IDS WORKSHOP 2012

A review of some systematic errors observed in the Precision Orbit Determination of recent DORIS satellites

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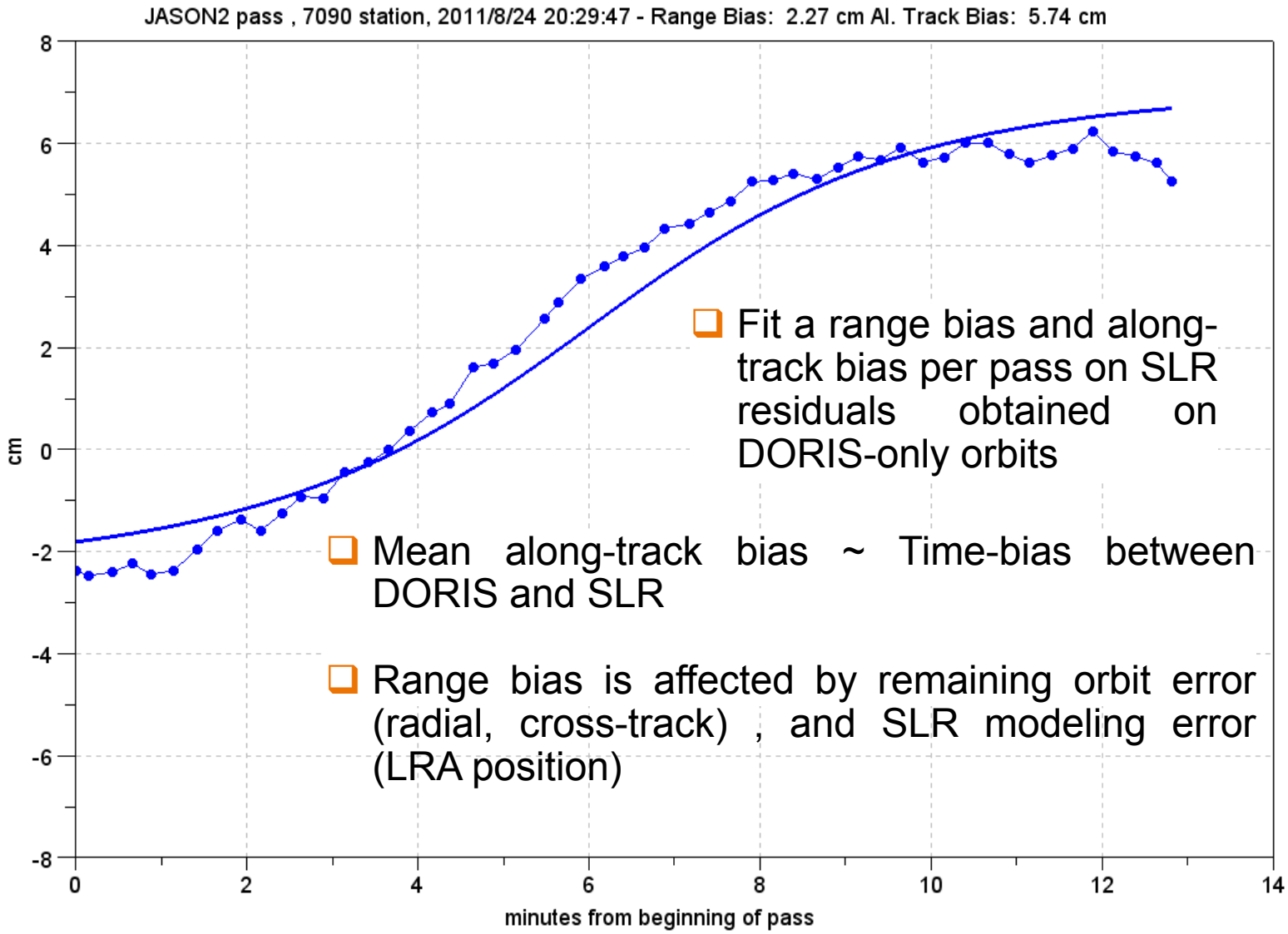
Introduction

- Systematic errors (along-track bias, macromodels signatures, network signatures) that might be of interest for the IDS analysts
  - Provide updated figures with the latest standards (GDR-D) and satellites (HY2A)

- DORIS ORBITS :
  - Laser statistics
  - Jason2 / HY2A GPS to DORIS comparison
  - Updated Empiricals and Macromodels

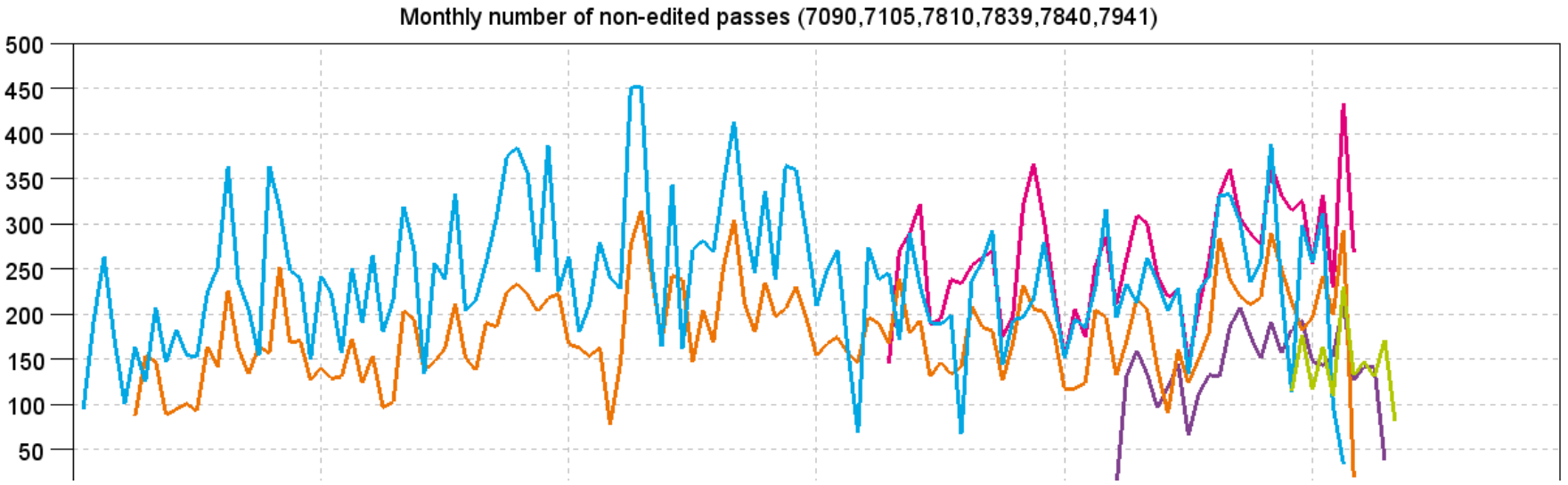
- DORIS NETWORK
  - Annual Signatures on specific beacons
  - Phase maps ?

