# HY-2A First POD Results

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# HY-2A's Orbit and Satellite

## Insight into HY-2A POD strategy

- Satellite characteristics
  - Launch date: 11/08/15
  - Orbit altitude: *790 km*
  - Mass: *1550 kg*

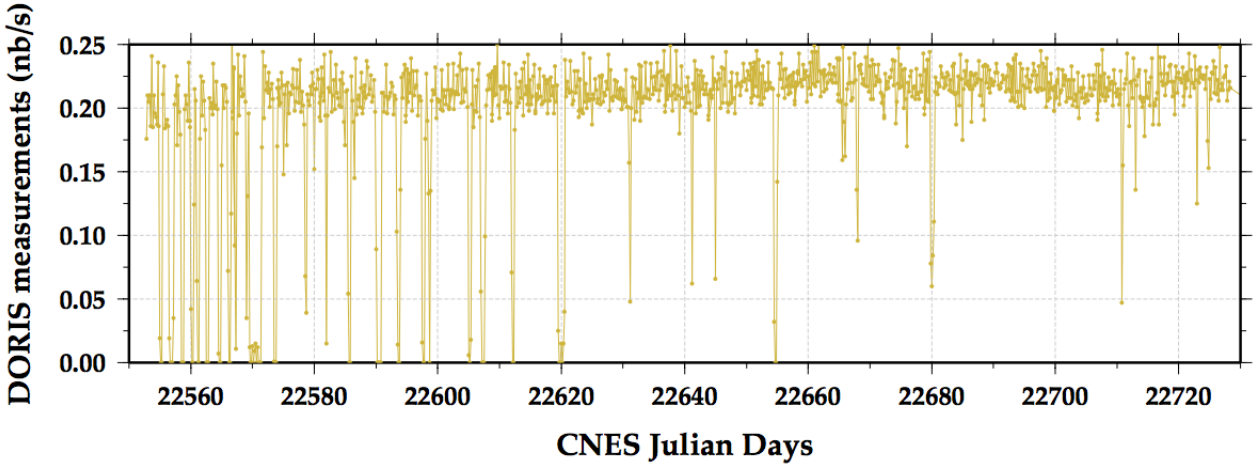
- Tracking data and arcs
  - Twenty height *7-day* arcs (*14-day* cycle) with a *4-hour* overlap
  - Data between 11/10/01 – 12/04/15

- Models
  - GDR-D orbit standards
  - Surface model available at ftp://ftp.ids-doris.org/pub/ids/satellites/DORISSatelliteModels.pdf

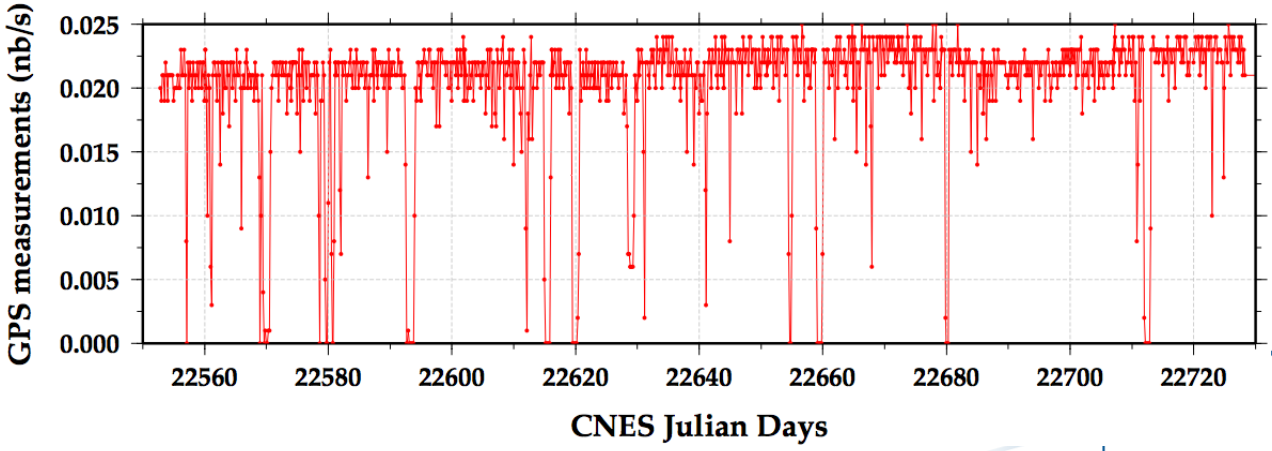
# DORIS and GPS Available Measurements

## Number of measurements computed over 4-hour intervals

- DORIS measurements
  - ✦ Several measurements gaps at the beginning of life of HY-2A



