Ocean Surface Topography Science Team Meeting

Precise Orbit Determination Splinter

JASON-2 , JASON-3 ~~and SENTINEL-3A~~ POD STATUS

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CONTENTS

GDR-F STANDARD PROPOSAL

	GDR-E	GDR-F (preliminary)
Surface forces	Atmospheric model : DTM-13 for Jason1&2 Calibrated solar radiation pressure model	*unchanged*
Geopotential	EIGEN-GRGS.RL03-v2.MEAN-FIELD Non-tidal TVG: one annual, one semiannual, one bias and one drift terms for each year up to deg/ord 80 C21/S21 modeled according to IERS 2010 conventions Atmospheric gravity: 6hr NCEP pressure fields (72x72) + tides from Biancale-Bode model	**EIGEN-GRGS.RL03-v3.MEAN-FIELD** *unchanged* **C21/S21 modeled consistent with TVG** Atmospheric gravity: **3hr ECMWF + 3hr TUGO ATTMO University Strasbourg**
Geocenter	Seasonal non-tidal geocenter motion from J.Ries model, for DORIS/SLR stations Tidal: ocean loading and S1-S2 atmospheric pressure loading	**Full non-tidal geocenter motion derived from DORIS analysis**, for DORIS/SLR stations *unchanged*

GDR-F STANDARD PROPOSAL

	GDR-E	GDR-F (preliminary)
Loading	Ocean loading: FES2012 S1-S2 atmospheric pressure loading, implementation of Ray & Ponte (2003) by Dr. Van Dam	Ocean loading: **FES2014b** *unchanged*
Pole tides	Pole tide: solid earth pole tides and ocean pole tides (Desai, 2002) Mean pole cubic+linear (IERS 2010)	*unchanged* **Linear mean pole (UAW 2017)**
GPS constellation	JPL solution in “native” format (orbits and clocks), referenced to the CoM of the solid Earth/Ocean – fully consistent with IGS08	JPL solution in “native” format (orbits and clocks), referenced to the CoM of the solid Earth/Ocean **for JASON-2** **GRG/IGS solution with fixed ambiguity for JASON-3** Fully consistent with **IGS14**
Propagation delay	Tropospheric model GPT GMF	Tropospheric model **GPT GMF1**

