



Generating precise and homogeneous orbits for Jason-1 and Jason-2

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- There is a need for high-quality **homogenous** altimetry products
→ i.e. **precise and homogeneous orbits for altimetry satellites.**
- The Navigation Support Office at ESOC is involved in the processing and validation of the **ESA altimeter missions:** ERS-1/2, Envisat and Cryosat-2 since the launch of each mission.
- We have the capability and the software (**NAPEOS**) to process efficiently all geodetic tracking techniques (SLR, DORIS, and GPS) in a **combined** processing.
- This presentation will focus on the **Jason-1/2 POD** carried out at ESOC using the NAPEOS software.
- All Jason-2 data has been processed (July 2008 – August 2011) and for Jason-1 all data from launch until January 2009

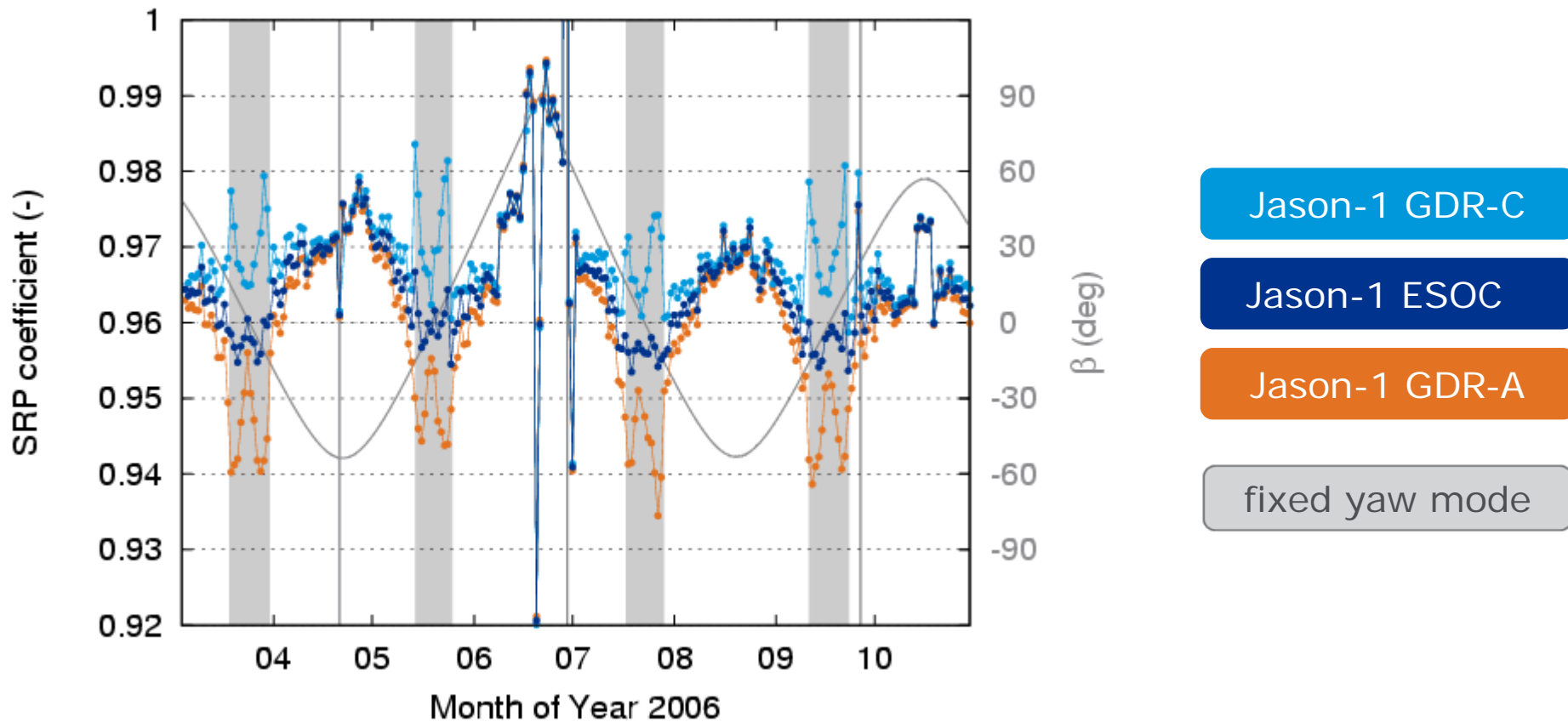
- Based on to the new CNES [GDR-D standards](#)
- Modeling according to latest standards ([IERS2003](#))
- [GPS + DORIS + SLR](#) used, technique-specific weighting
- [ESA IGS08 GPS orbits and clocks](#) (30s) introduced (kept fixed)
- Estimated parameters
 - [Orbit parameter \(3-day arcs\)](#)
 - SV
 - 4 CPRs (sin/cos in along-track/cross-track) every 12h
 - 5 Drag parameters every 24h
 - GPS phase ambiguities
 - Jason-1/2 clock bias (30s)
 - DORIS station frequency bias, time-tag bias, atmospheric zenith delay correction

- Gravityfield
 - GFZ-GRGS **EIGEN-6C** (120x120) + annual and semi annual variation up to degree and order 50
- Station Coordinates
 - **DORIS** DPOD2008 and for **SLR** ITRF2008
- Macro model for box-wing (next slides)
 - ESA model (average of CNES GDR-A and GDR-C model)
- **GPS antenna phase centre** modeling
 - Estimated based on stacking 2 years of NEQ for Jason-1 and Jason-2. Estimated both GPS & Jason-1/2 antennas in full IGS like scenario (GPS up to 17 degrees).
- **Attitude** modelling
 - Quaternions with fallback on nominal attitude model (with attitude event file) if not available