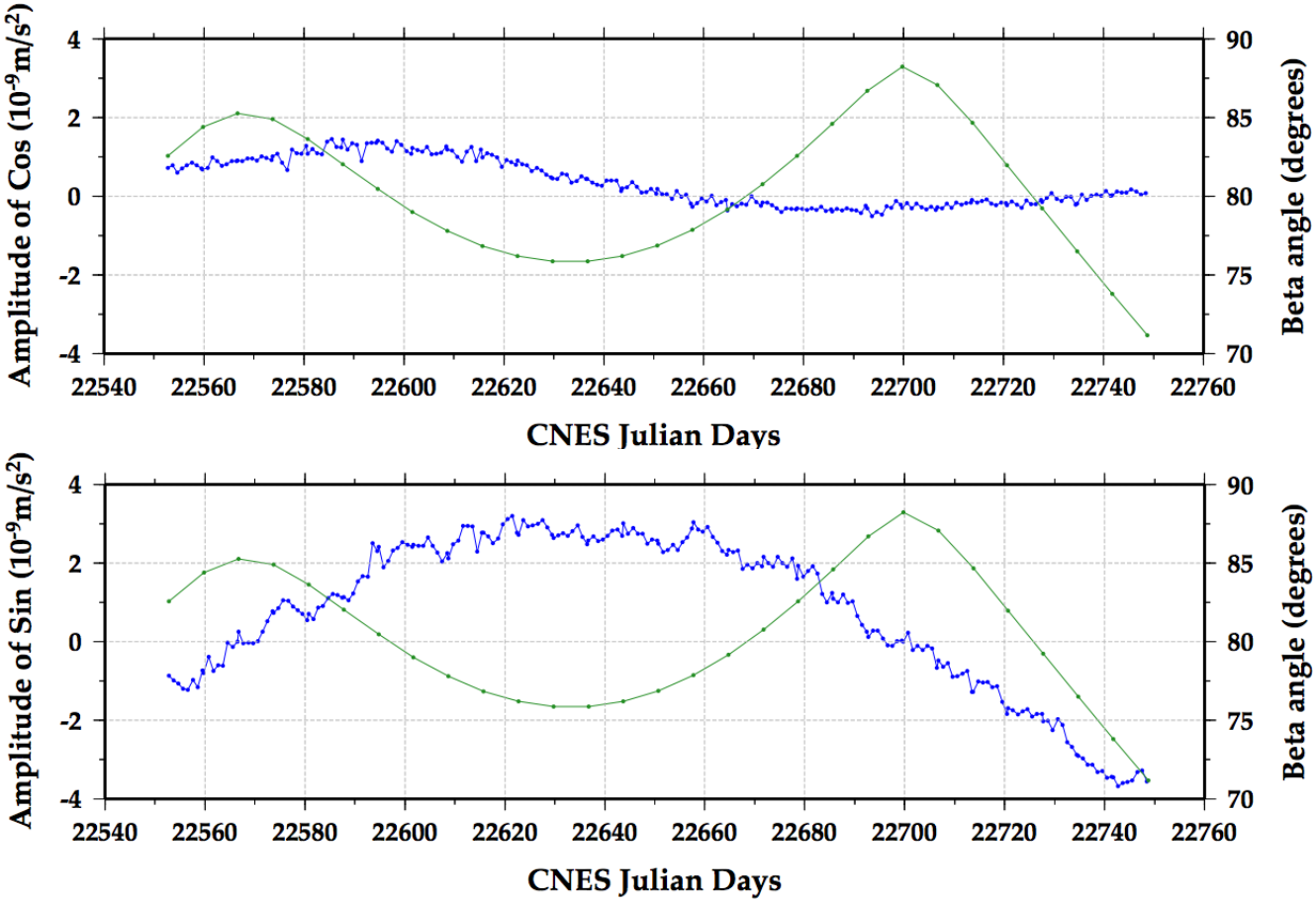

- GPS measurements
  - ✦ Consequences on empirical accelerations
    - » Only five parameters estimated per day (1-cpr along-track, cross-track and a bias along-track)