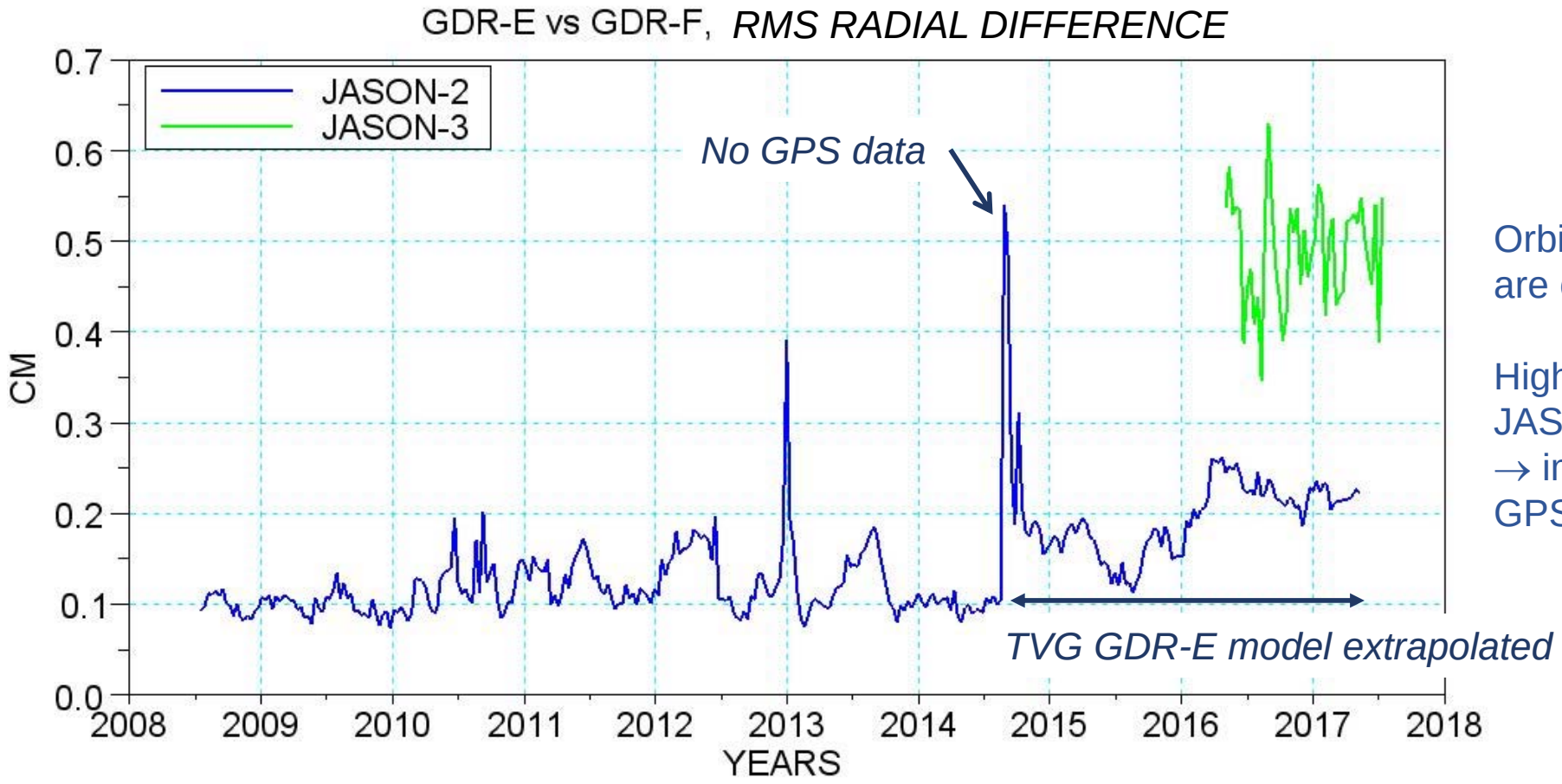
GDR-F STANDARD PROPOSAL

	GDR-E	GDR-F (preliminary)
Others	DORIS station coordinates in DPOD 2008 SLR coordinates stations in SLRF2008	DORIS station coordinates in **DPOD 2014** SLR station coordinates in **SLRF2014** **Low elevation DORIS measurement (>5°) with weighting function and tropospheric gradients** **SENTINEL3-A position corrections** **SLR GPS DORIS ANTENNAS +2cm cross track, center of mass correction** **GPS ANTENNA +1.8cm radial** **SLR ANTENNA +1.5cm along track**

To be integrated in final GDR-F version :

- **MSIS2000 model for Sentinel3-A**
- **New GRGS potential version with improvement on sectorial terms**
- **GPS constellation with global translation parameters**