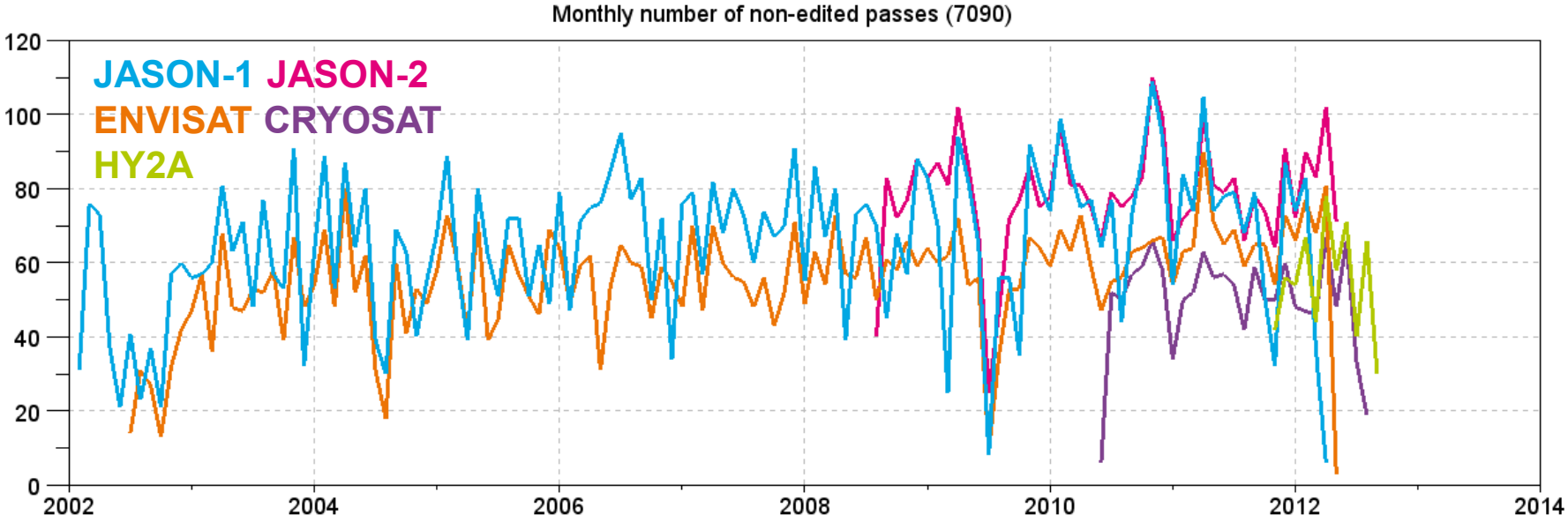
SLR statistics on DORIS-only orbits



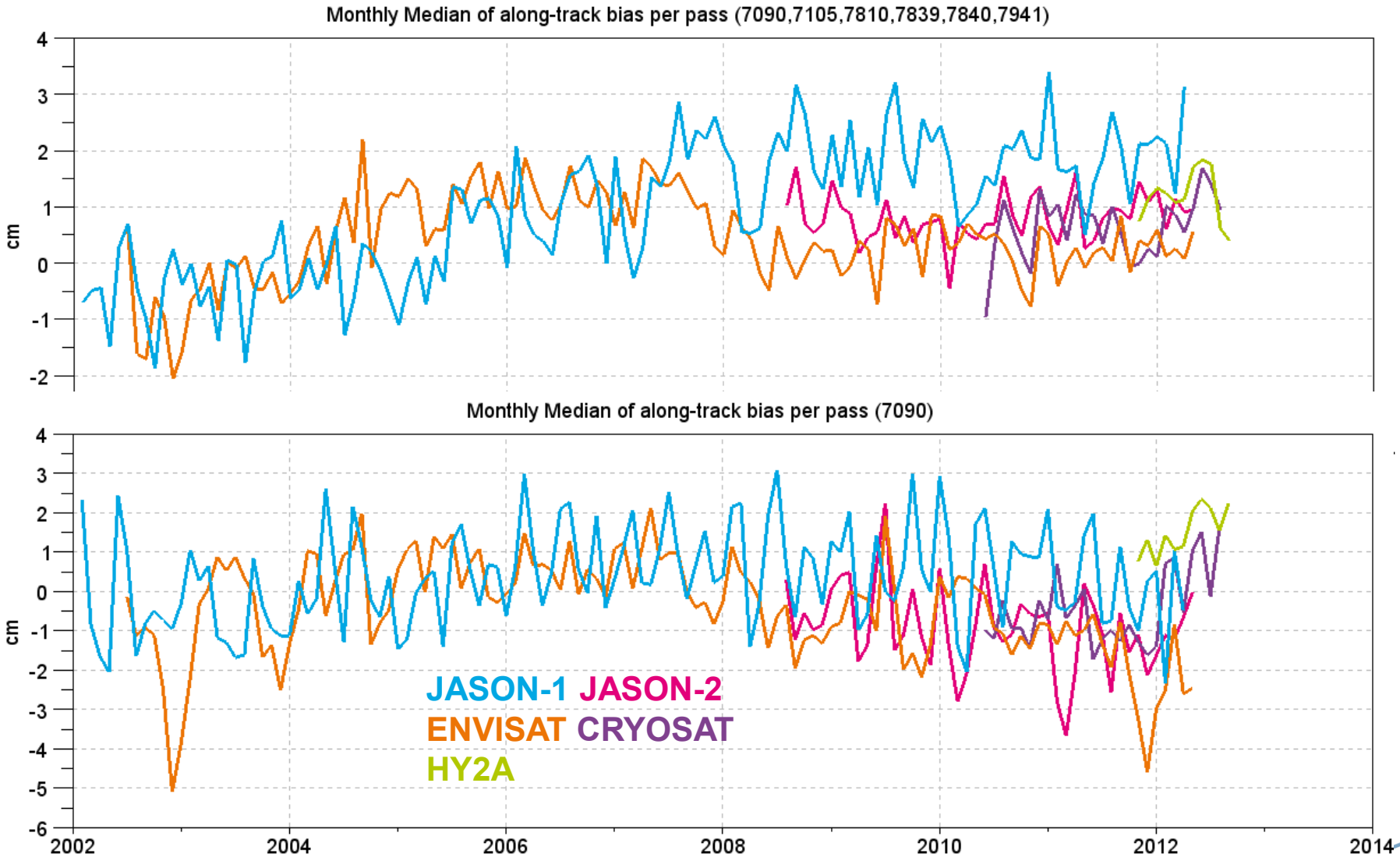
- Fit a range bias and along-track bias per pass on SLR residuals obtained on DORIS-only orbits
- Mean along-track bias ~ Time-bias between DORIS and SLR
- Range bias is affected by remaining orbit error (radial, cross-track) , and SLR modeling error (LRA position)