# One-cycle-per-revolution Empirical Accelerations

## Along-track amplitudes

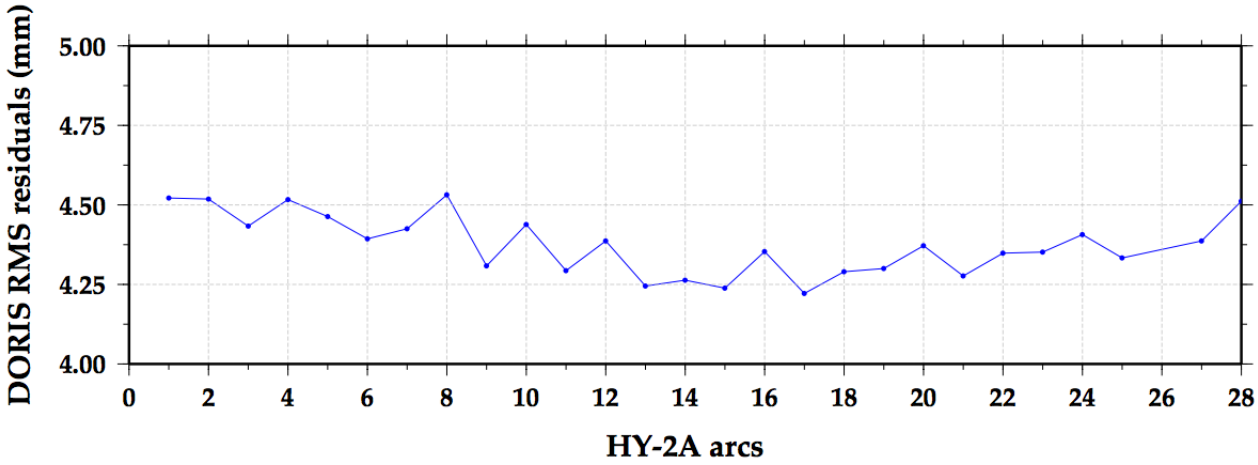
- Cosine term
  - ✦ Slightly higher amplitudes than those associated with Jason-2
- Sine term



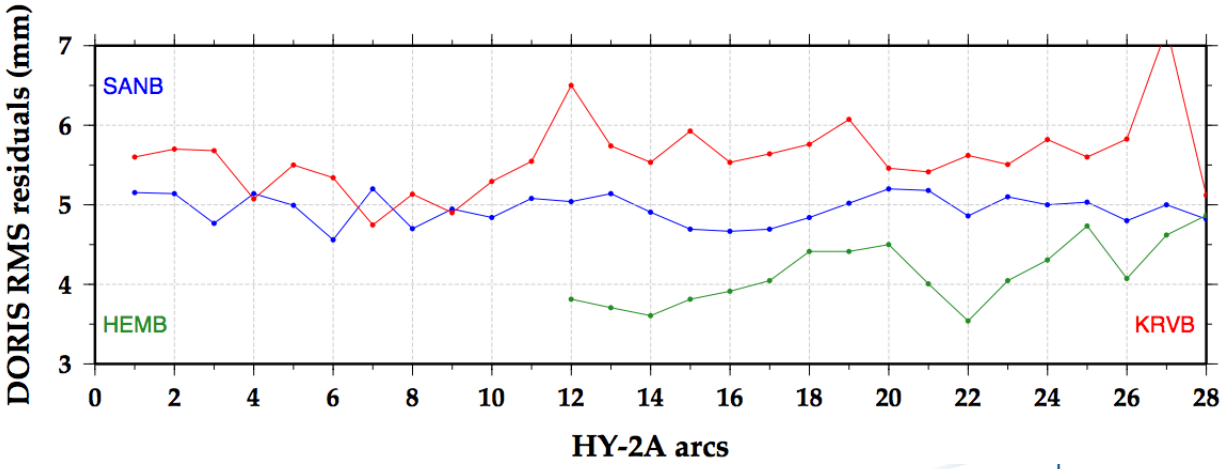
# Post-fit Residuals on the GDR Solution (1/2)