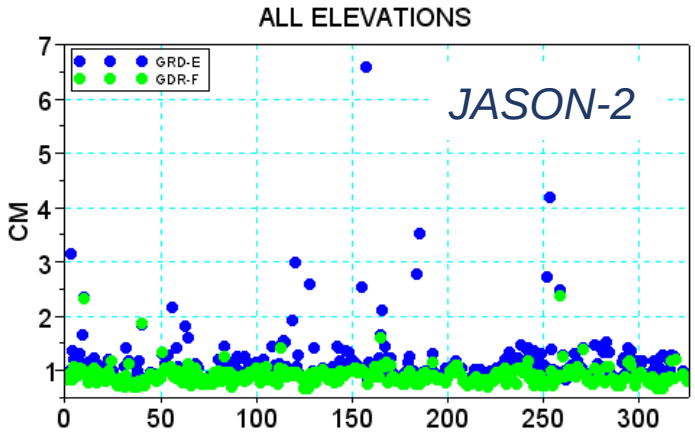
JASON-2 & JASON-3, ORBIT COMPARISONS

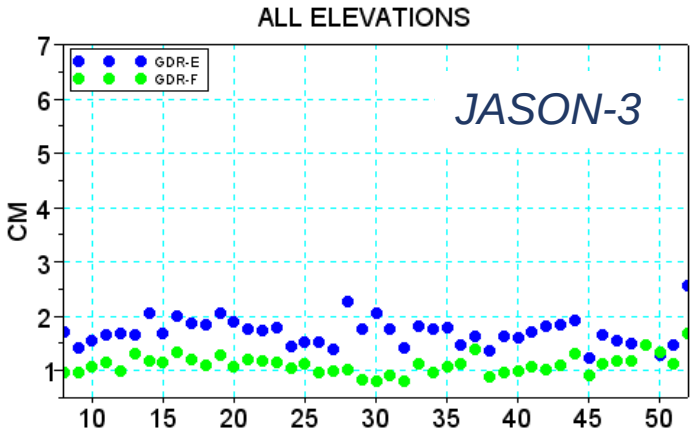


Orbits comparisons are ok

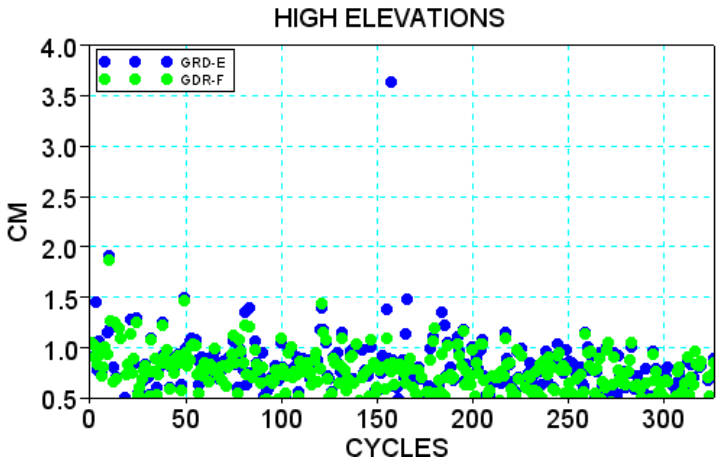
Higher differences for JASON-3
→ impact of fixing GPS ambiguities