Number of passes

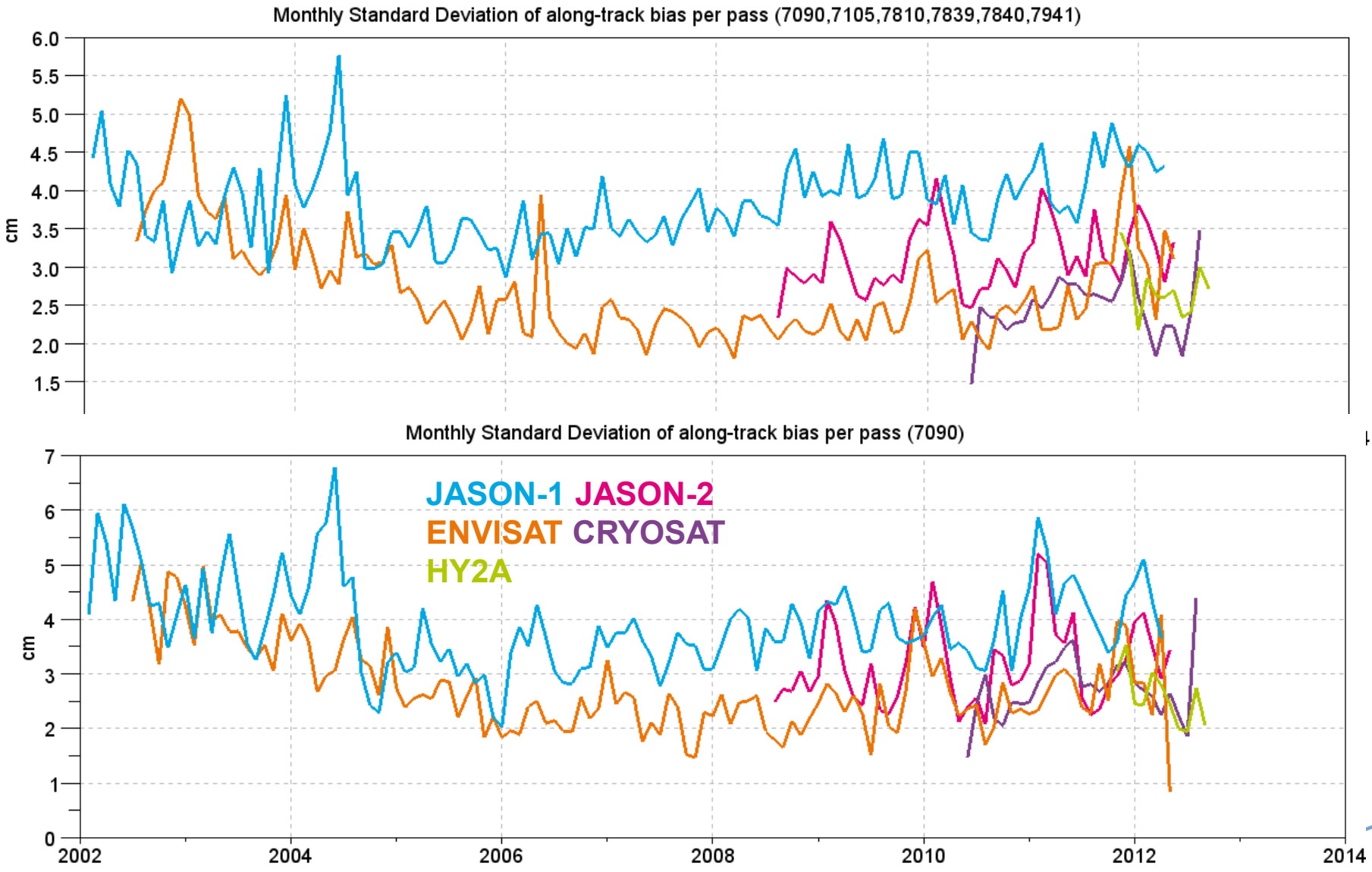




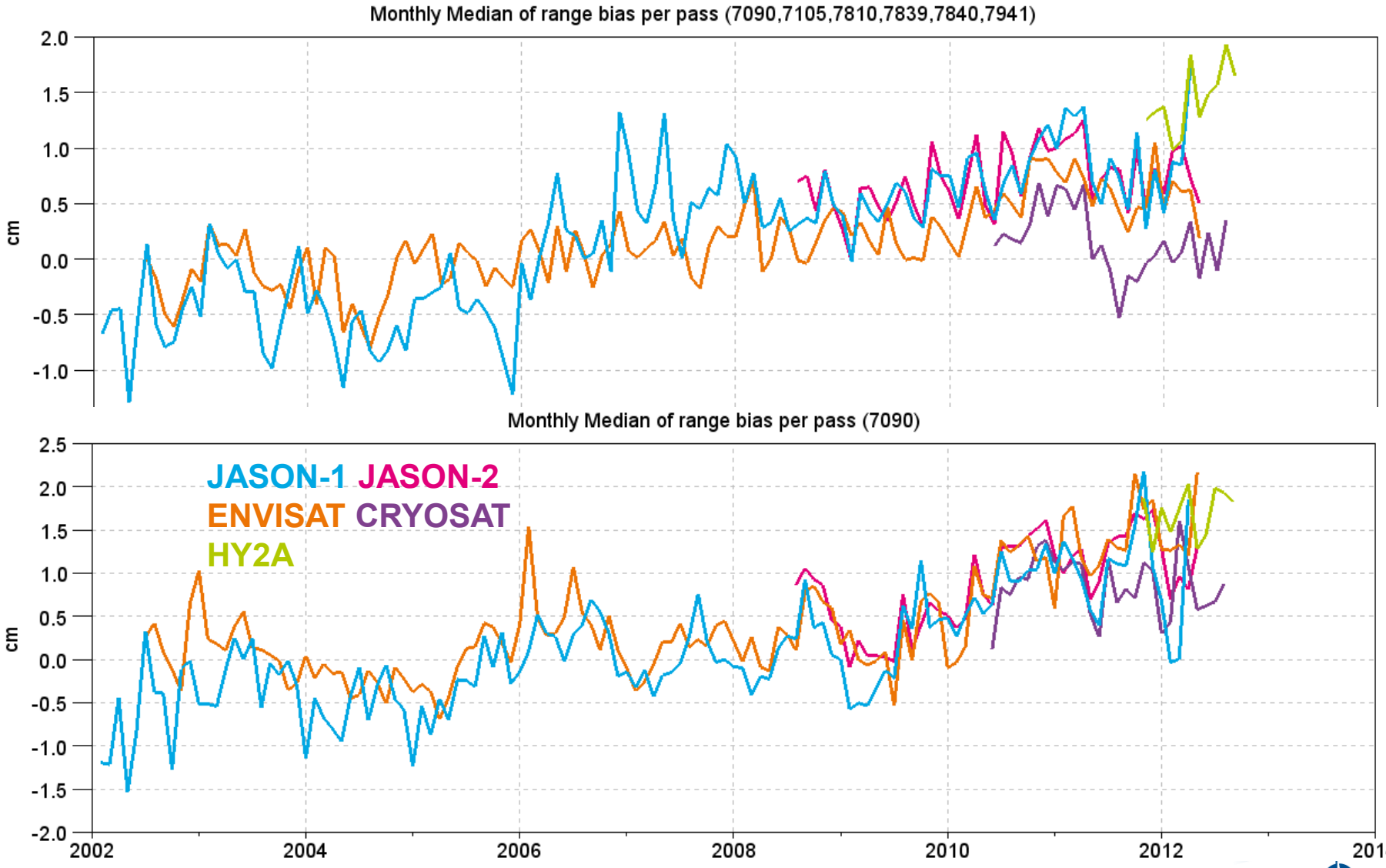
Average along-track bias per pass



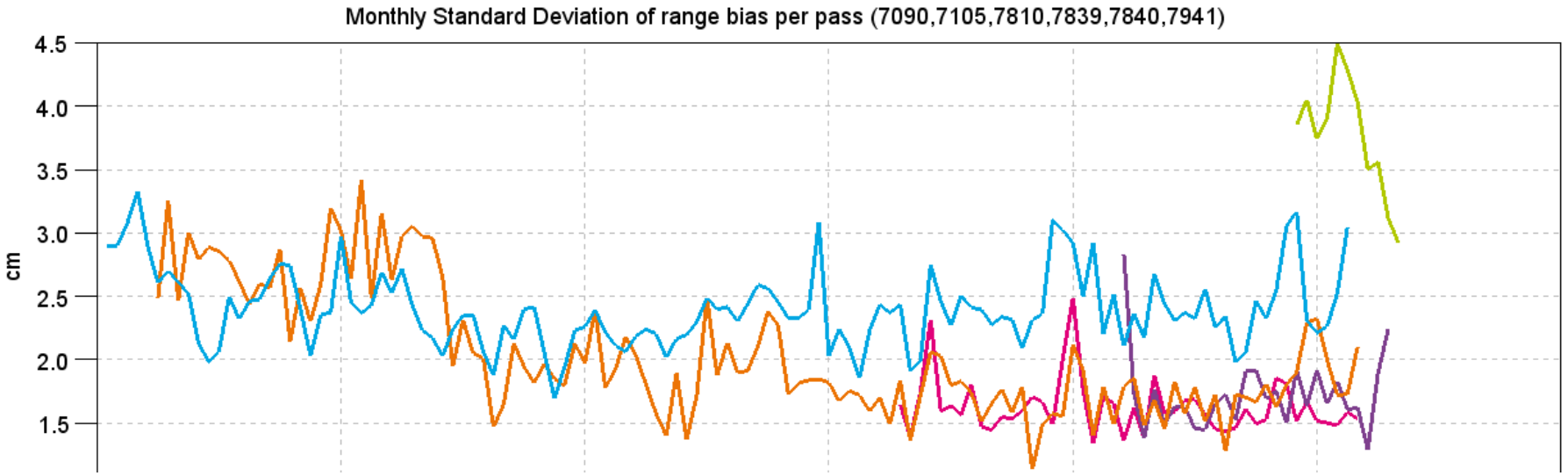
Standard deviation of along-track bias per pass