## RMS of DORIS post-fit residuals (10-seconds phase increments)

- DORIS performance
  - Same level as on Jason-2

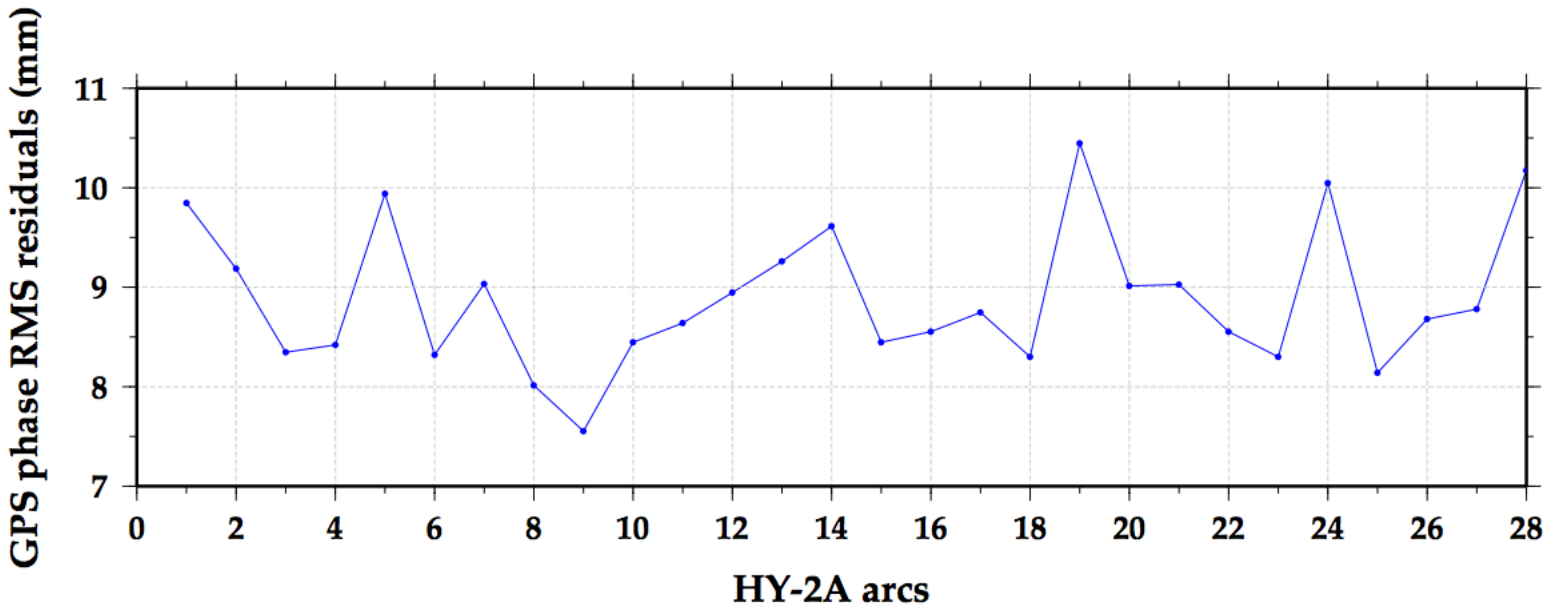



- Monitoring of DORIS beacons in the vicinity of the SAA
  - No conclusive sign of degradation due to the SAA effect



