Macromodel assessment for Cryosat-2

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Cryosat-2 OPR Empirical Acceleration Amplitudes

3 LCA series of acceleration parameters for Cryosat-2:

#0: provided to Frank for comparison
→ previous processing (before Septembre 2011)

#1: improved attitude model (6 deg nose-down)
→ reprocessing + current processing

#2: with 7-plate macromodel (instead of 6-plate model)
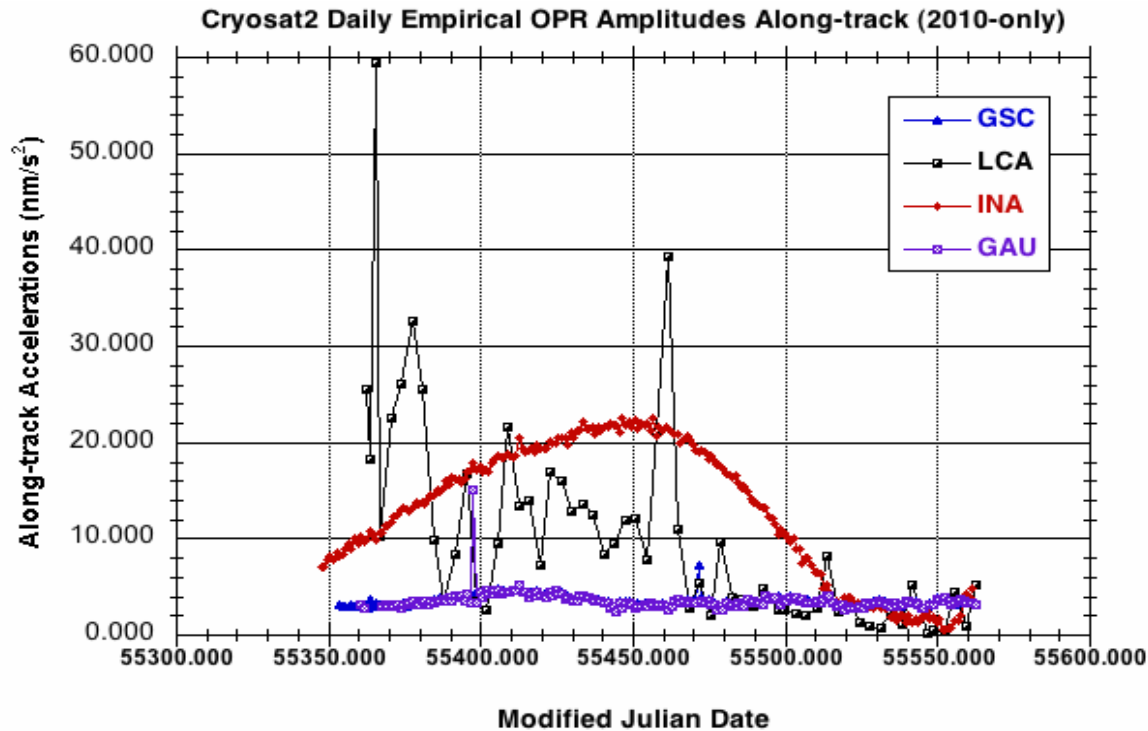→tests shown in this presentation