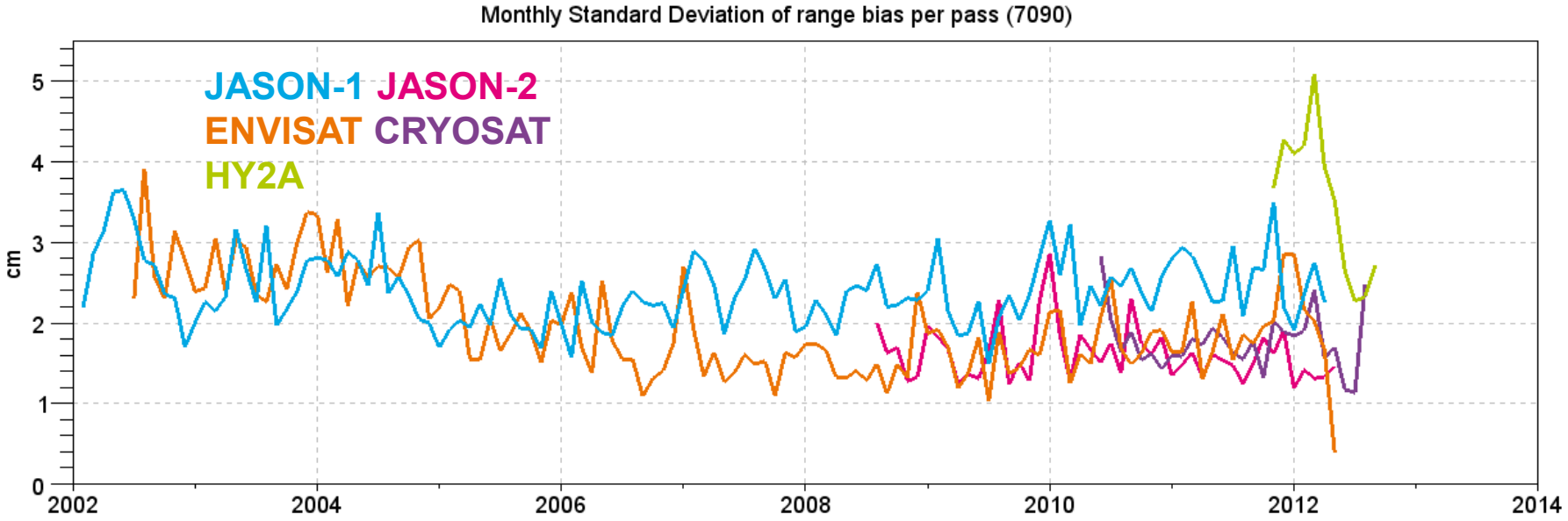


Average range bias per pass

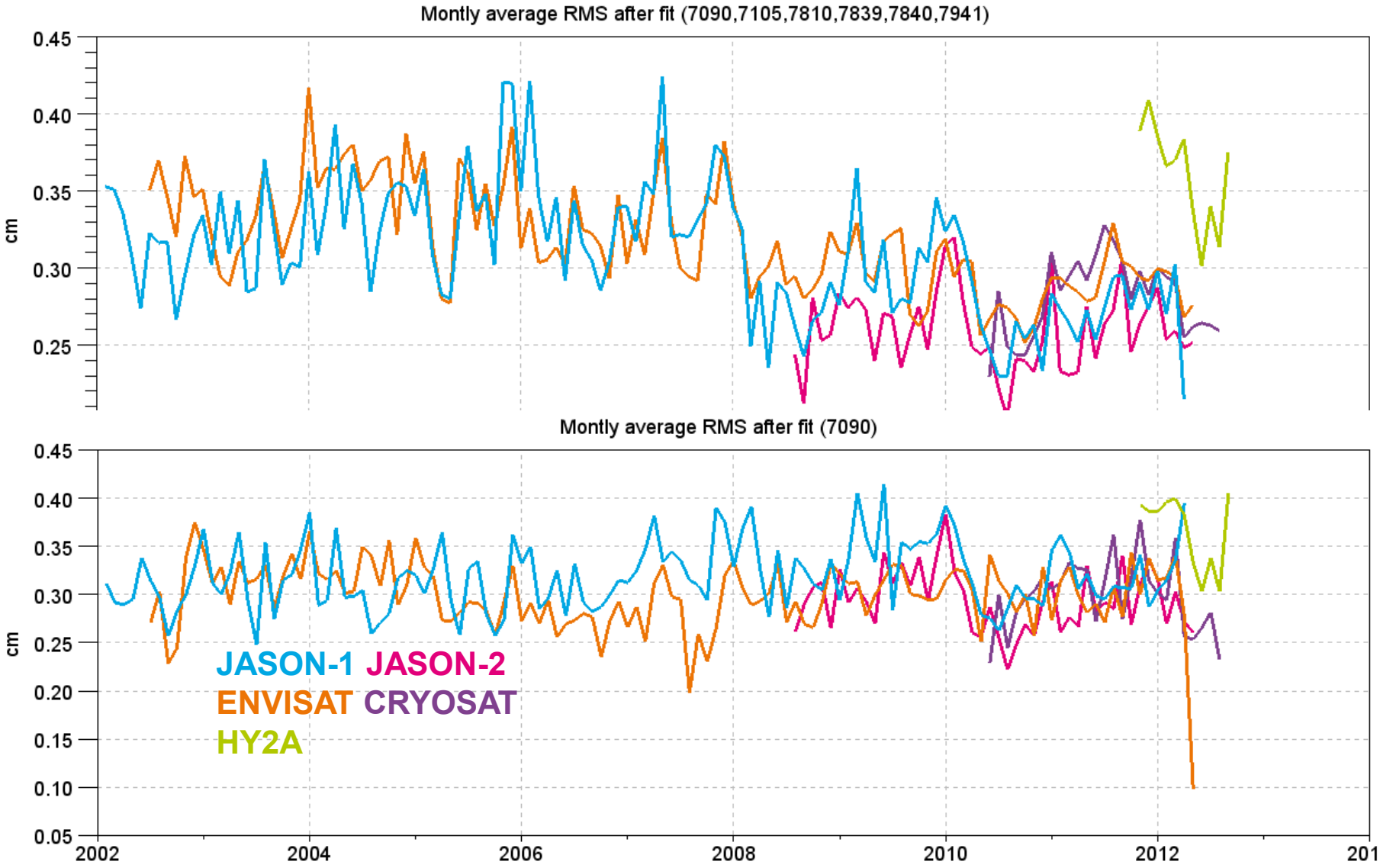


Standard deviation of range bias per pass

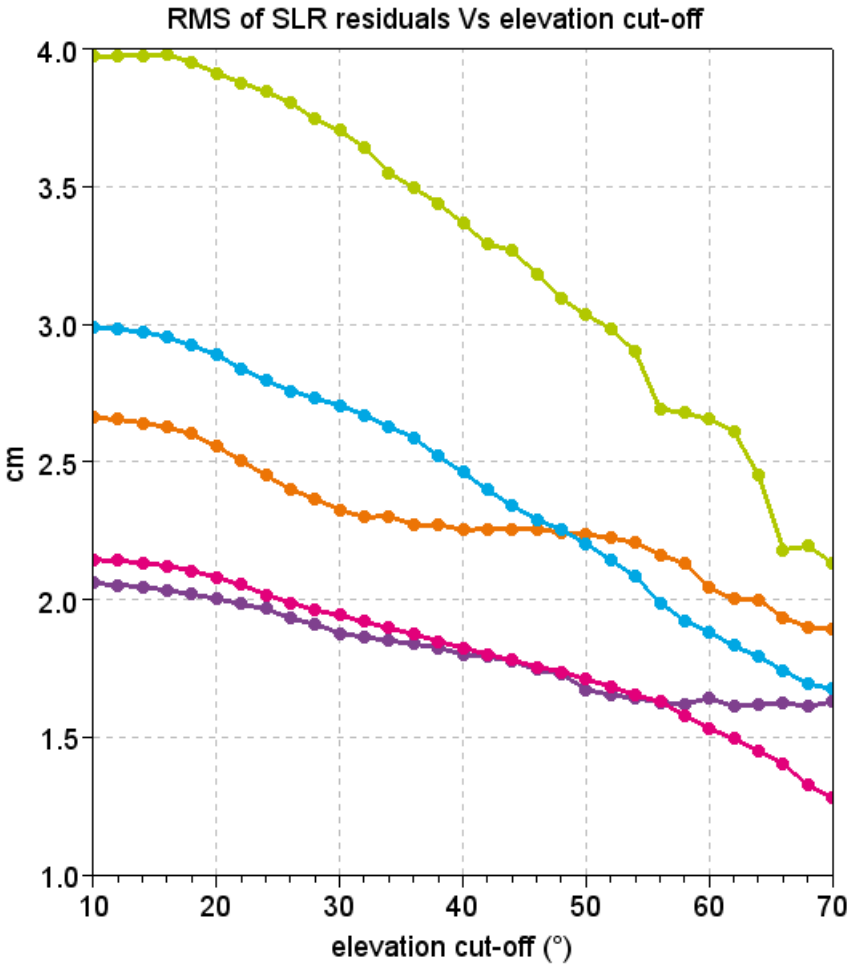


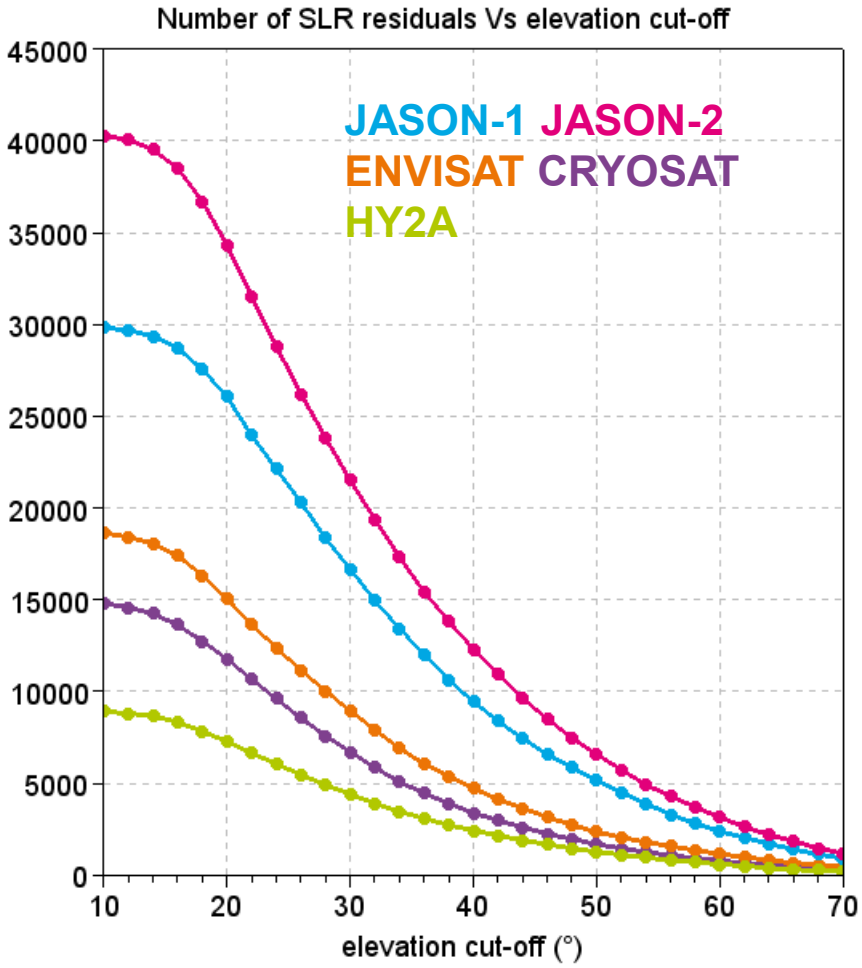