# Post-fit Residuals on the GDR Solution (2/2)

RMS of GPS phase post-fit residuals

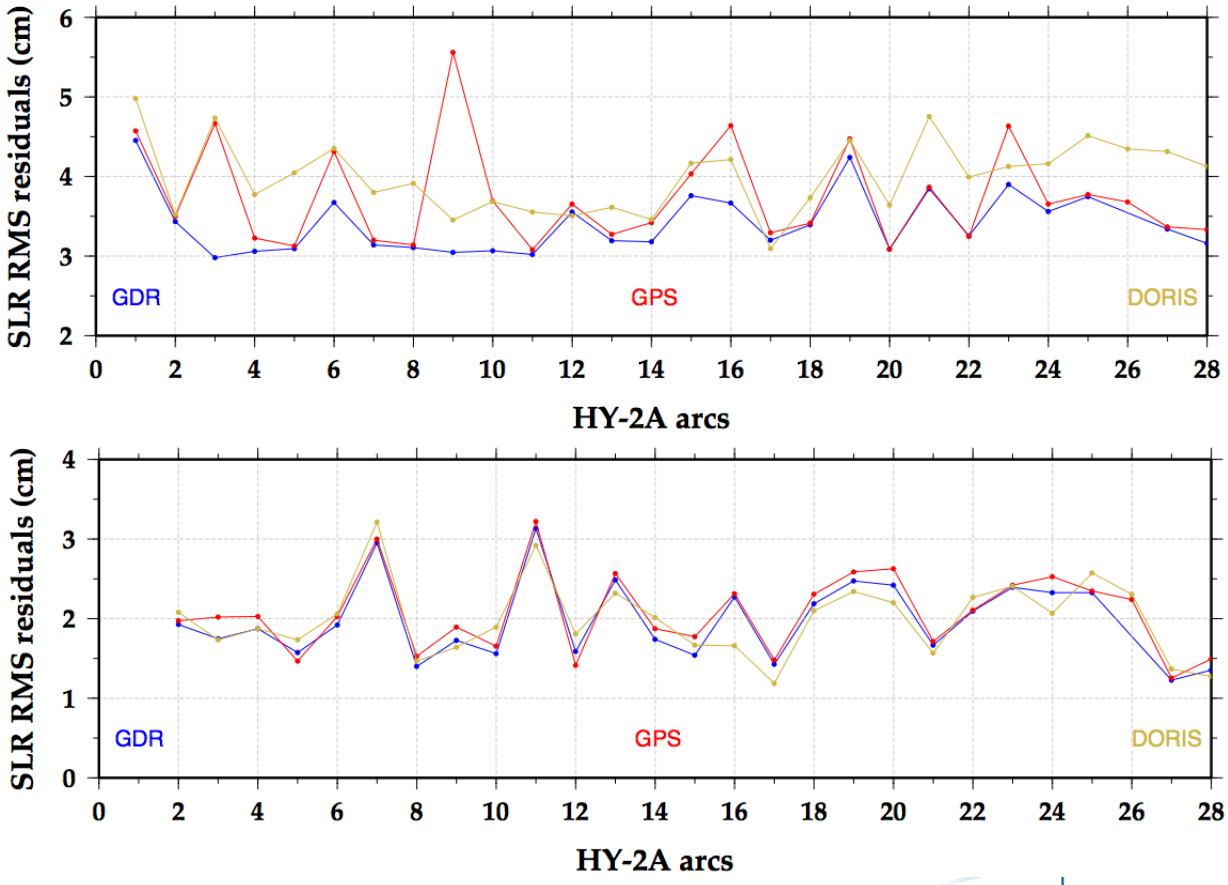



- Overall ~*9-mm* stable GPS phase RMS residuals (no PCV map applied)

# SLR Validation of the Different Orbit Solutions

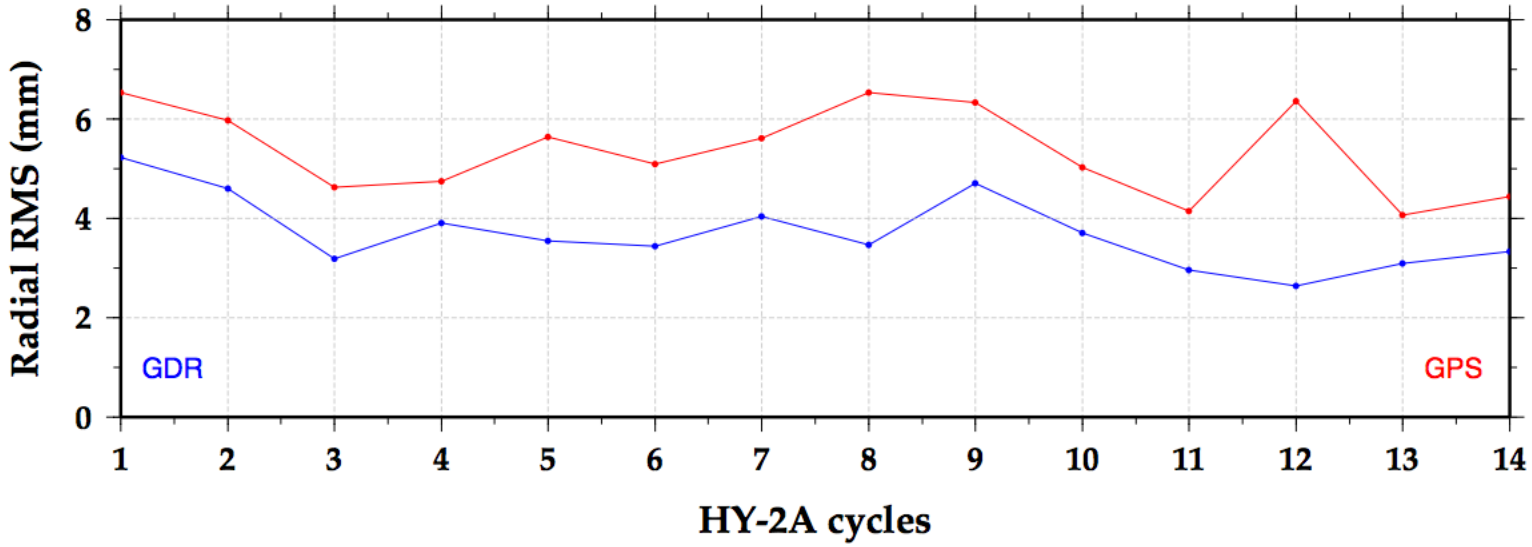
## RMS of SLR residuals on core network *(7090Yarr 7105Wash 7810Zimm 7839Graz 7840Hers 7941Mate)*

- All elevations
  - The GPS-based solution performs slightly better than the DORIS-only orbit
- Above *70°*
  - Similar *~2-cm* radial orbit accuracy for the different solutions (all highly dynamically constrained)