Cryosat-2 OPR Empirical Acceleration Amplitudes

Along-track and cross-track OPR amplitude

Refering to Frank Lemoine & Doug Chinn's presentation in Prague (AWG, 2012), where they tabulated the Cryosat-2 OPR amplitudes:
- LCA was at 9 nm/s**2 in a median sense for 2010
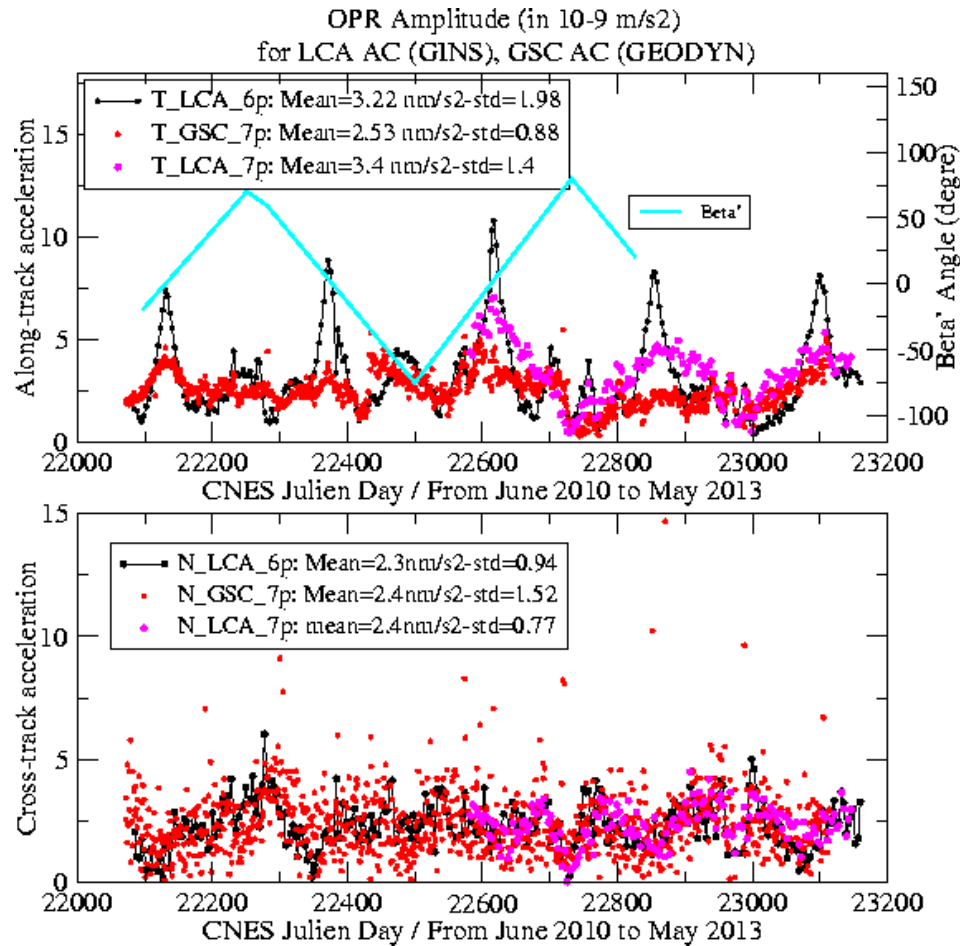- GSC (and CNES POD) were at 2-4 nm/s**2.

Cryosat2 Daily Empirical OPR Amplitudes Along-track (2010-only)

Cryosat2 OPR Empirical Acceleration Amplitudes

Along-track and cross-track OPR amplitude

LCA series #1 & #2

LCA made some corrections in the implementation of attitude law and in the macromodel in GINS

OPR Amplitude (in 10-9 m/s2)
for LCA AC (GINS), GSC AC (GEODYN)

Strategy:
-For LCA: opr/3.5day, macromodel: 6-plates ESA and 7-plates CNES, attitude: nominal law
-For GSC: opr/day, macromodel: 7-plates CNES, attitude: quaternions

Results:
-Beta' (480 days) signature in the OPR along-rack amplitude for LCA with 6-plates macromodel:
one peak every 240 days when Beta' is close to zero **but** the amplitudes in a median sense are at the same level as those of GSC [2-4] nm/s**2

When LCA uses the 7-plates CNES macromodel the along-track peaks are significantly reduced and the mean value is around 3.4 nm/s**2 (from November 2011 to May 2013)

DORIS/SLR RMS for LCA with 6-plates ESA macromodel from June 2010 to May 2013 and with 7-plates CNES macromodel from Nov. 2011 to May 2013

