, data were included that weakened the satellite solution.

This means with the new GEODYN version, we must modify all our setups, remove all the deletes accumulated from previous runs, and completely reprocess the data, re-converge the orbits, and regenerate all the deletes.

Tests of GOCO05s: HY-2A, ENVISAT





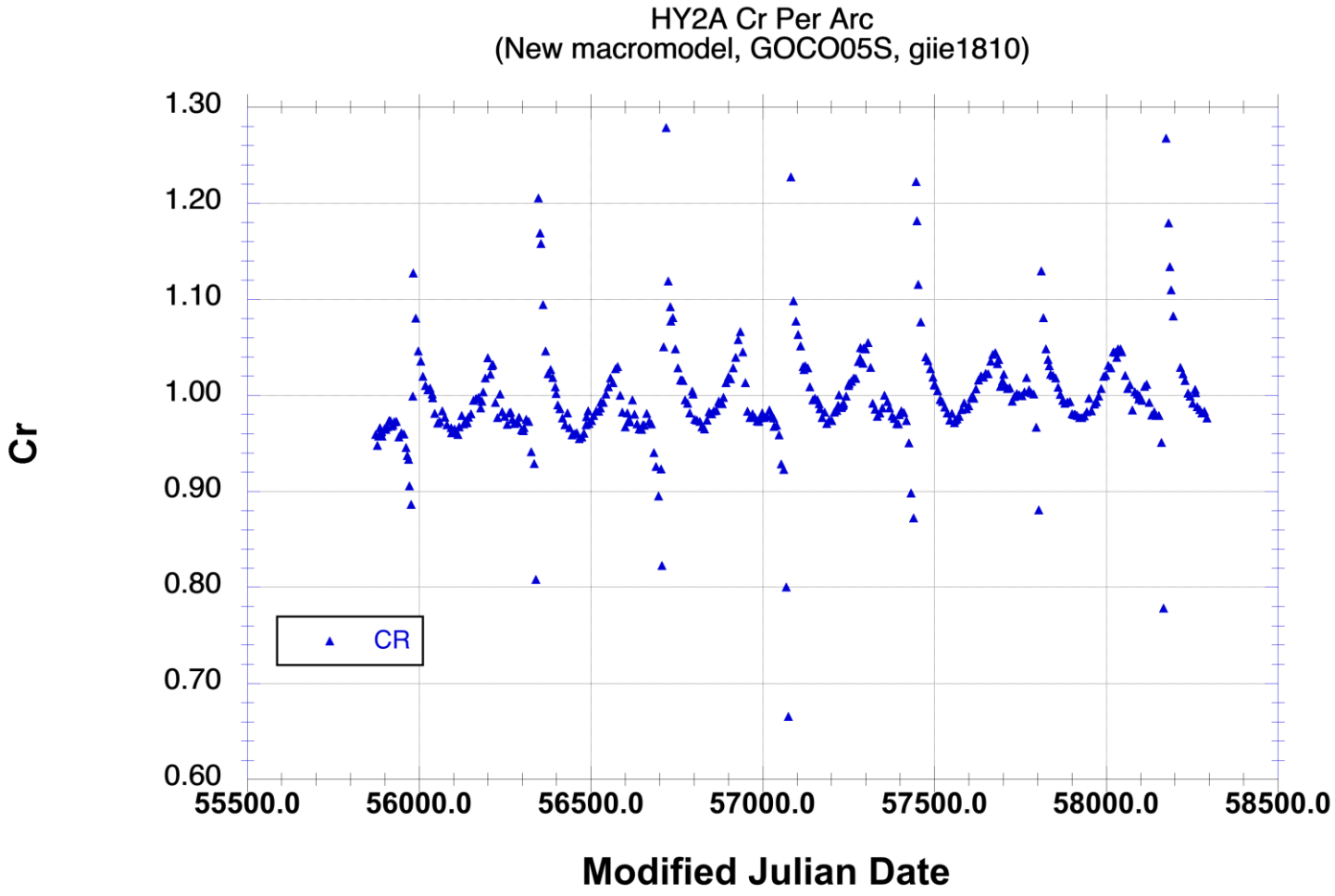
HY-2A Avg. SLR RMS of fit:

- **wd25, (w.** *ITRF2014/DPOD2014, to 170326, n=329*) **= 1.431 cm**
- **GIIE1810, GOCO05s, VMF1, New Macromodel, Adj Cr/Arc: (to 180624, n=401) = 1.161 cm**