# HY-2A Orbits Comparison: Radial Component

RMS of radial orbit differences relative to the DORIS-only solution

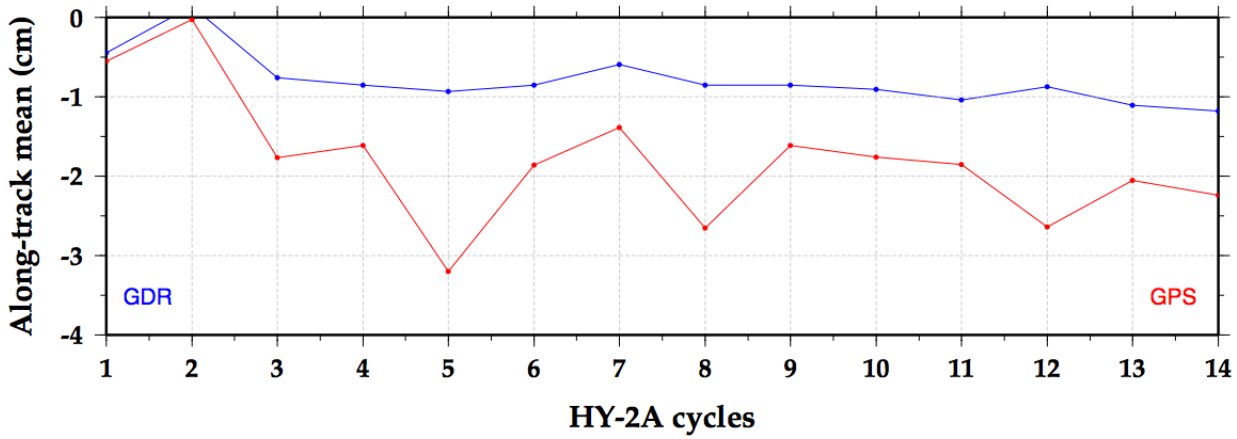



- GPS-based and DORIS-only orbits compare very well in the radial direction (*4-7 mm*), since all these solutions share identical dynamical models

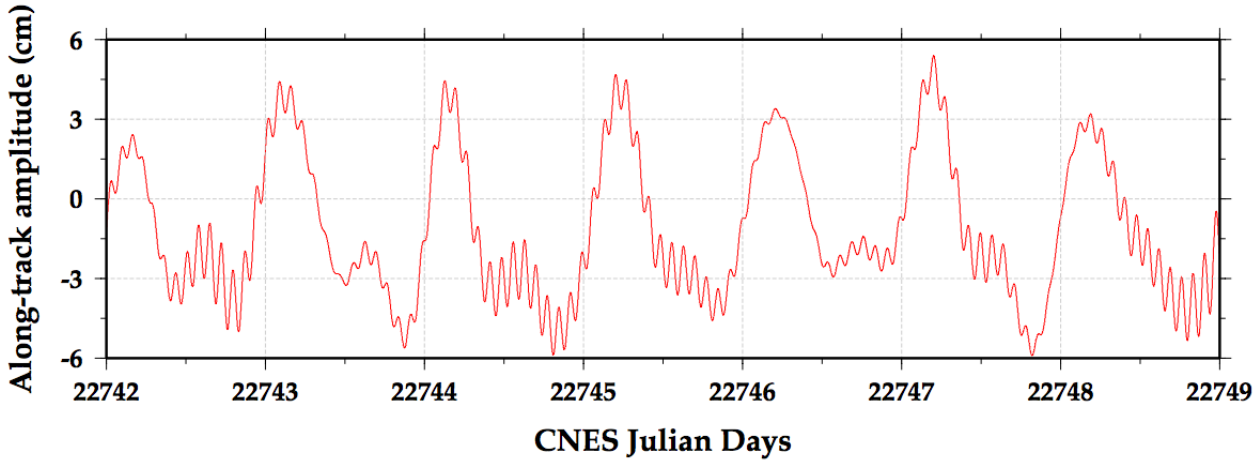
# HY-2A Orbits Comparison: Along-track Component