Scaling of solar radiation pressure model

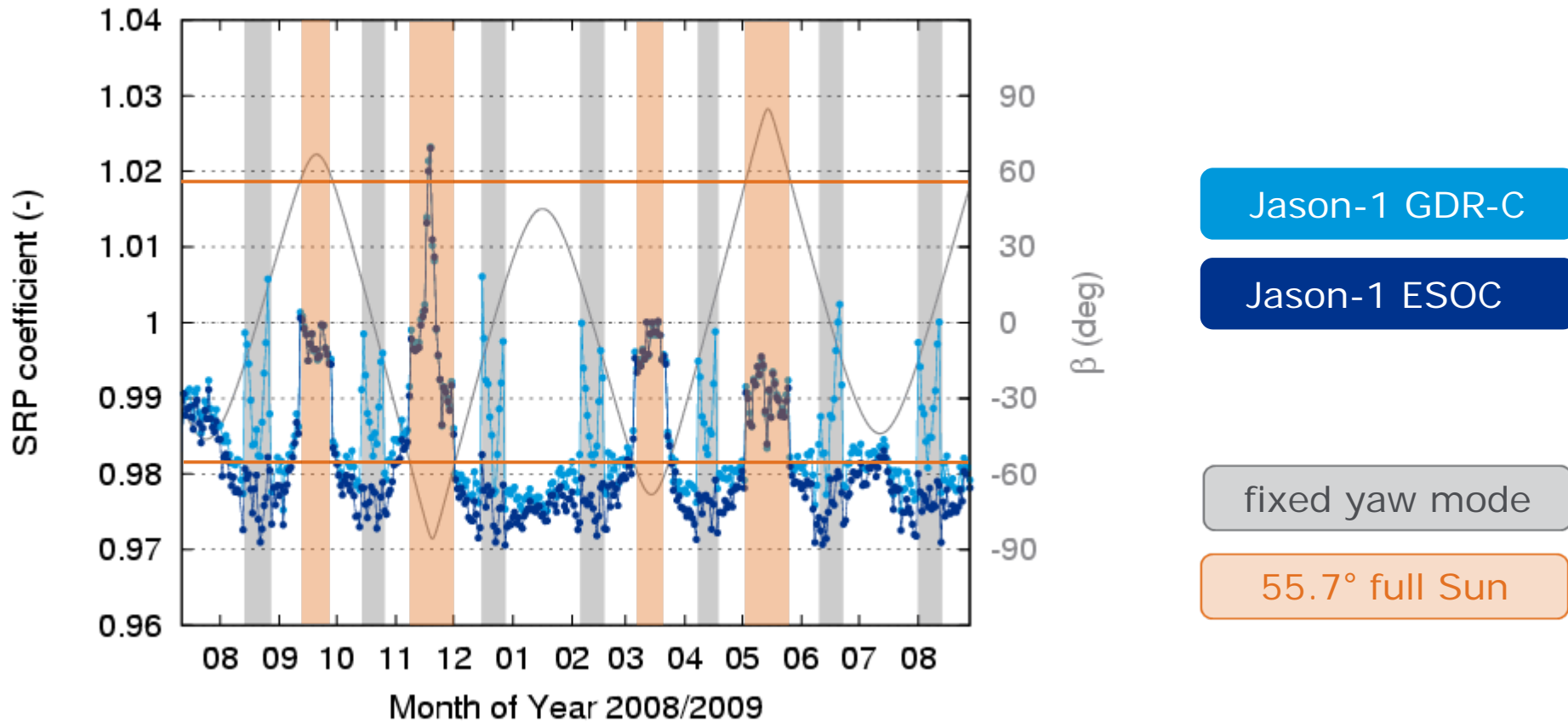


Jason-1



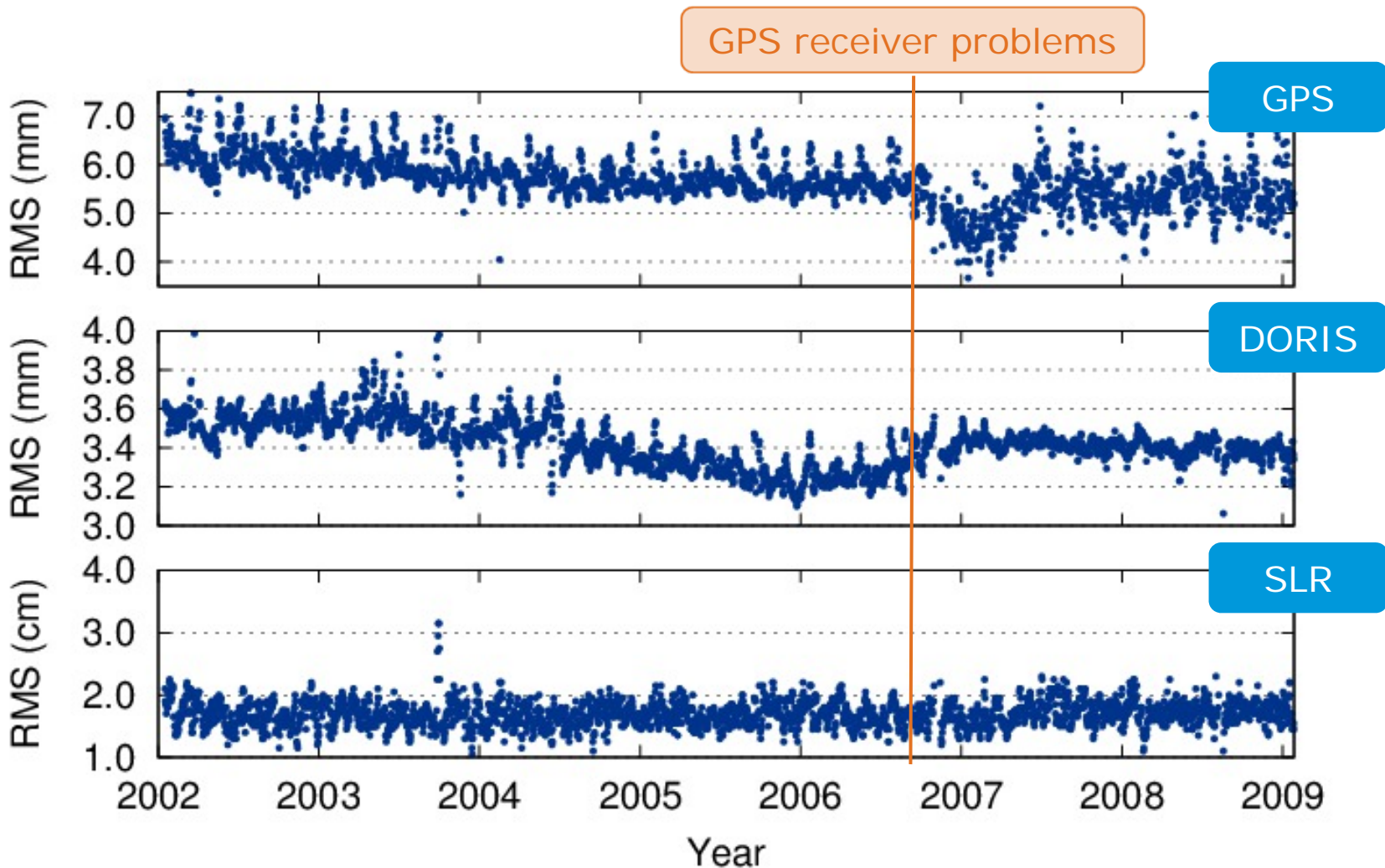
Scaling of solar radiation pressure model