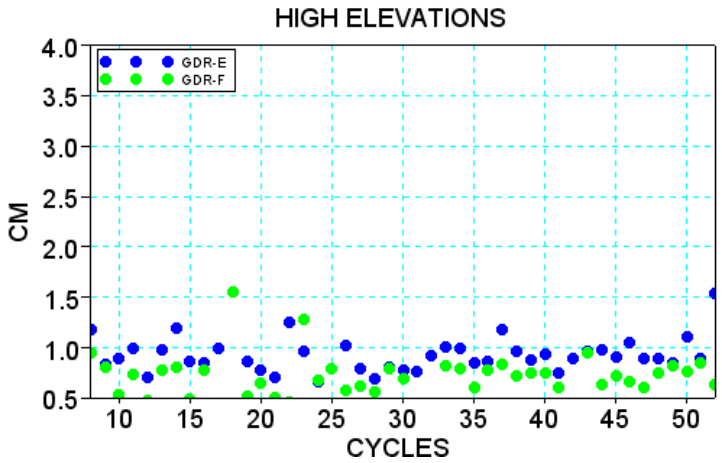
SLR RMS CORE NETWORK





mission	IMPROVEMENT
JASON-2	*2. MM*
JASON-3	*6.2 MM*



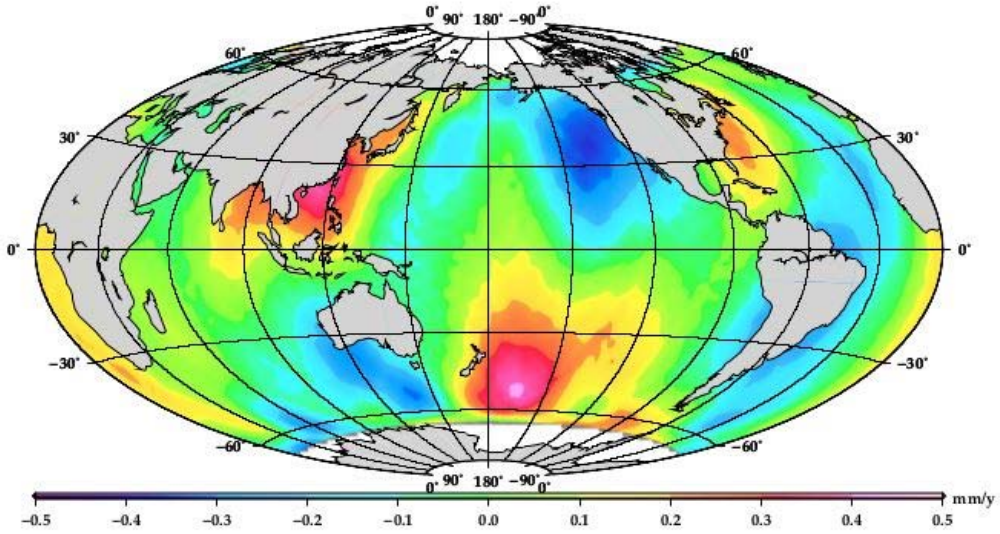


mission	IMPROVEMENT
JASON-2	*0.8 MM*
JASON-3	*2.5 MM*

CORE NETWORK : L7090 L7105 L7810 L7830 L7840 L7941

JASON-2, GEOGRAPHICALLY CORRELATED

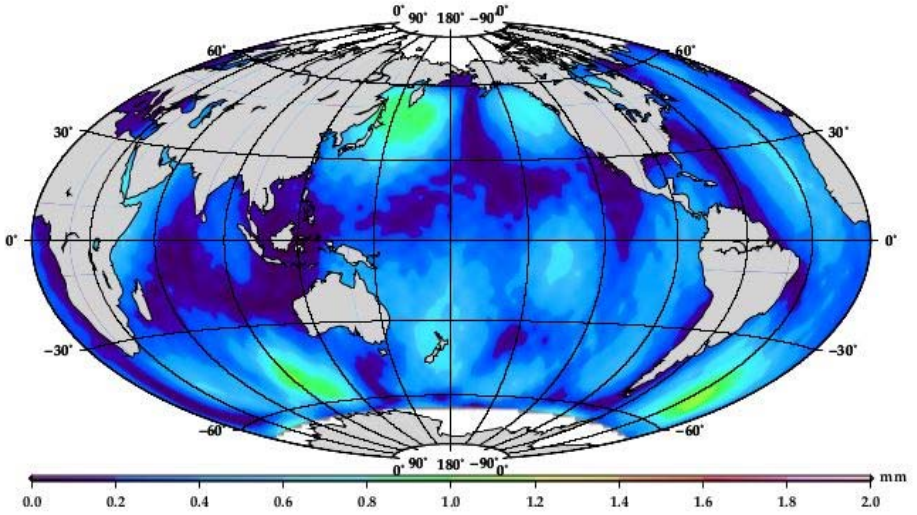