Mean of along-track differences relative to the DORIS-only solution

- *~2-cm* negative along-track bias between DORIS-only and GPS-based orbits

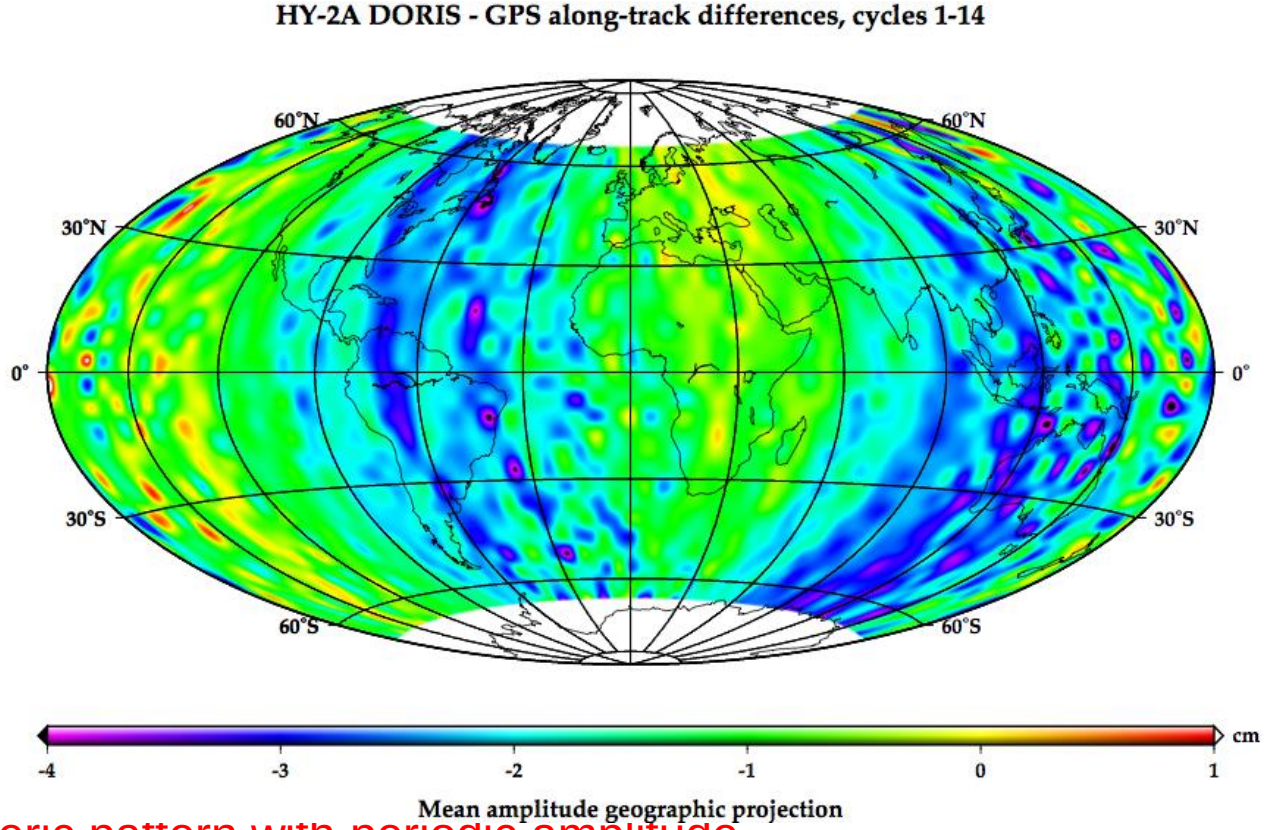



- *2-cm* along-track bias combined with a *24-hour* signal



# Geographical Map of these Along-track Differences

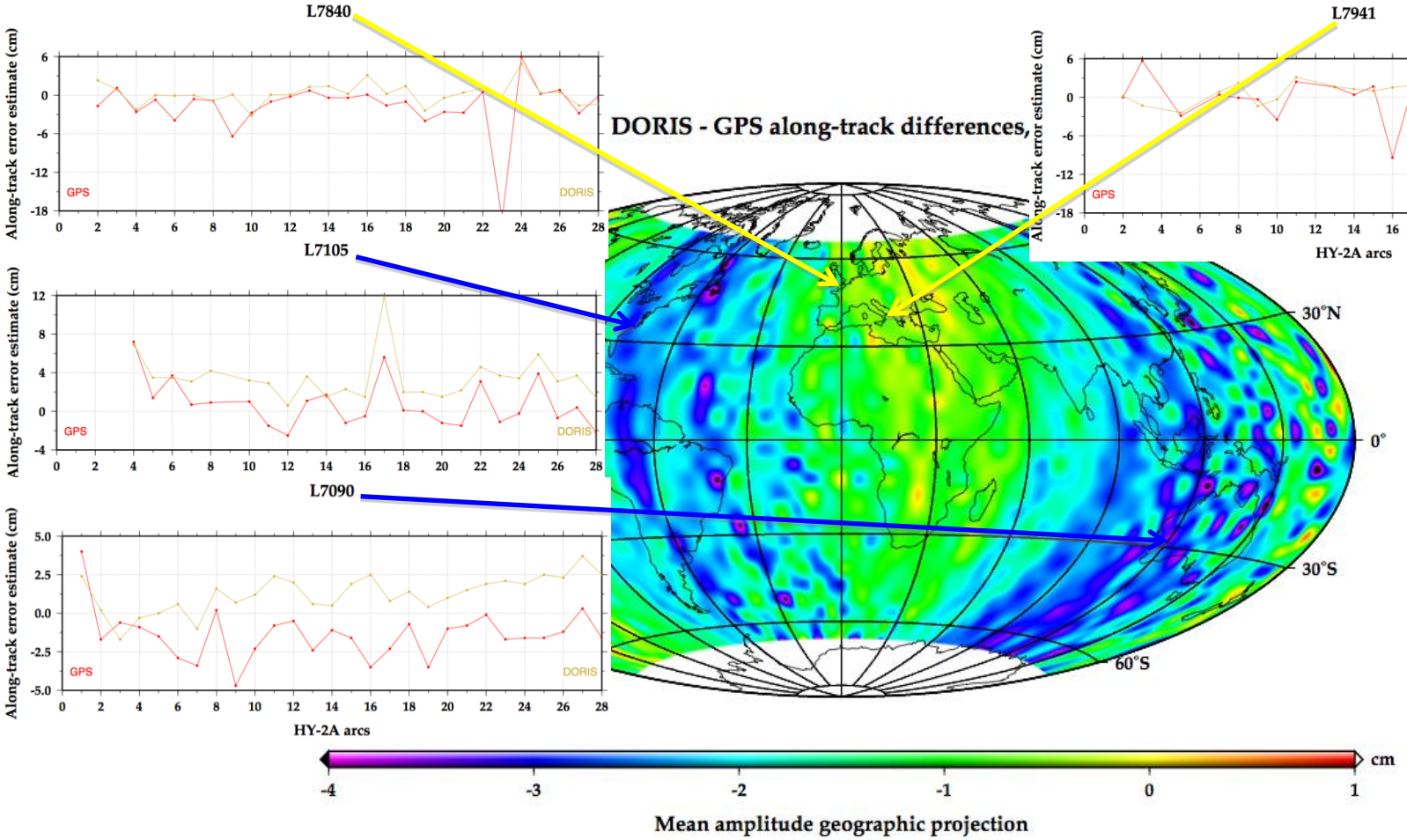
Mean geographically correlated along-track differences