Jason-2



RMS of observation residuals

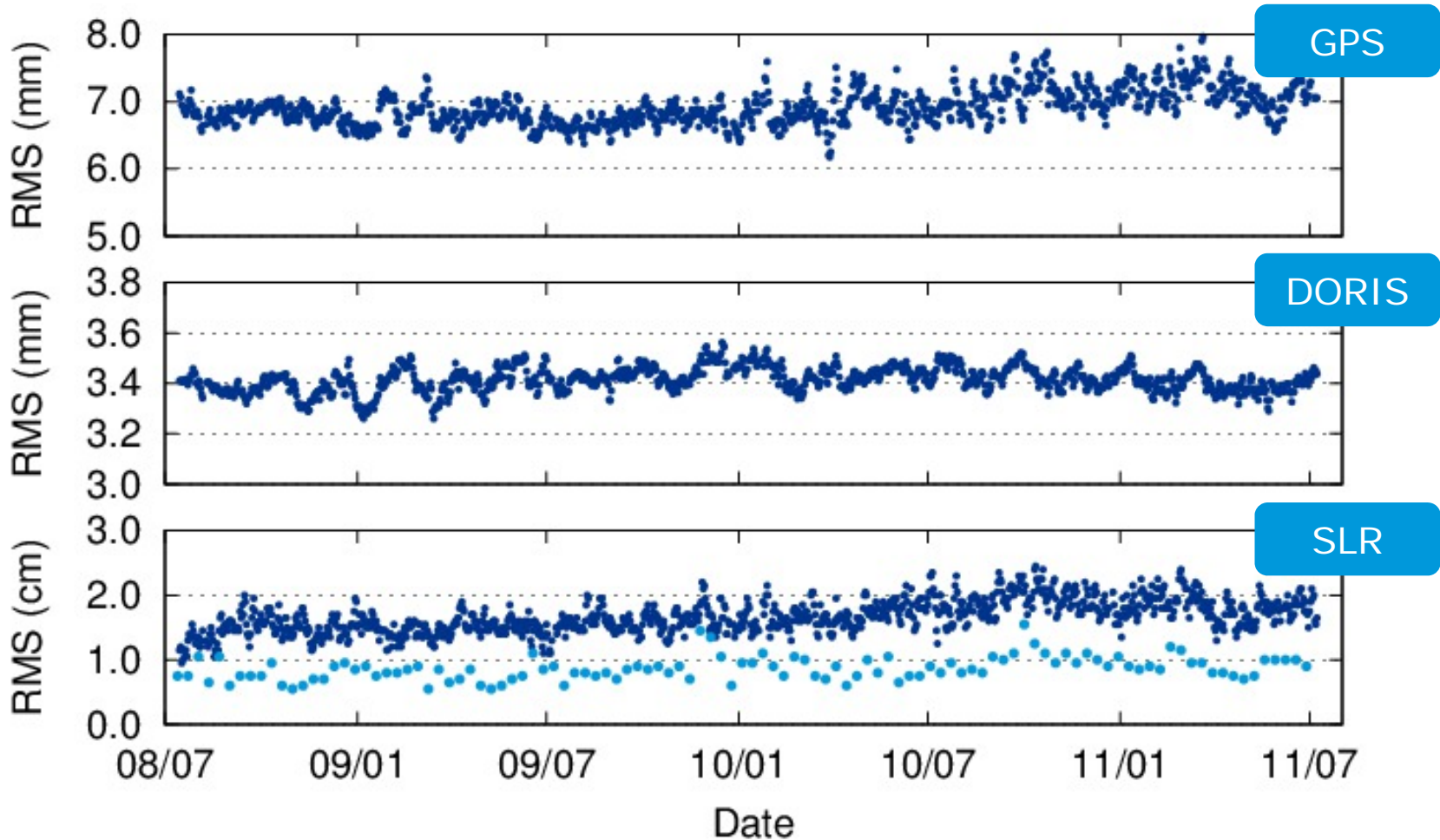
Jason-1



RMS of observation residuals

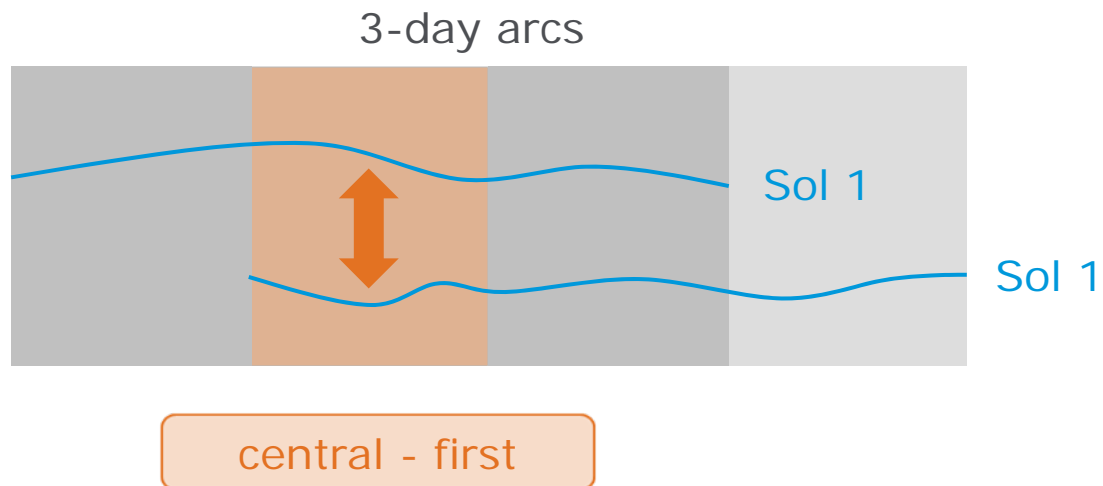
Jason-2

light blue dots SLR core station *rms* per cycle, no trend visible



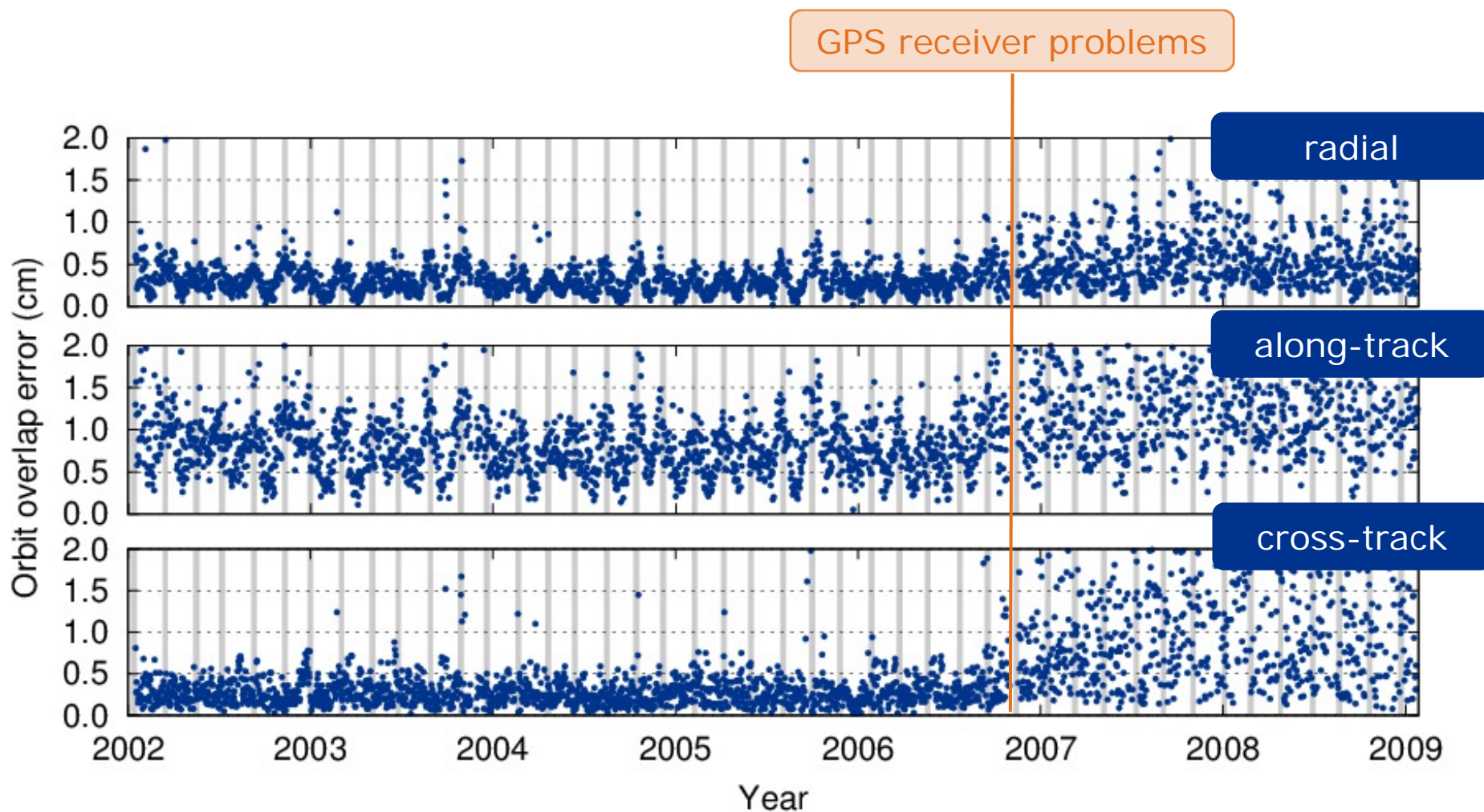
Orbit overlap errors

Overview



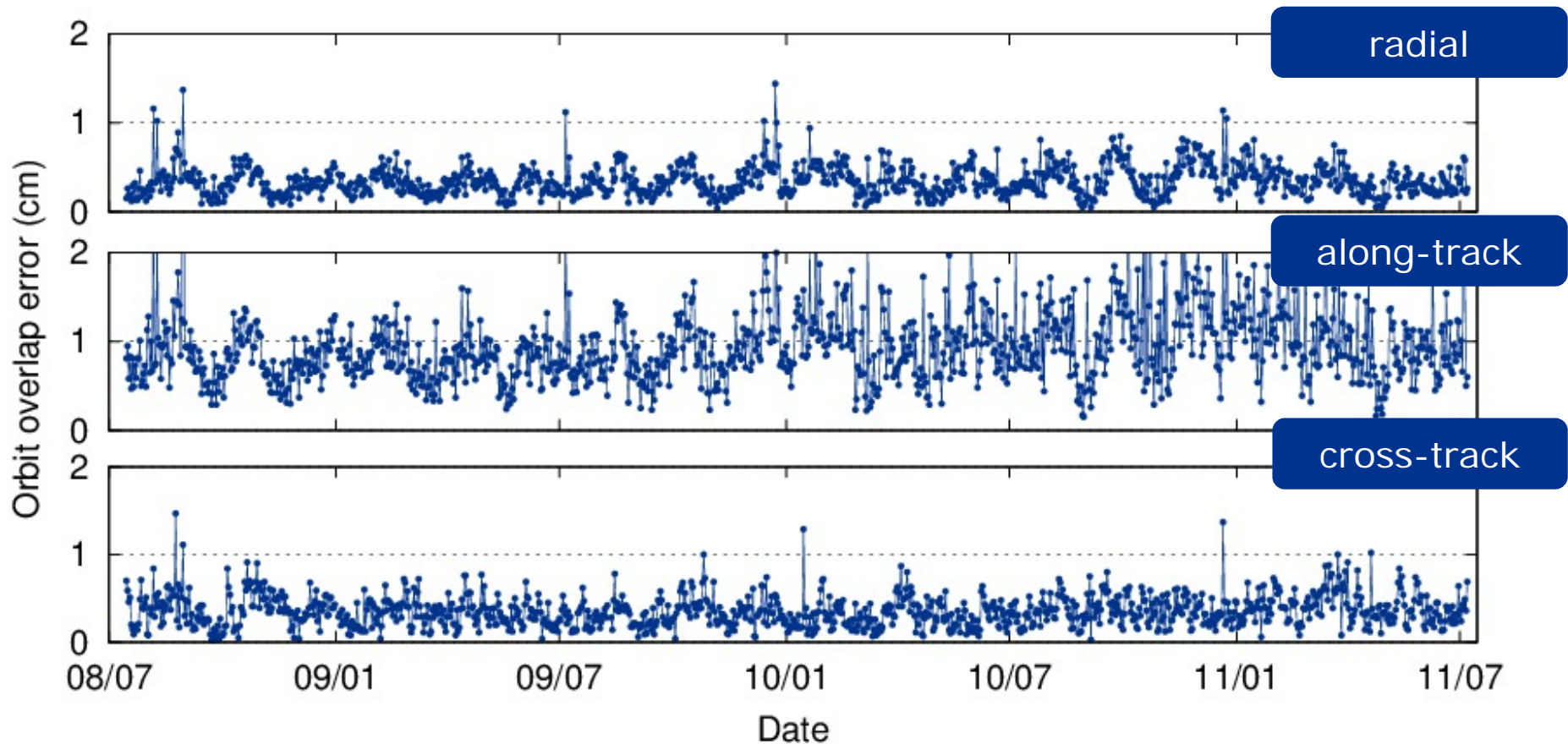
Daily RMS of orbit overlap errors