DORIS/SLR RMS Cryosat2
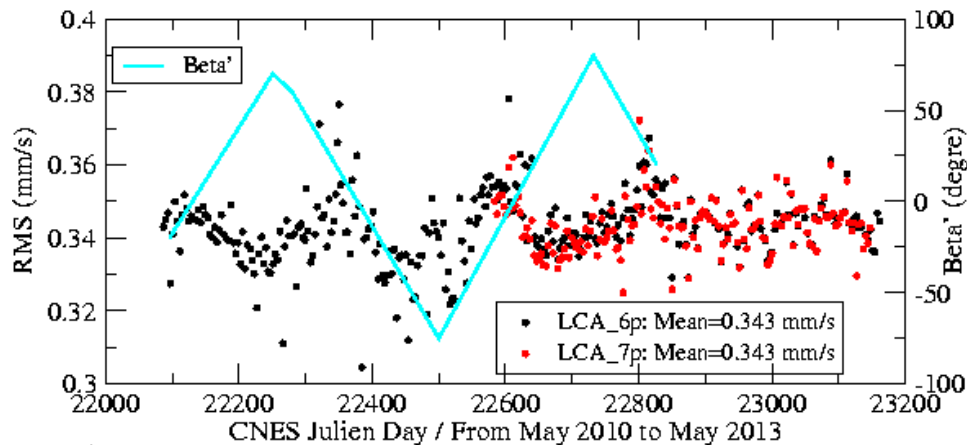
There is also a Beta' (480 days) signature in RMS DORIS:
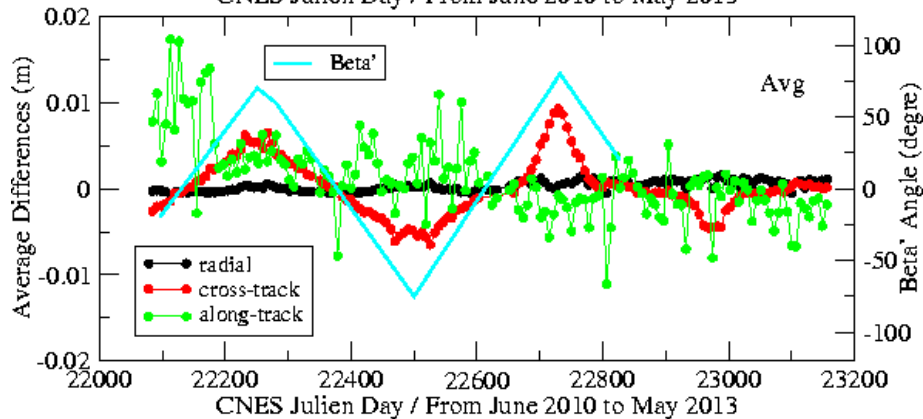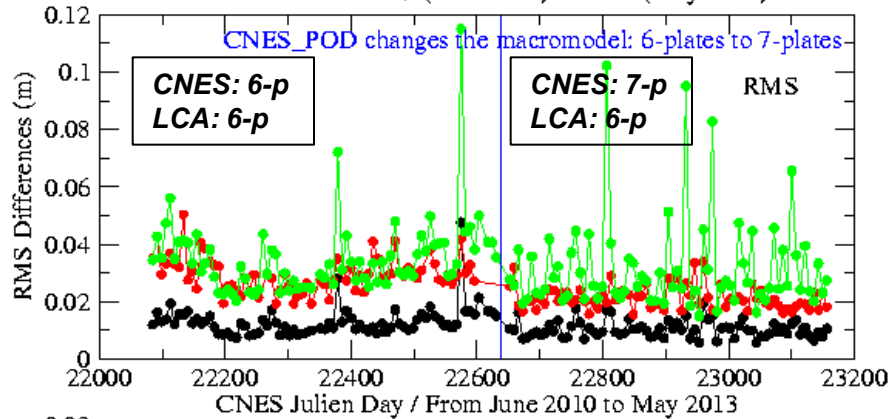the RMS are higher when Beta' is close to zero every 240 days
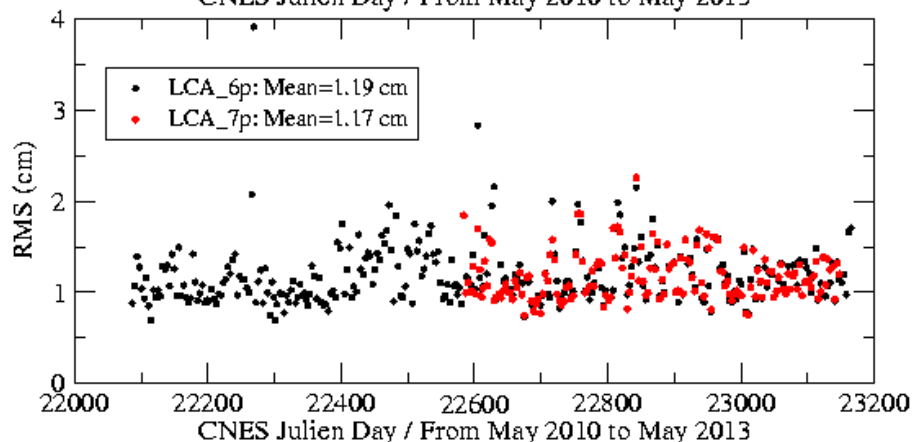
For the two macromodels, the SLR RMS reach the right level [1-2] cm