ENVISAT Avg. SLR RMS of fit:

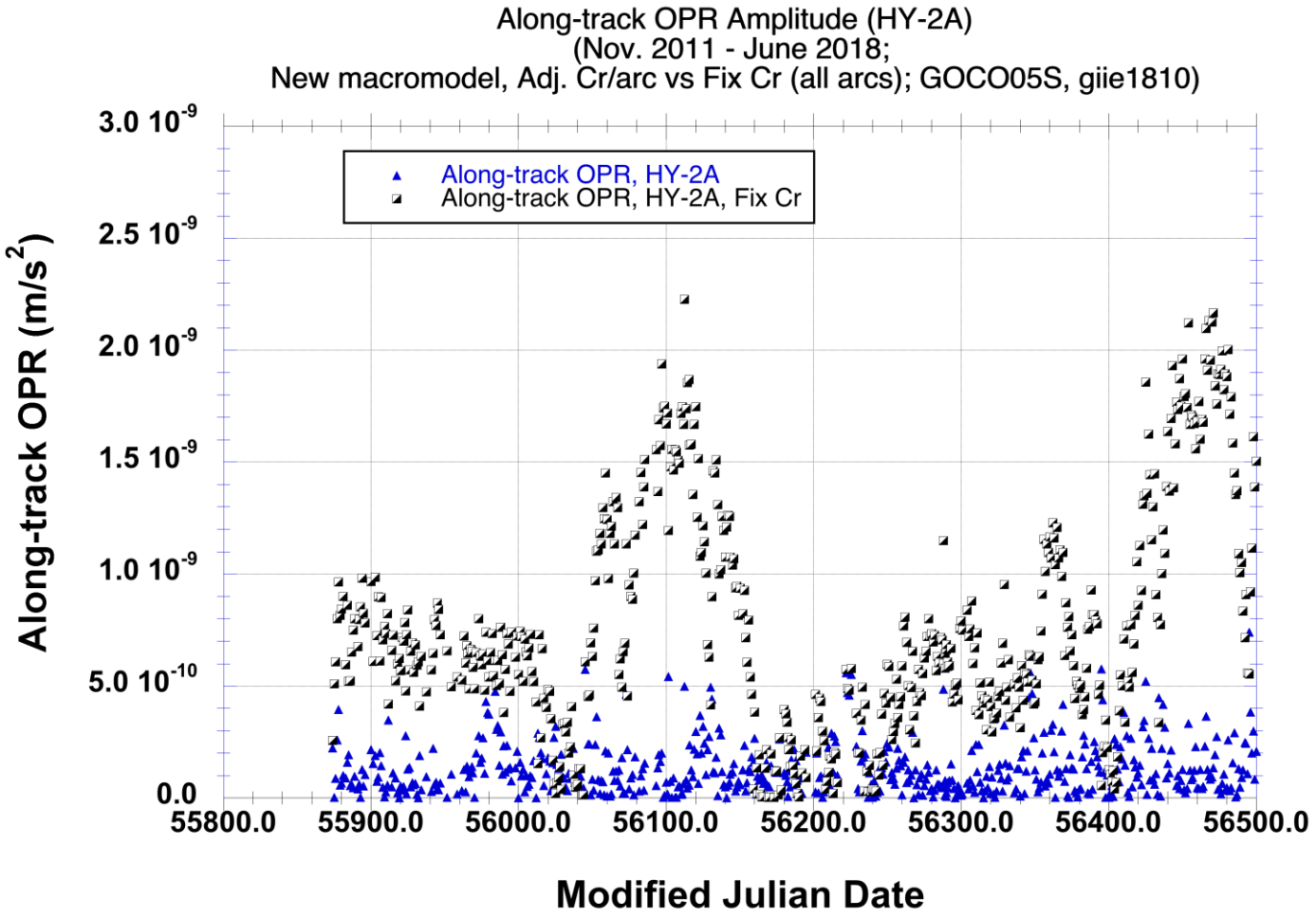
- **wd25, (***updated with ITRF2014/DPOD2014*) **= 1.093 cm**
- **GIIE1810, GOCO05s + VMF1 = 0.997 cm**

Example of Macromodel Improvement, HY-2A (1)