Jason-1



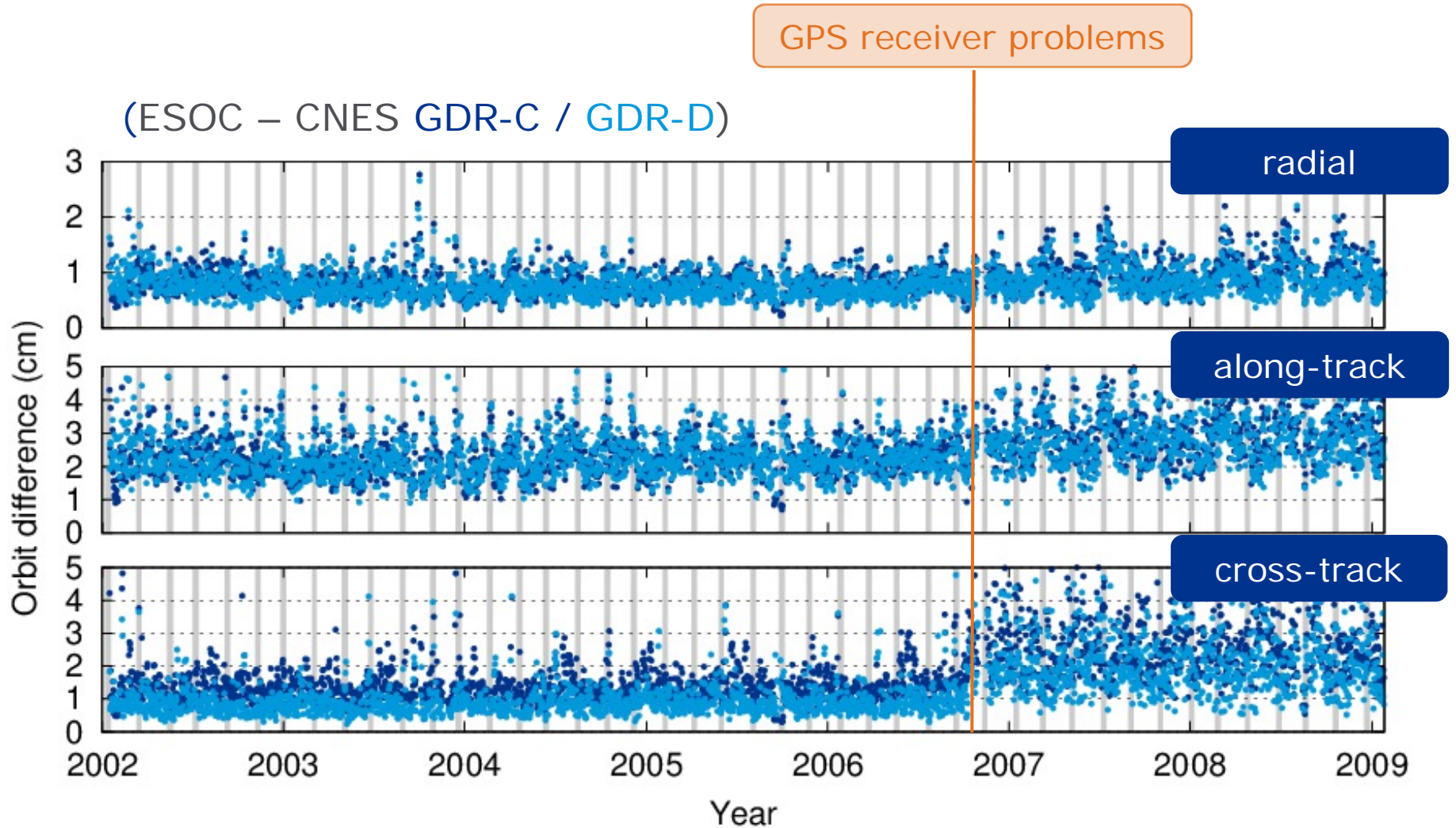
Daily RMS of orbit overlap errors

Jason-2



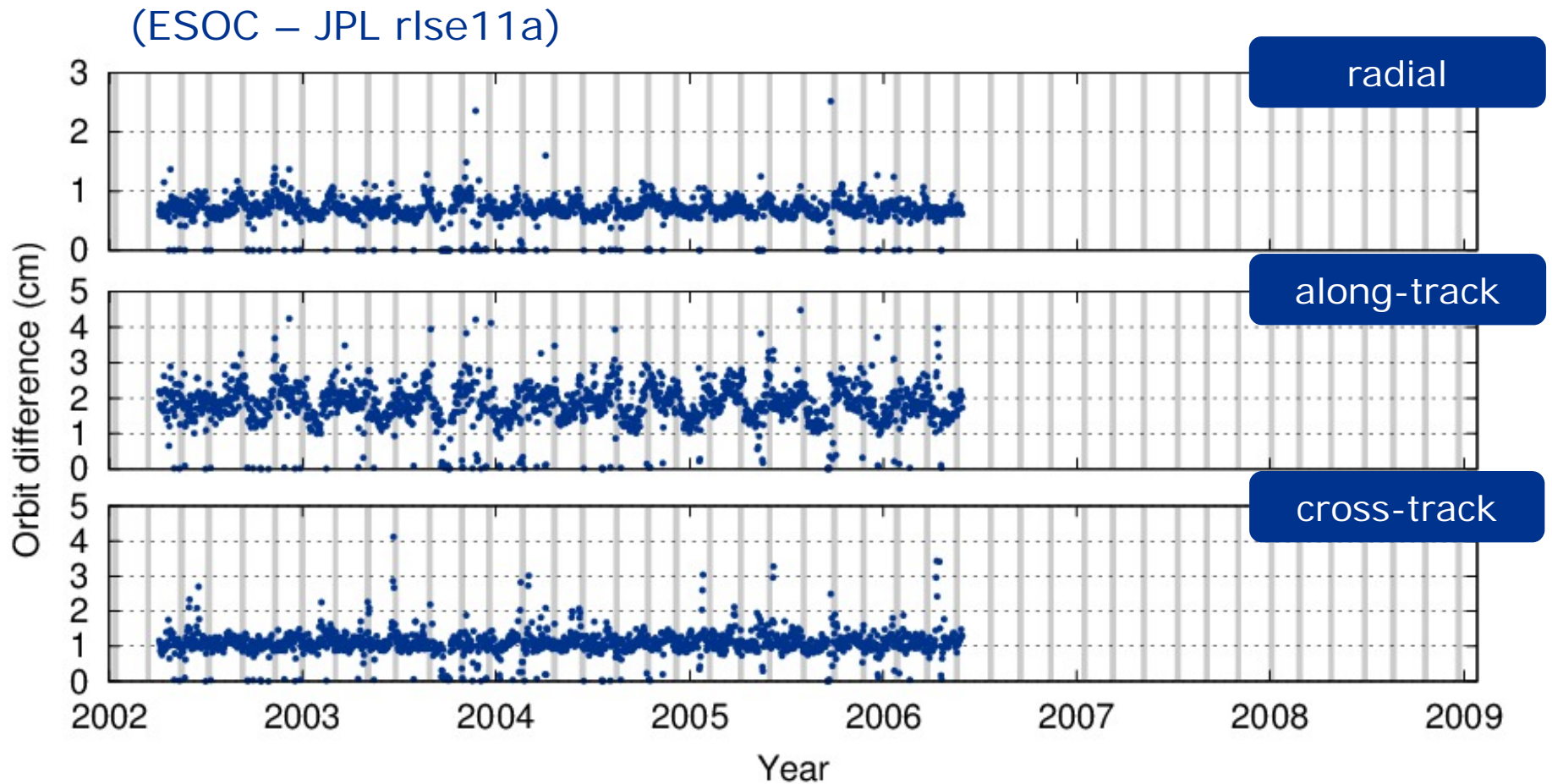
Daily RMS of orbit differences

Jason-1



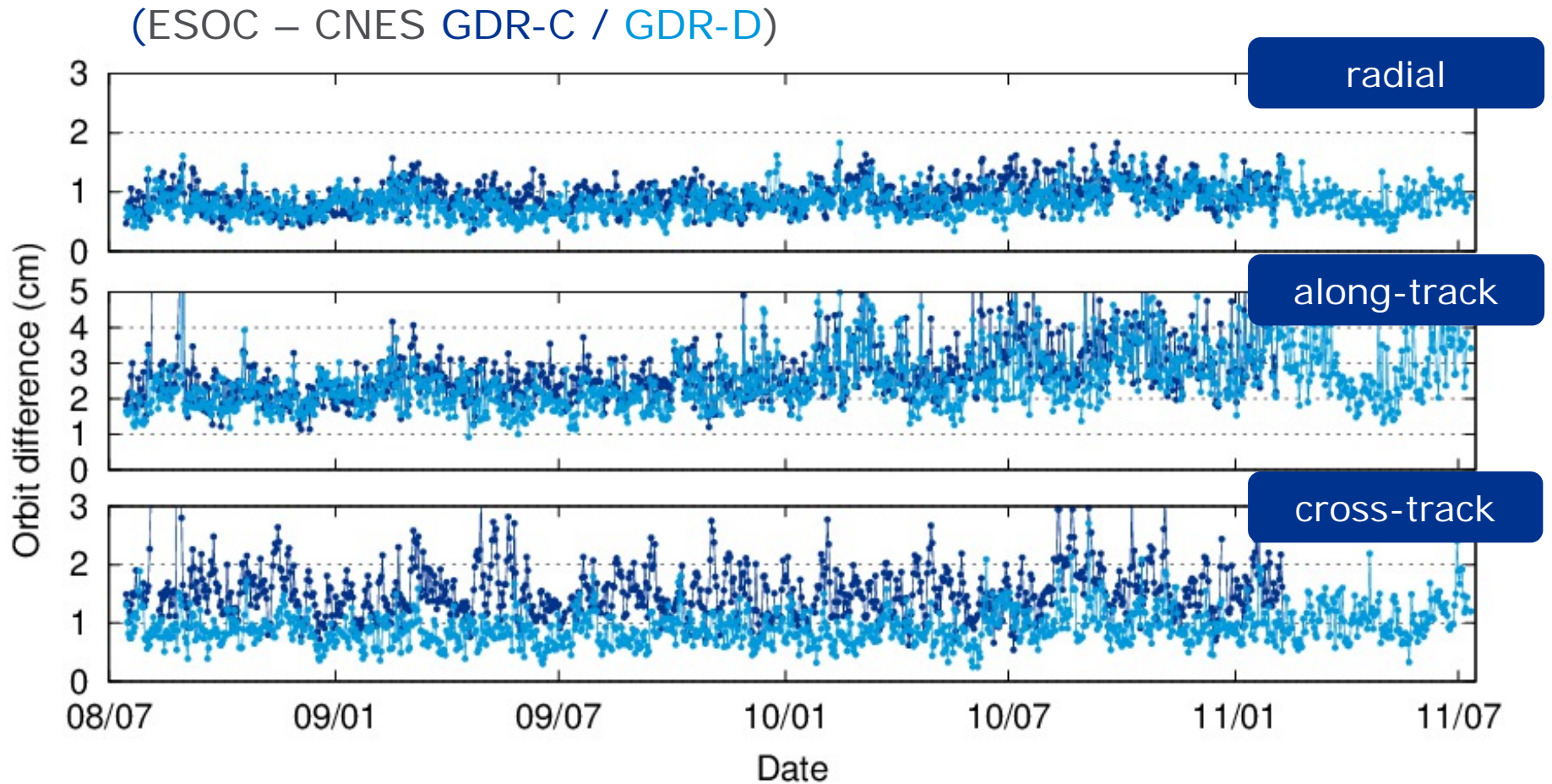
Daily RMS of orbit differences

Jason-1



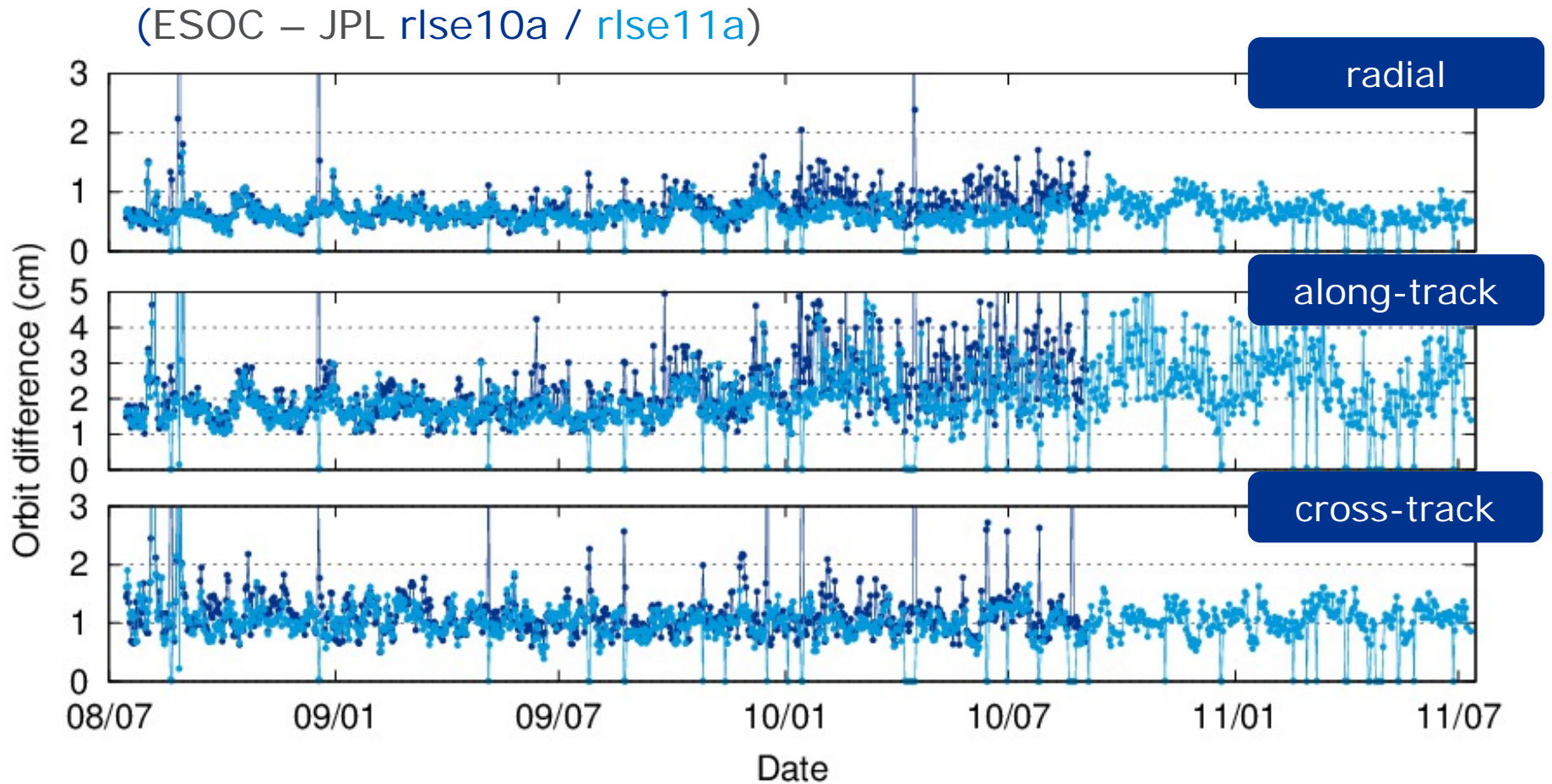
Daily RMS of orbit differences

Jason-2



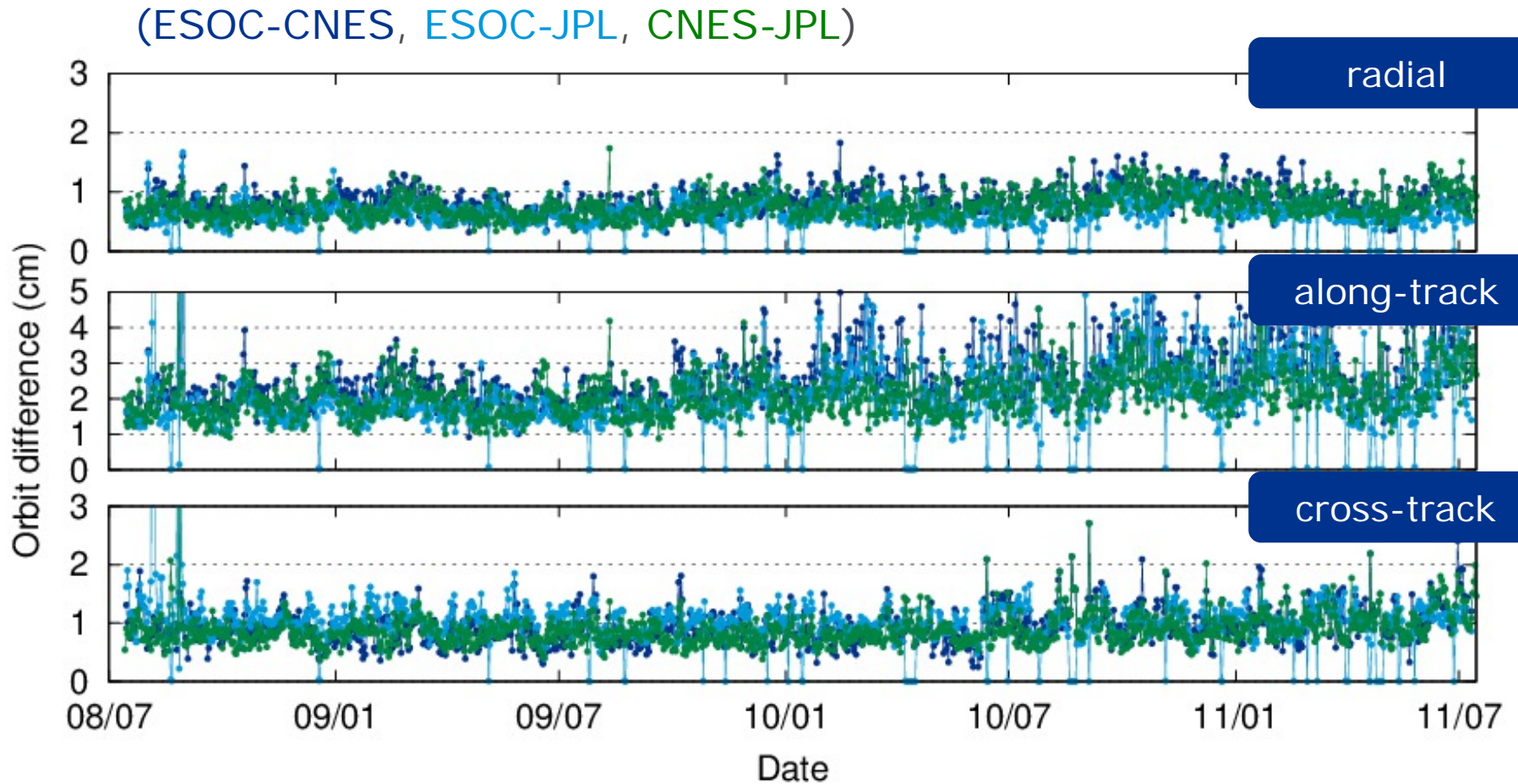