RMS after fit



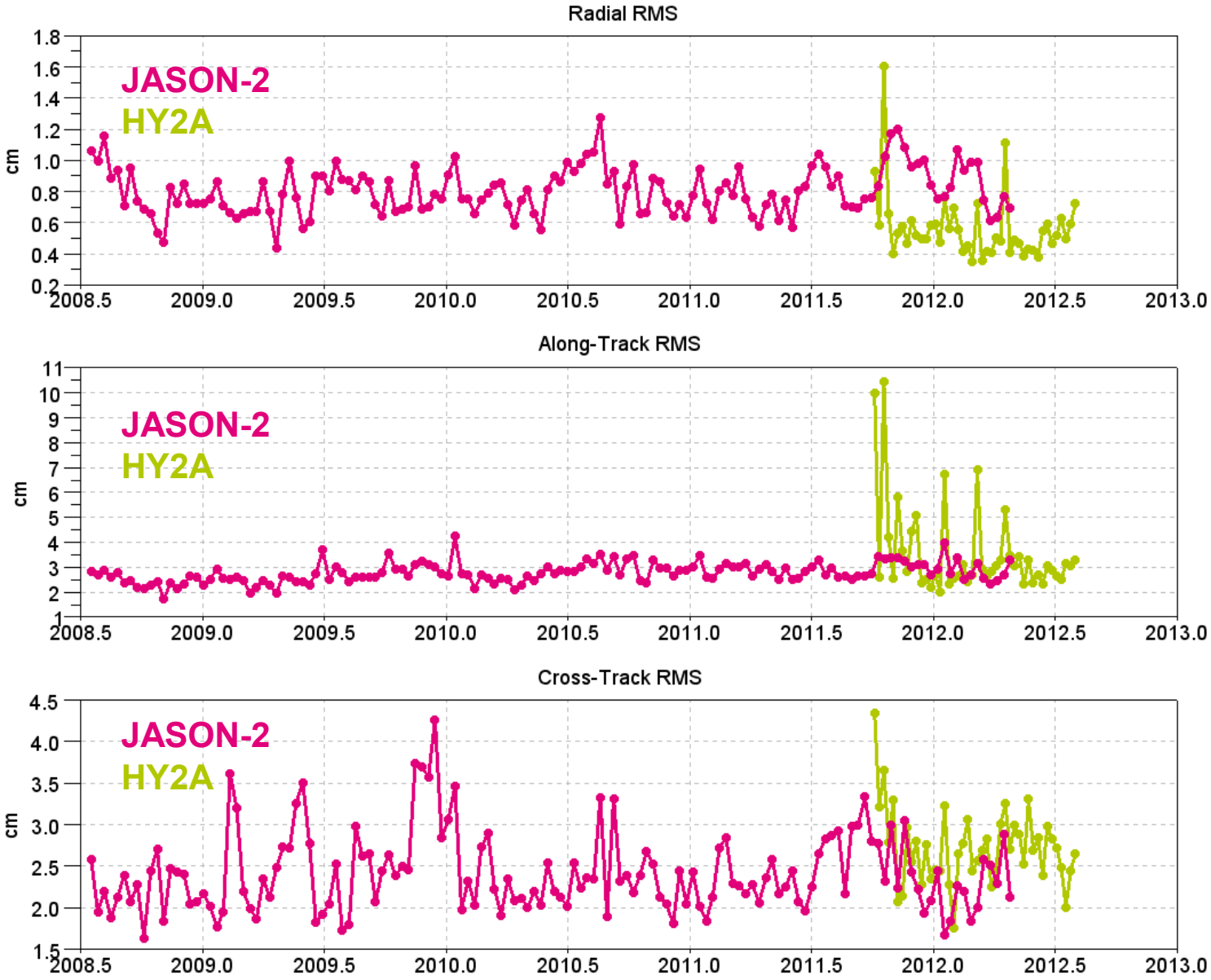
SLR Residuals as a function of elevation



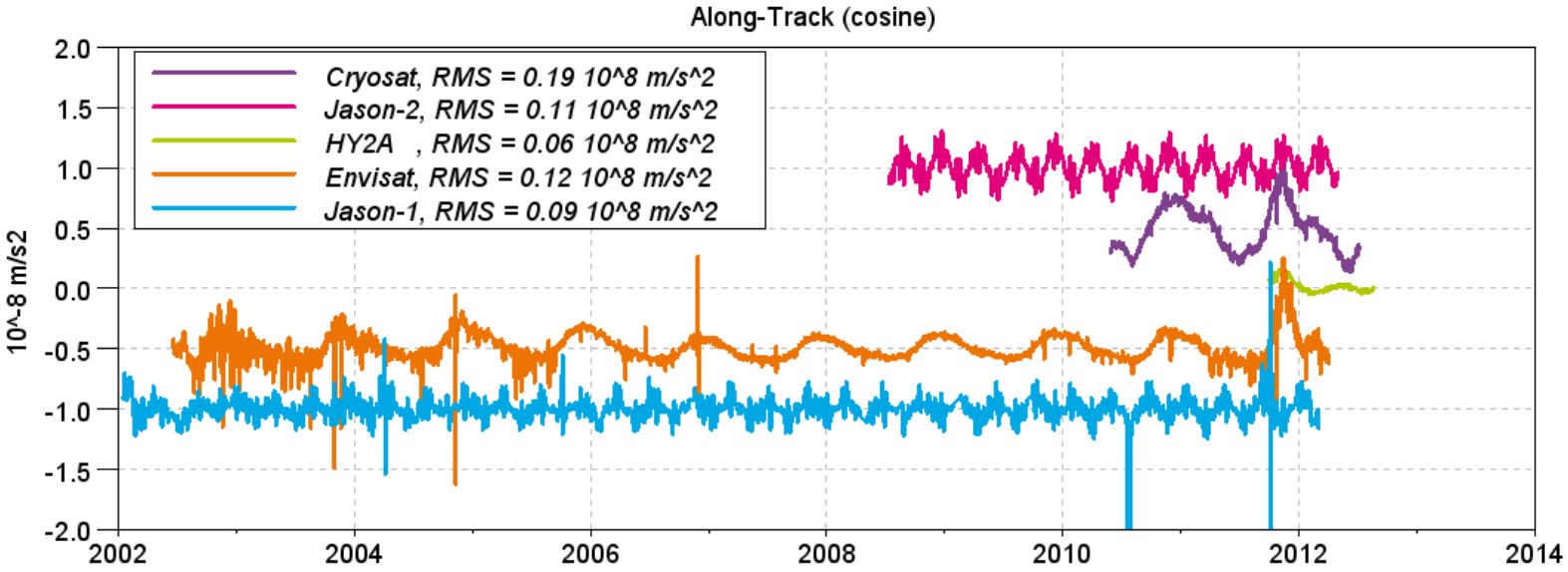


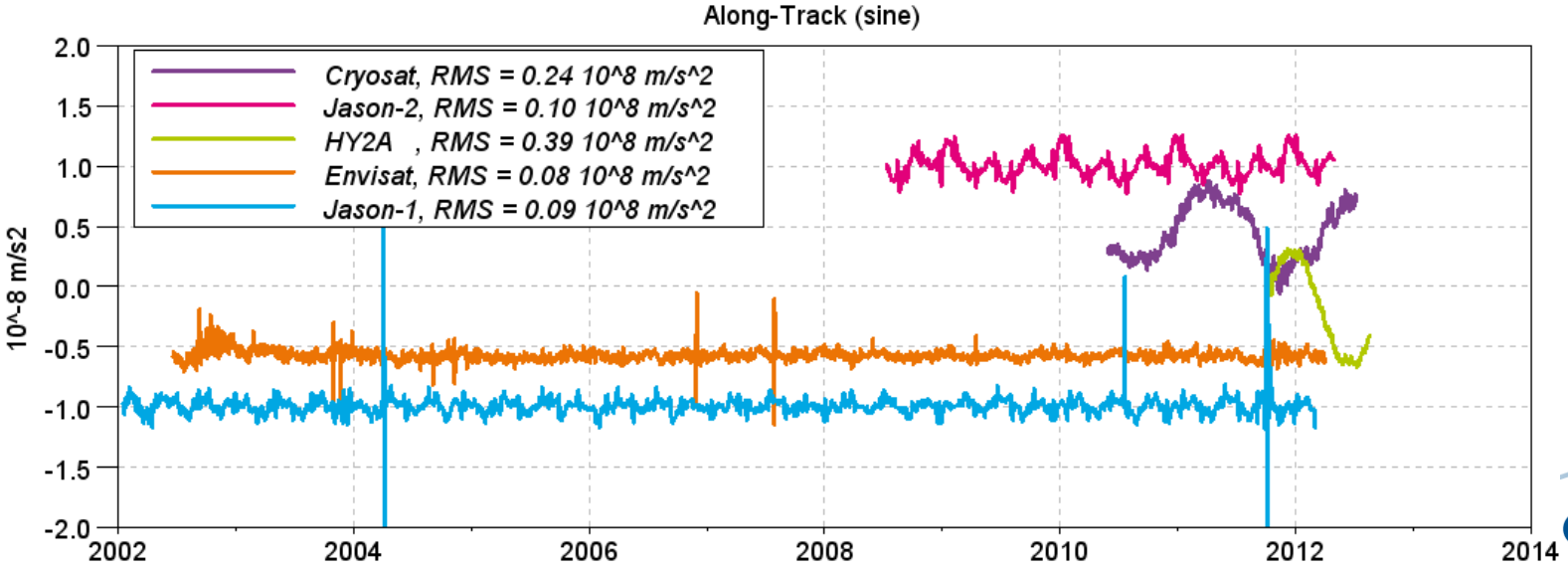
- Common interval between 05/10/2011 and 03/03/2012 (151 days)