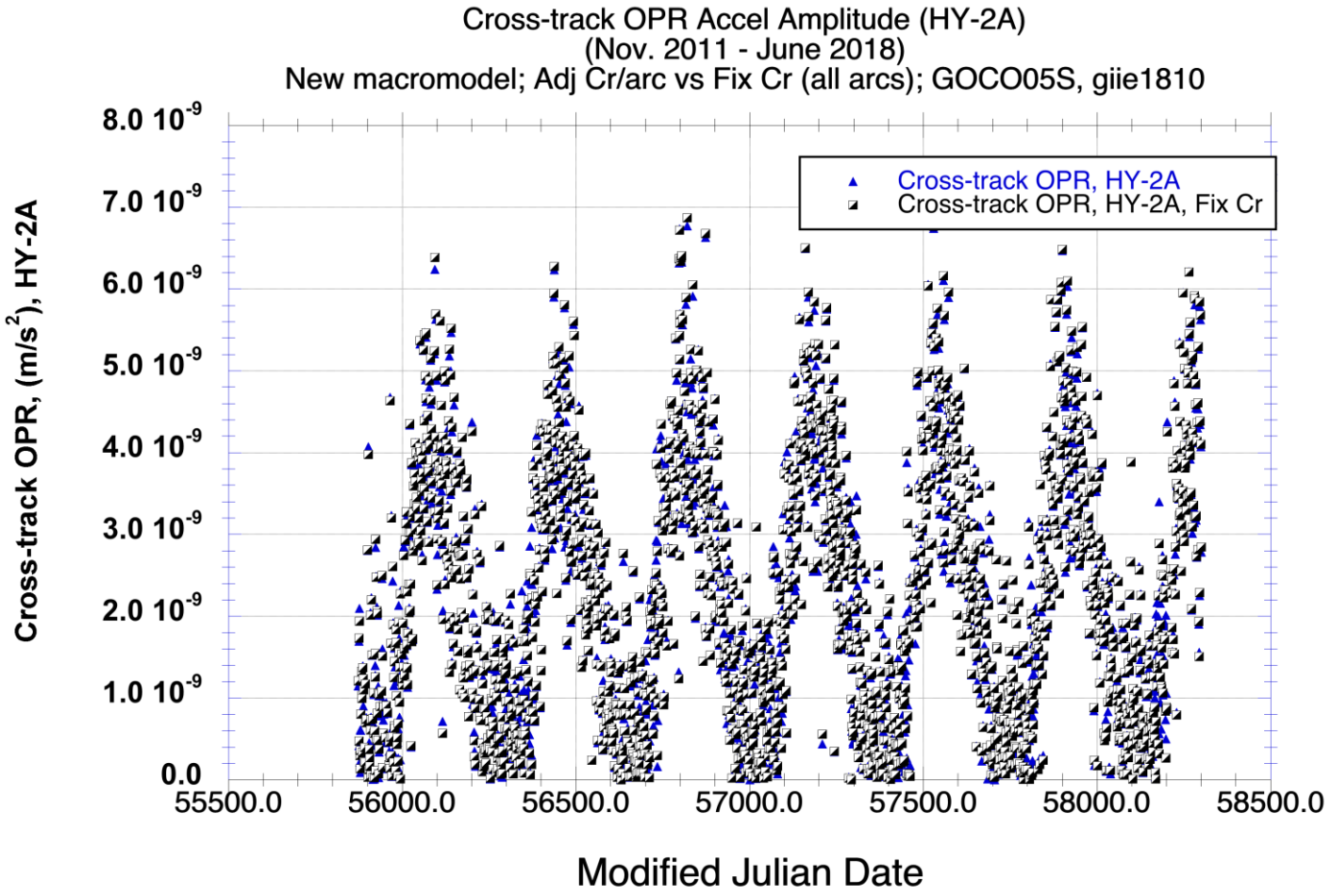
Cr shows periodic (*annual & semi-annual changes*). These are computed with respect to new macro-model, and IDS-defined attitude law.

Example of Macromodel Improvement, HY-2A (2)