Orbit Comparison LCA POD vs CNES POD

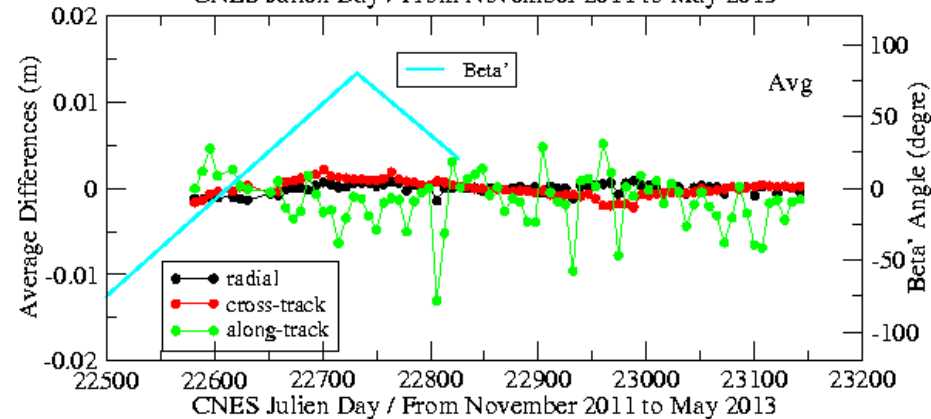## AVERAGE/RMS differences

with the 6-plates ESA macromodel   with the 7-plates CNES macromodel

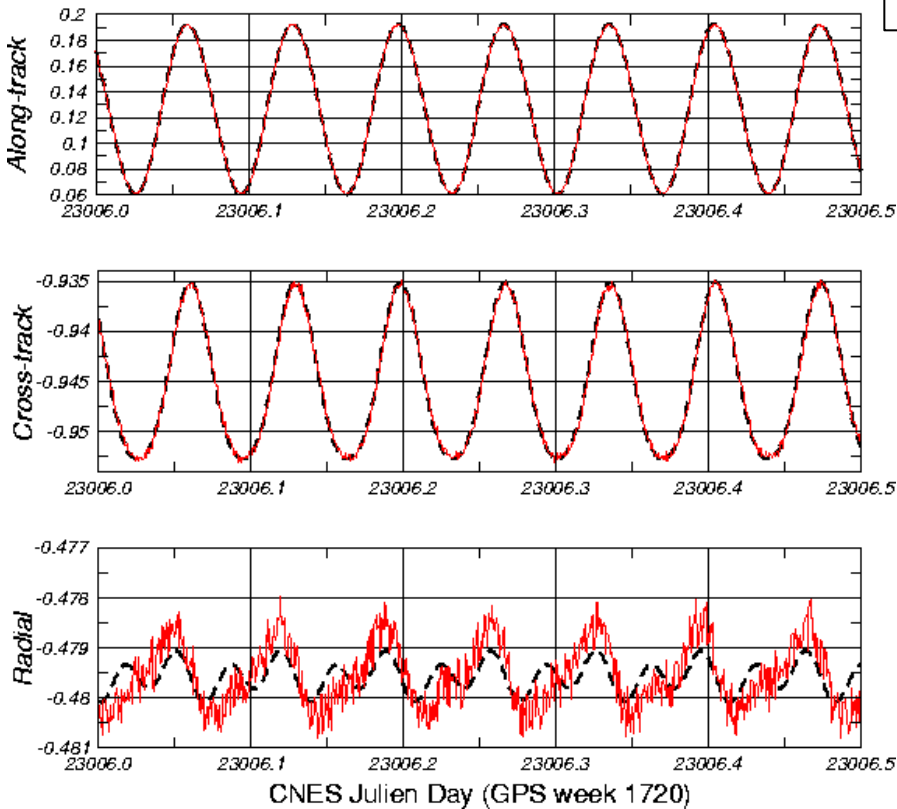**LCA POD is more consistent with CNES POD when using the 7-plates CNES macromodel**