Comparison of GPS Vs DORIS orbits

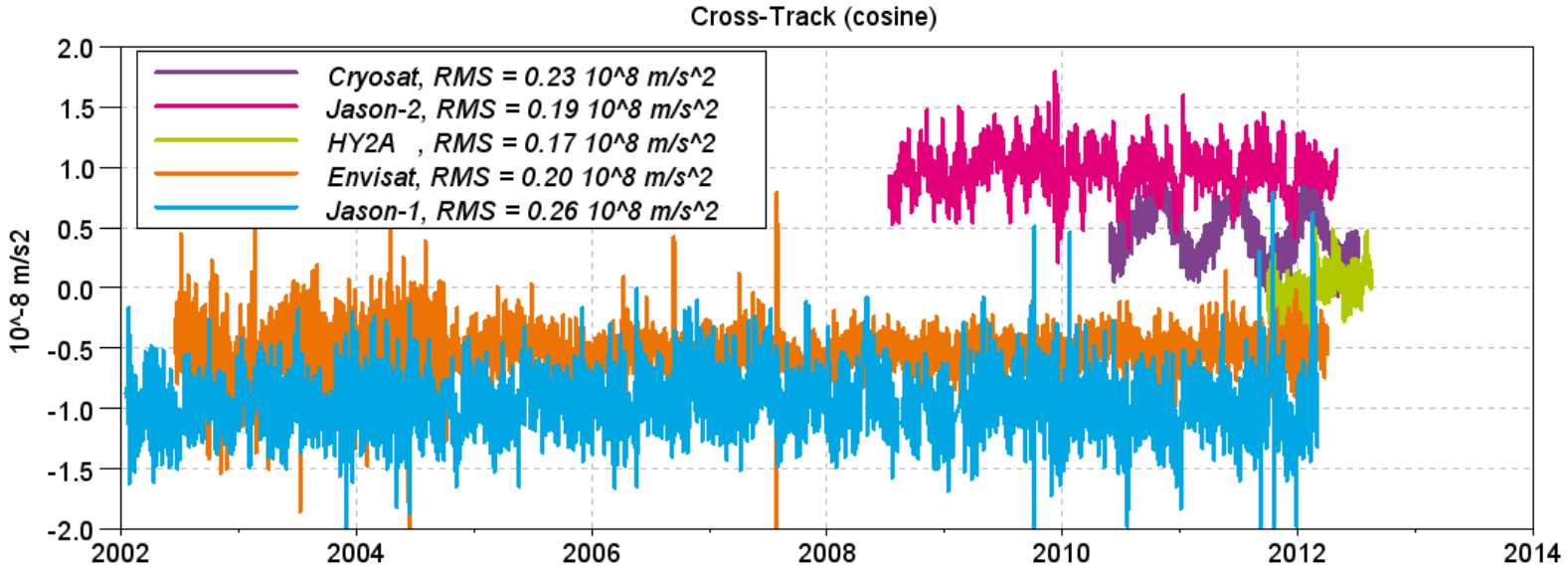


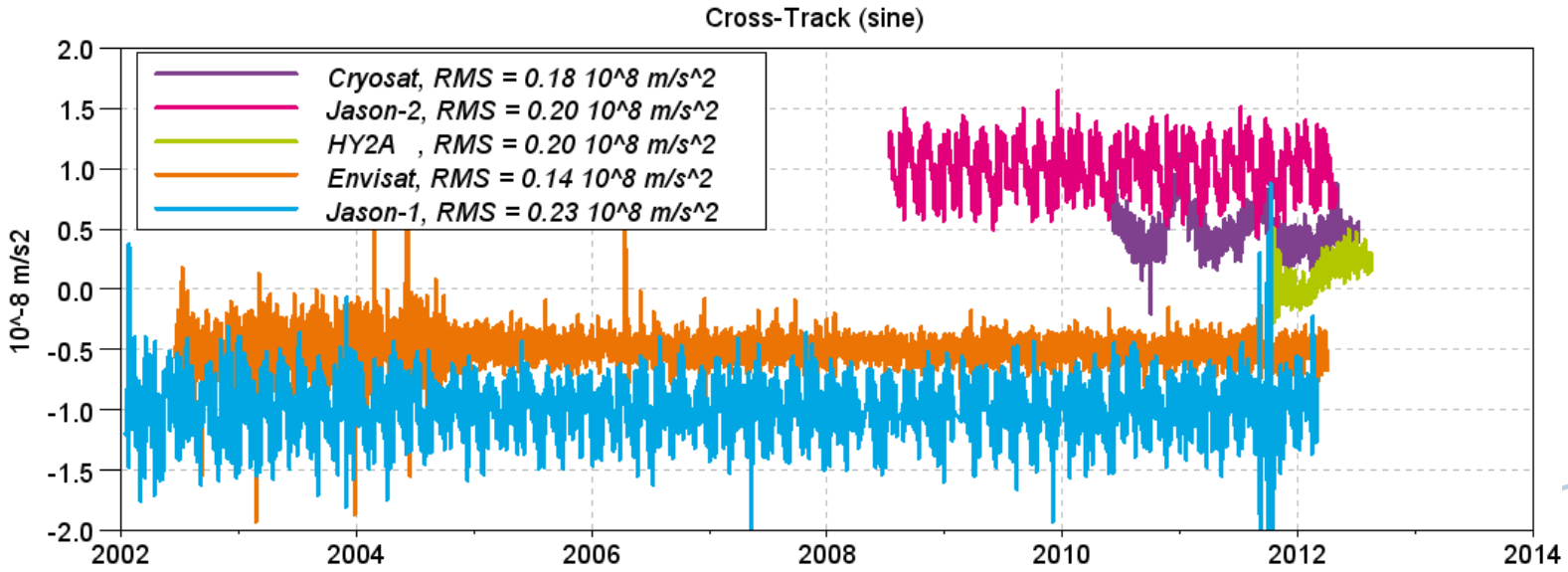
DORIS-based 24 hr 1/rev , along-track



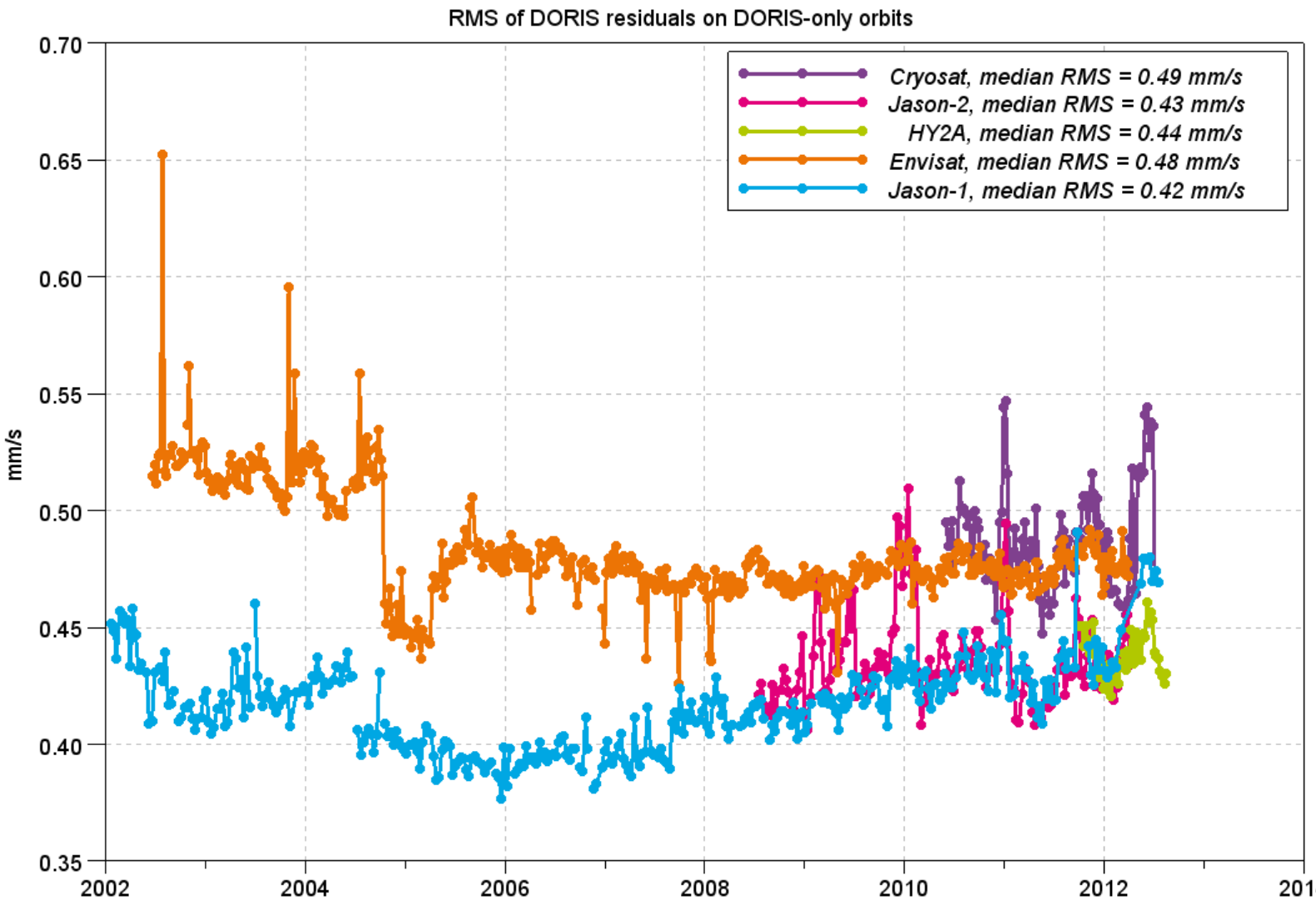


DORIS-based 24 hr 1/rev , cross-track

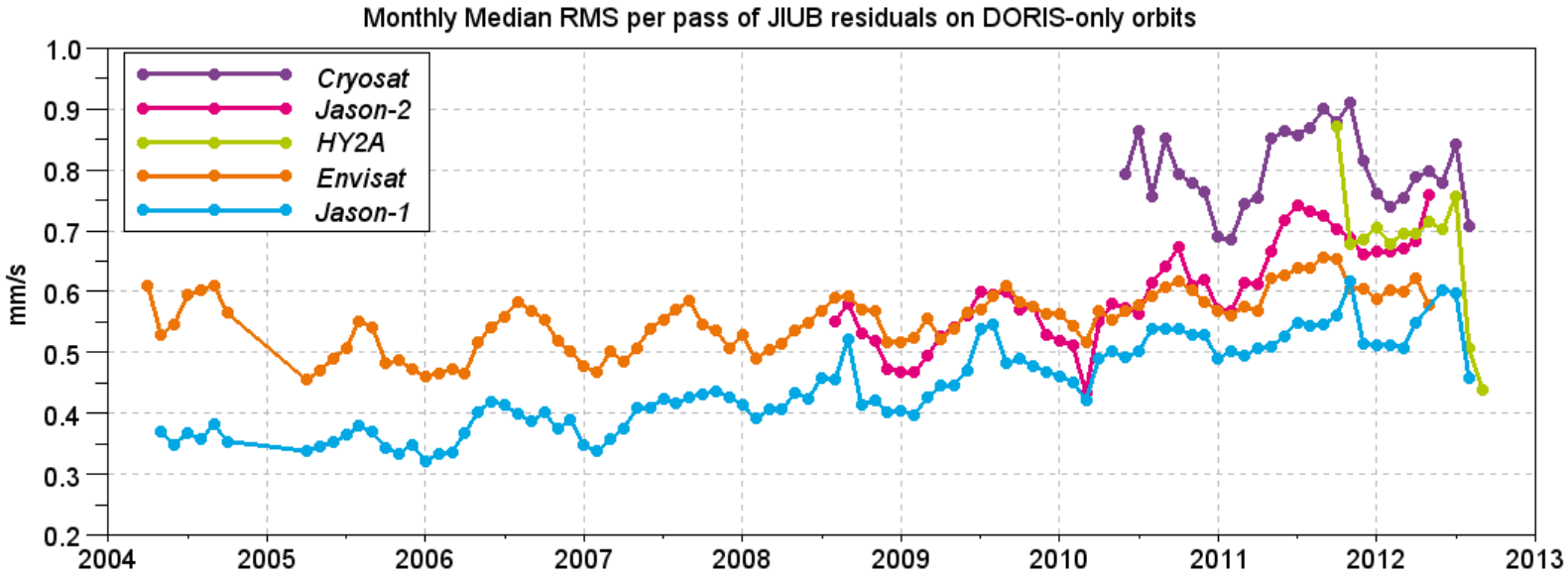


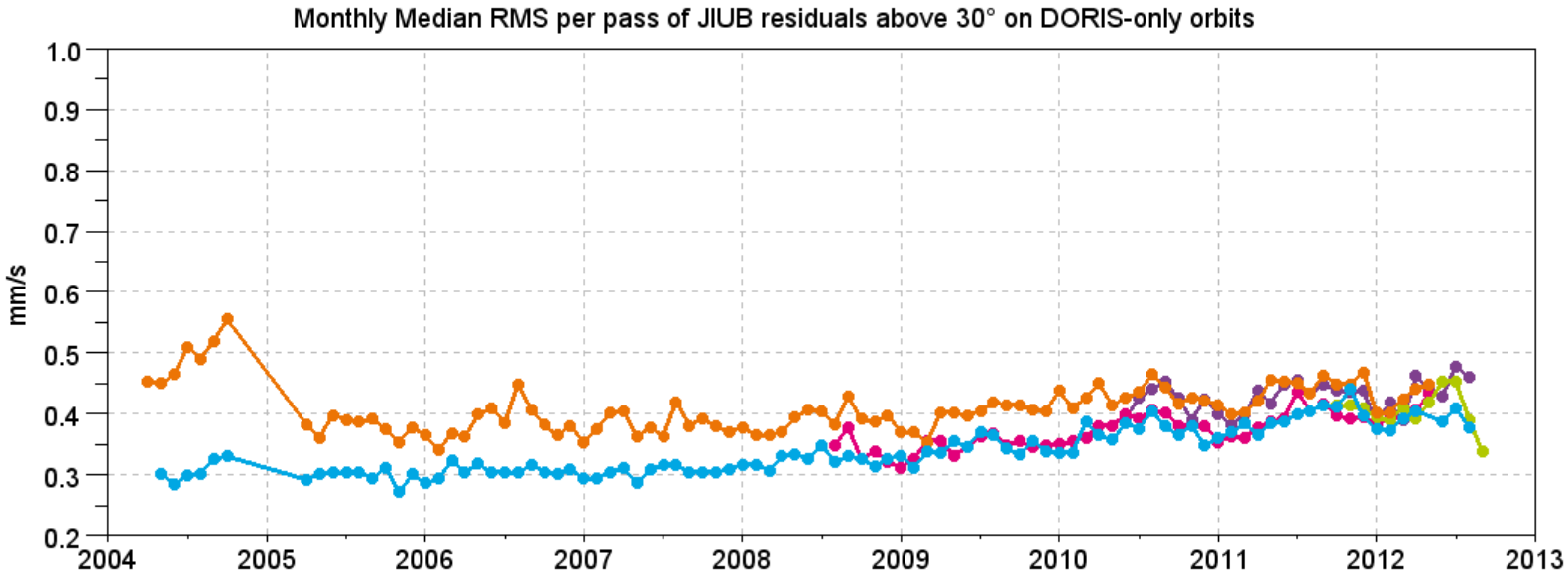


RMS of DORIS Residuals

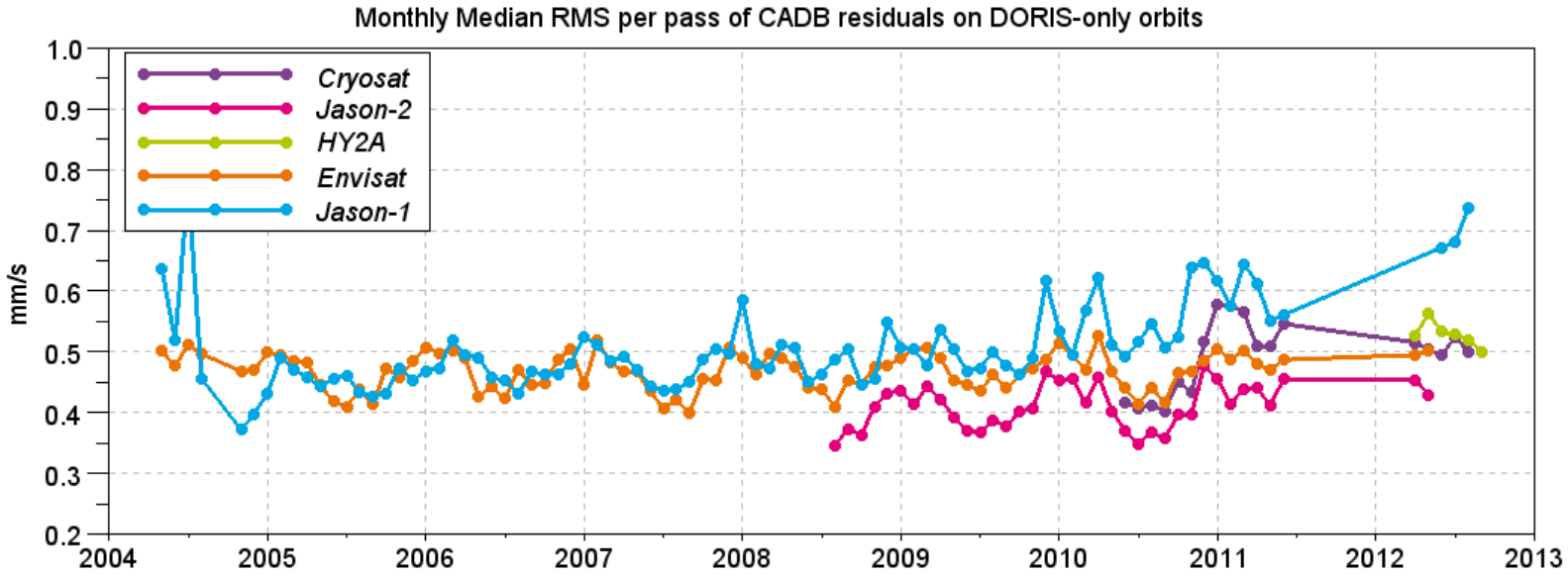


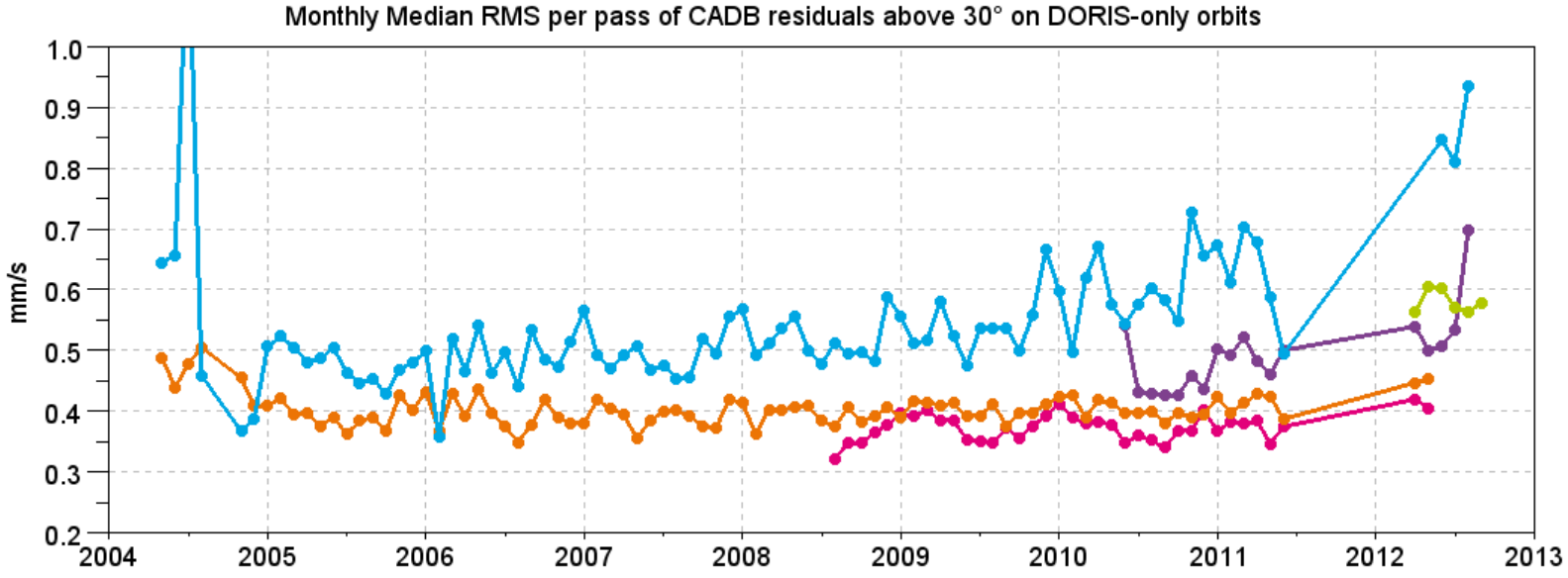