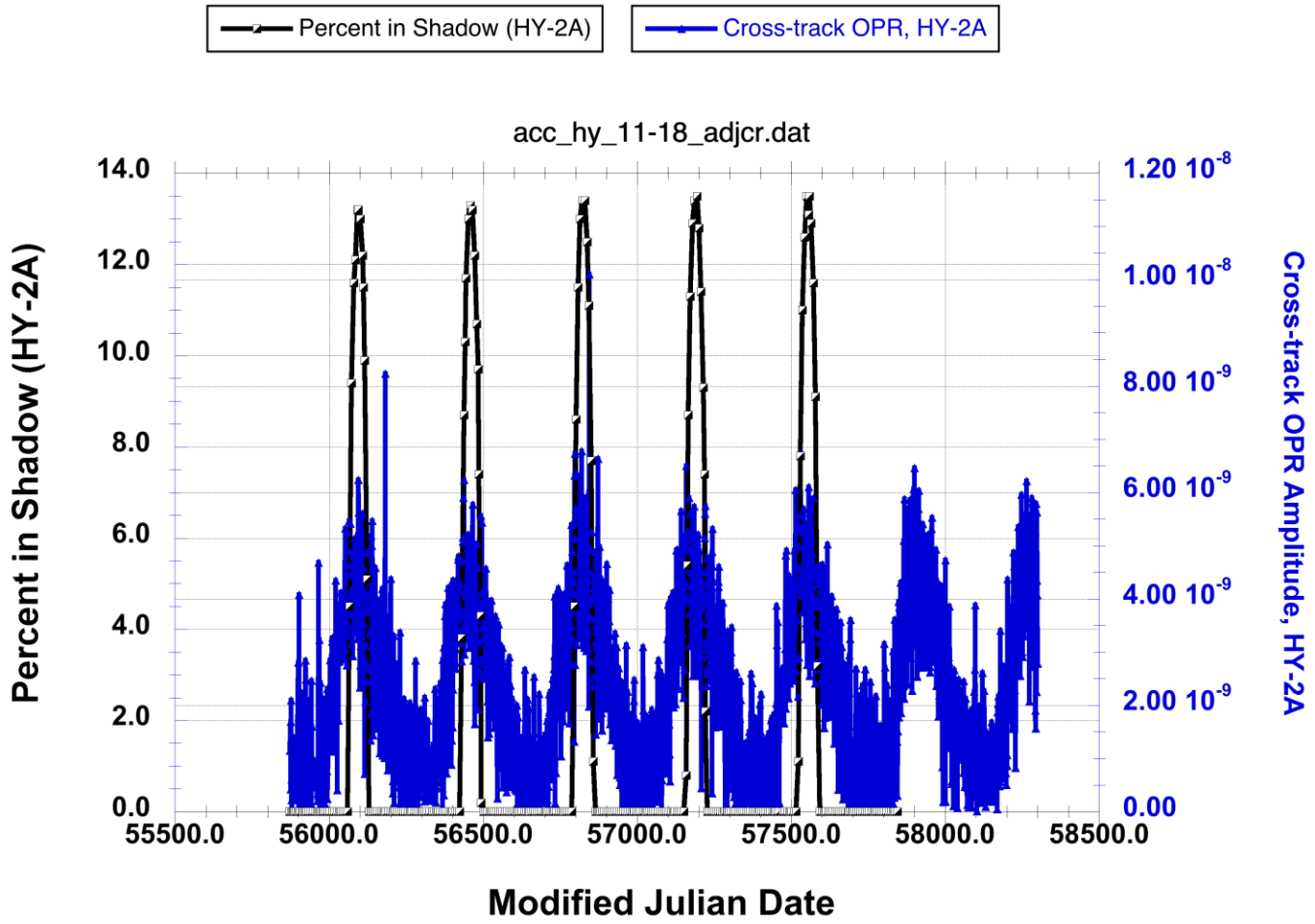
Along-track OPR Amplitude is dramatically reduced (as we now do on TOPEX & the Jason satellites) when Cr is adjusted per arc.

Example of Macromodel Improvement, HY-2A (3)



In contrast, the cross-track OPR amplitude is unchanged with this attempt at micromodel tuning. These empirical accelerations are still quite large!

Example of Macromodel Improvement, HY-2A (4)



HY-2A is in a full-Sun orbit for most of the year, but goes through an eclipse period from May-July each year. The max eclipse duration is about 13 percent of the orbit.

The macromodel does not accommodate the s/c thermal emission (especially form the solar array) which must have a strong annual dependence.

Summary

- The GSC Analysis Center is making progress on the ITRF2020 reprocessing preparations.

- In addition to the work items on slide (2) we plan to adjust a background low-degree gravity model from SLR & DORIS data to different satellites (1993-2018), using ITRF2014/DPOD2014/SLRF2014, GOCO05s and the new linear mean pole. A preliminary solution will be available by the time of the IUGG.

- Other changes in the processing can be implemented as long as they do not have a big impact on the modeling or require lots of changes to the GEODYN processing (e.g. improved interpolation for the quaternions in GEODYN or a better background model for planetary radiation pressure), since we are severely bandwidth limited.