Attitude comparison between LCA and CNES

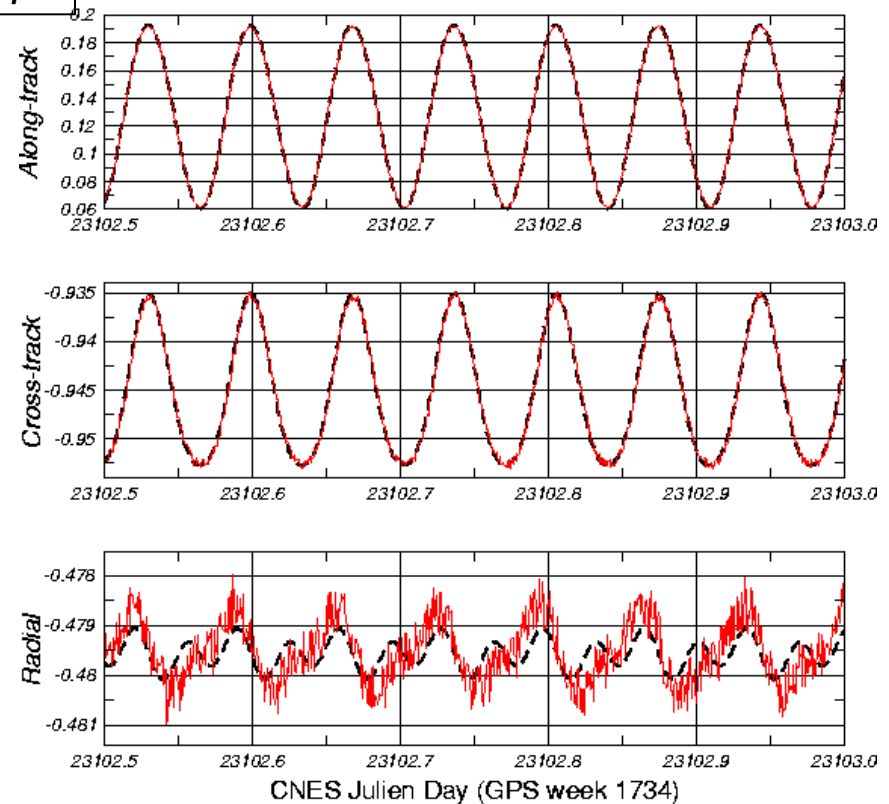## Orbit CoG and SLR CoP differences for LCA and CNES POD
GPS week 1720 (OPR along-track GINS is high) and 1734 (OPR along-track GINS is low)

CNES: 7-p
LCA: 6-p

The attitude in GINS and ZOOM are very close
Same results when we use the 7 plates CNES macromodel in GINS software

Conclusion

-The 7-plates CNES macromodel reduces the peaks correlated to the Beta' angle of the OPR along-track amplitude

-The OPR amplitudes along-track and cross-track in a median sense are at the same level as these of GSC (<4 nm/s**2)

-The attitude in GINS and ZOOM are very close and the RMS SLR reach the right level [1-2] cm
→The attitude law is implemented correctly

Perspectives

-Test the quaternions
(minor adjustments in the software are necessary to take into account quaternions for cryosat-2)