DORIS RMS per Beacon





DORIS RMS per Beacon





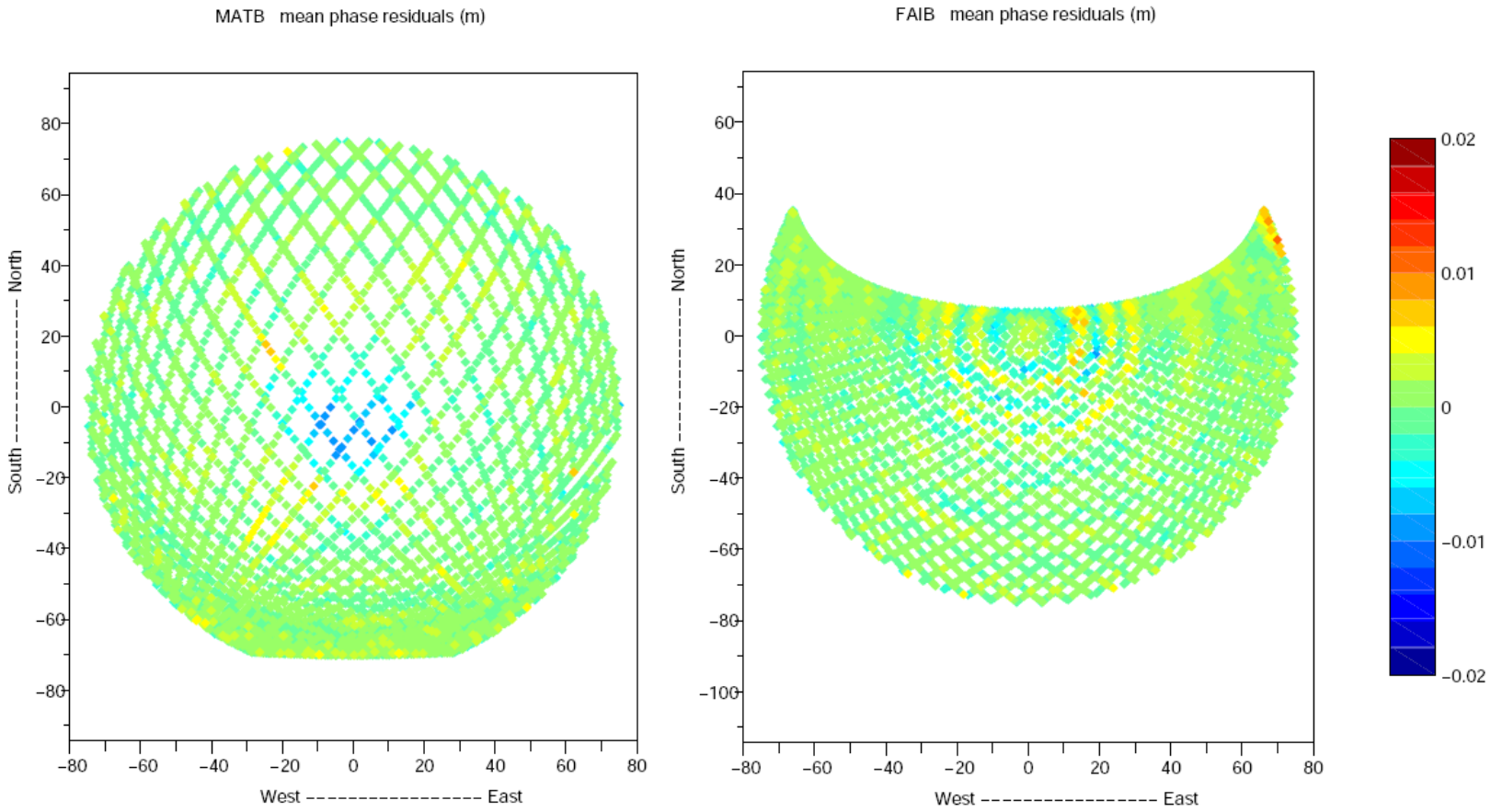
CONCLUSIONS

- Average SLR / DORIS Along track bias is largely reduced (< 2 cm) using the latest DORIS datasets
- Accuracy of DORIS-only dynamic orbits estimated by SLR residuals is similar for different satellites :
  - better than 2 cm RMS radial, ~5 cm along-track and cross-track
- Good agreement between DORIS-only and GPS-only dynamic orbits
- Macromodels for most recent satellites (Cryosat-2, HY2A) have margins for improvement
- DORIS residuals after JASON-1 orbit change should be carefully monitored

PROSPECTS

- Extend the phase-residual maps derived from Jason-2 with Cryosat-2 and HY2A data – and test impact on phase residuals of proposed new PCO/PCV for STAREC Antennas

http://ids-doris.org/documents/report/AWG200903/SOD_PhaseResidualMapsJason2AllStationsCy001_017.pdf



Thanks !