- Hemispheric pattern with periodic amplitude

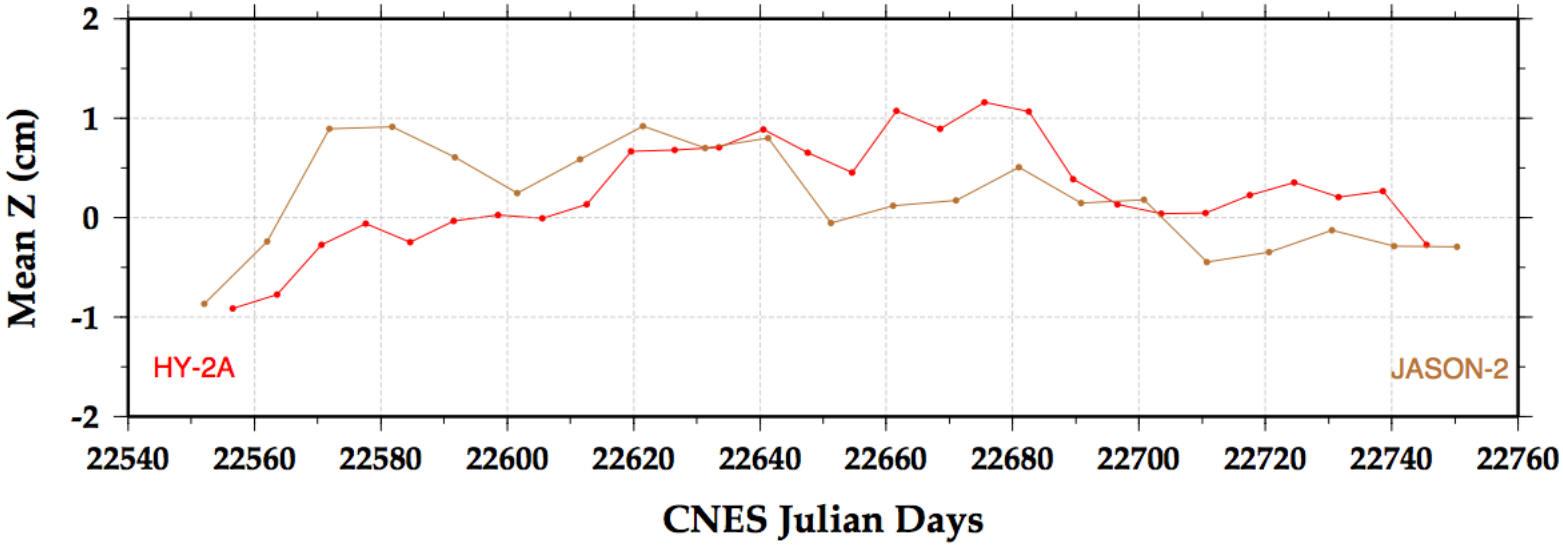
# Who's Right Between DORIS and GPS?

## Along-track error estimates from SLR reference stations



# HY-2A Orbits Comparison: Z-centering

Mean of Z orbit differences: DORIS-only – GPS-based orbits




- Annual geocenter motion?