Daily RMS of orbit differences

Jason-2



Daily RMS of orbit differences

Jason-2

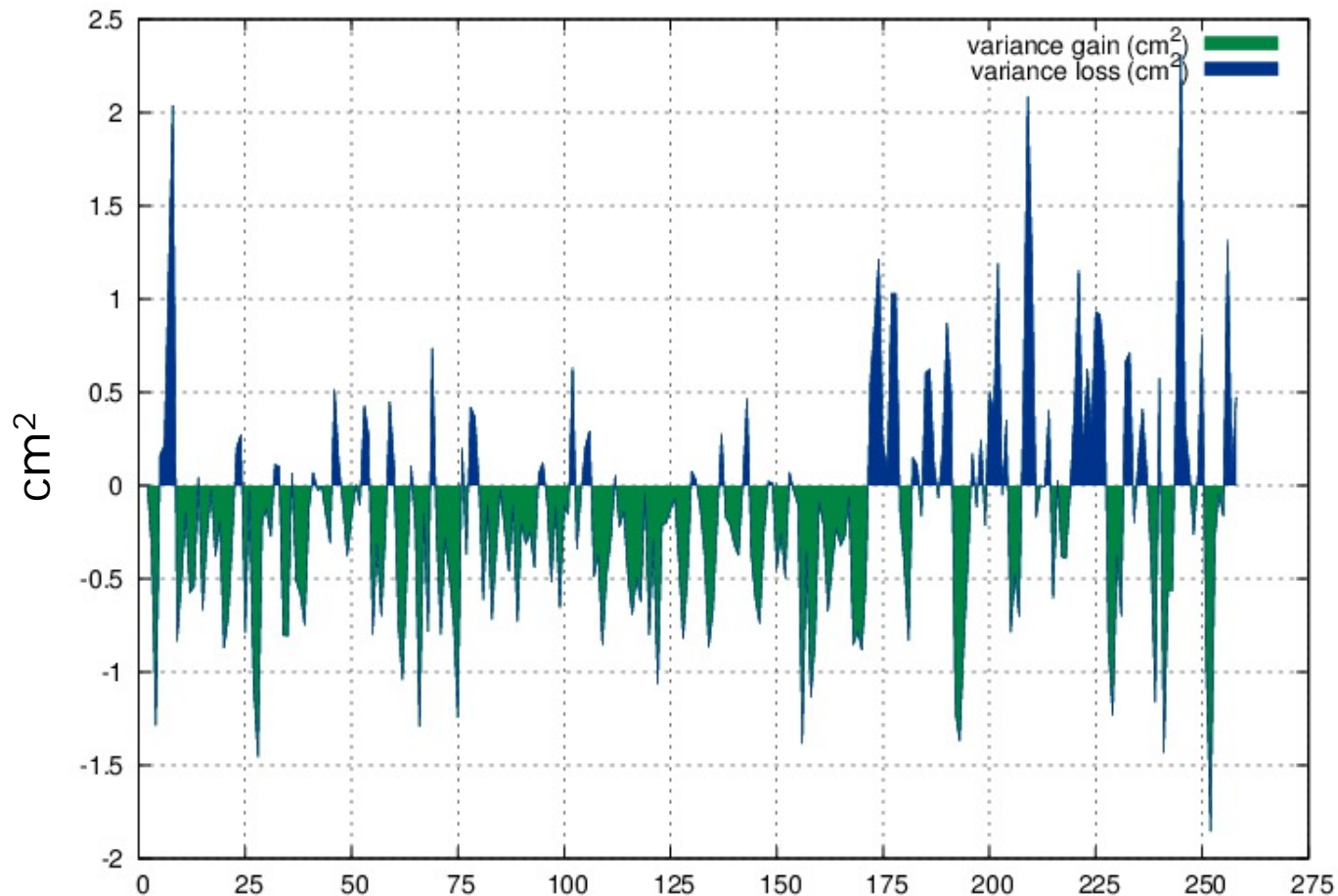


Altimeter Crossover Performance

Jason-1



Altimeter crossover gain (green) per cycle of the ESOC orbits compared to the CNES GDR-C orbits

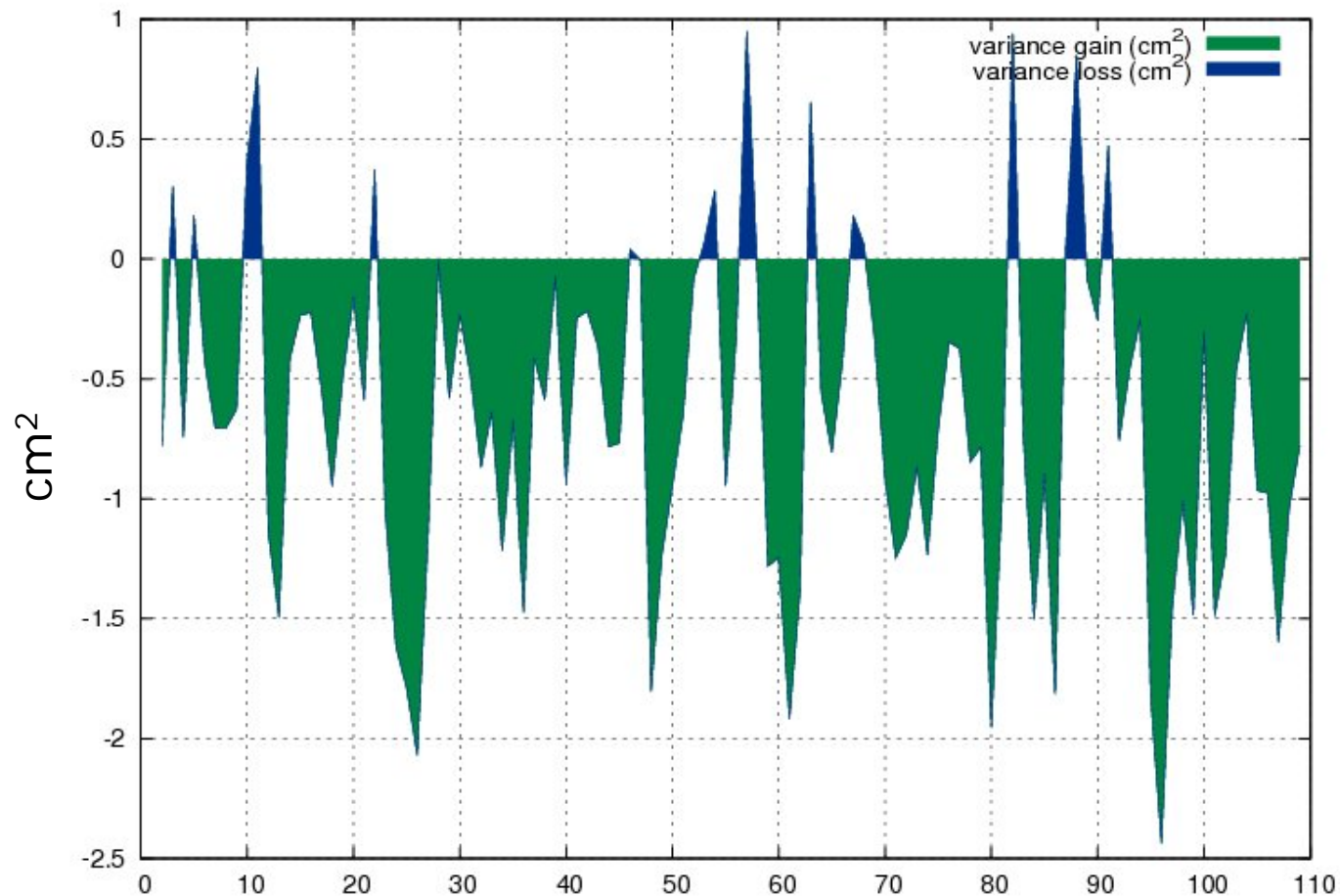


Altimeter Crossover Performance

Jason-2



Altimeter crossover gain (green) per cycle of the ESOC orbits compared to the CNES GDR-C orbits



- The Navigation Support Office at ESOC is able to process in an **homogeneous** way with a **single software** Jason-1 and Jason-2 in addition to the existing processing of the ESA altimeter missions: ERS-1/2, Envisat and Cryosat-2
- All geodetic tracking techniques can be processed and we are not depend on external GPS products e.g., orbits or clocks.
- good agreement of solutions, no systematic bias between tracking techniques
- **good agreement with independent orbit solutions** (CNES, JPL, GSFC)
- Performance of orbit solutions highly correlated with the quality of the GPS receiver.

- Orbit solutions for Envisat, Cryosat-2, Jason-1/2 and ERS-1/2 (as part of REAPER project) are available on our ftp server
 - <ftp://dgn6.esoc.esa.int>
 - as a service to the altimetry community
 - continues extension/update of time series
- Jason-1 data will be extended till 2011 and continuously extended like Jason-2
- We will extend our processing depending on staffing availability with Topex/Poseidon.
- We will keep updating our processing with newer models when they become available.

Thank you



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