GDR-E vs GDR-F, cycles 1→326



-0.5 ⟷ 0.5mm/y

drift amplitude

GDR-E vs GDR-F, cycles 1→326

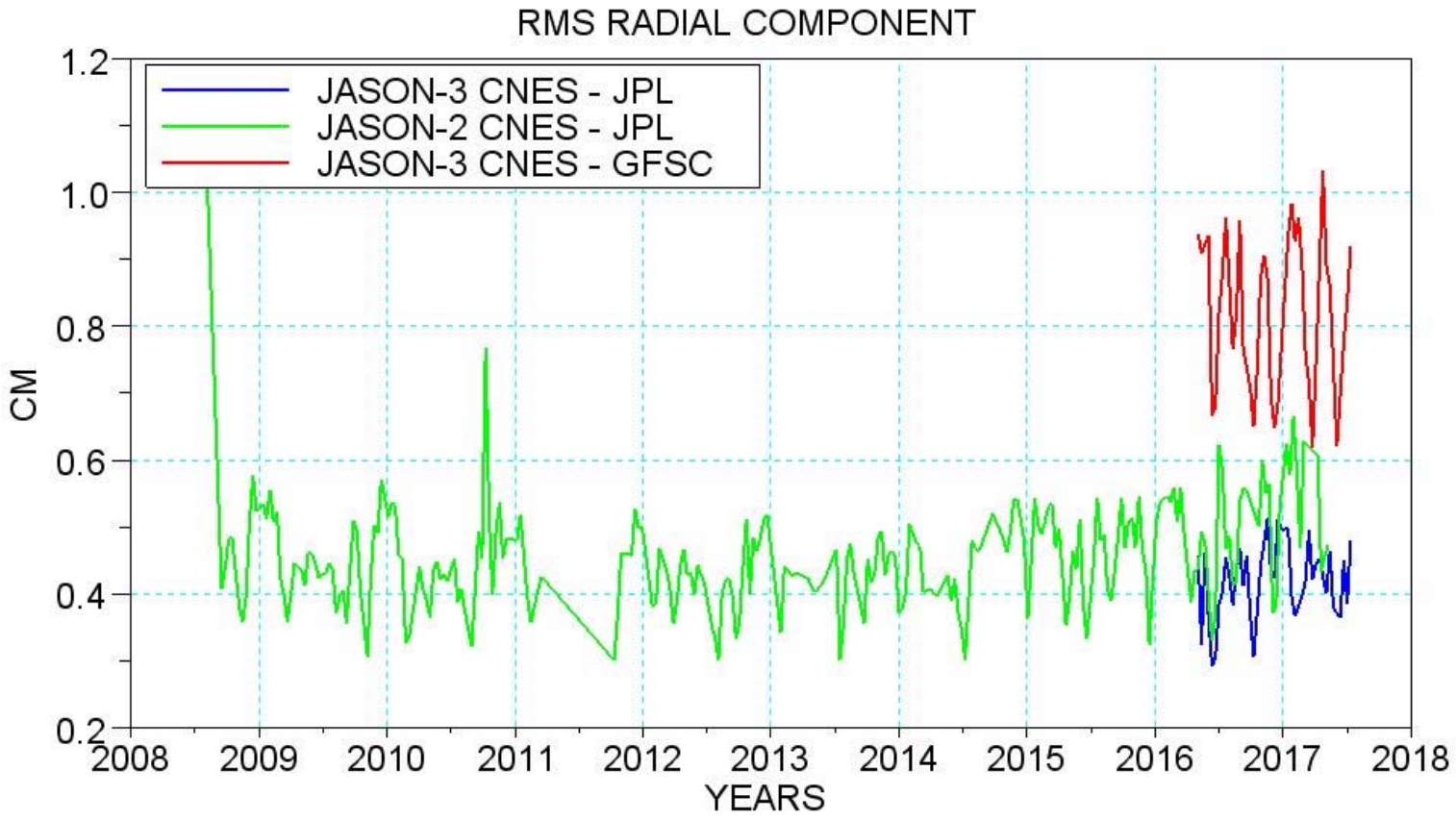


0. ⟷ 2.0mm

annual amplitude

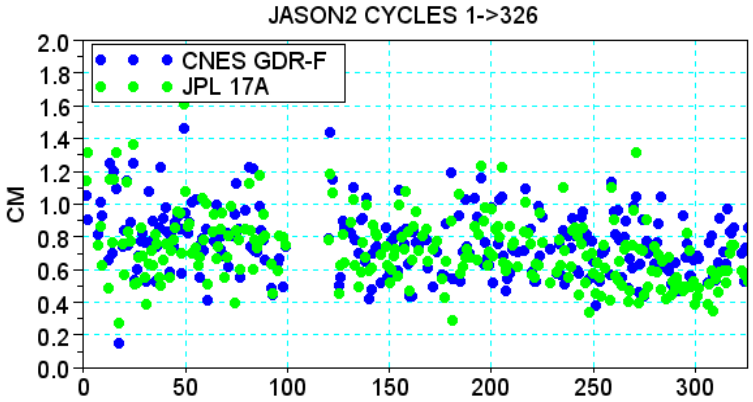
Difference between GDR-E and GDR-F D+G reduced dynamic orbits

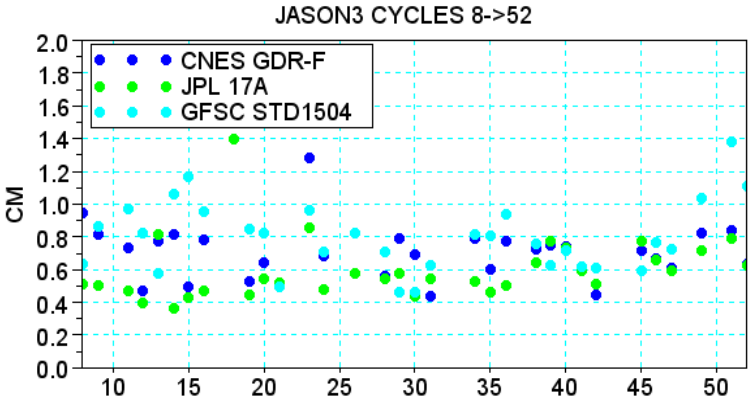
GFSC JPL, ORBIT COMPARISONS

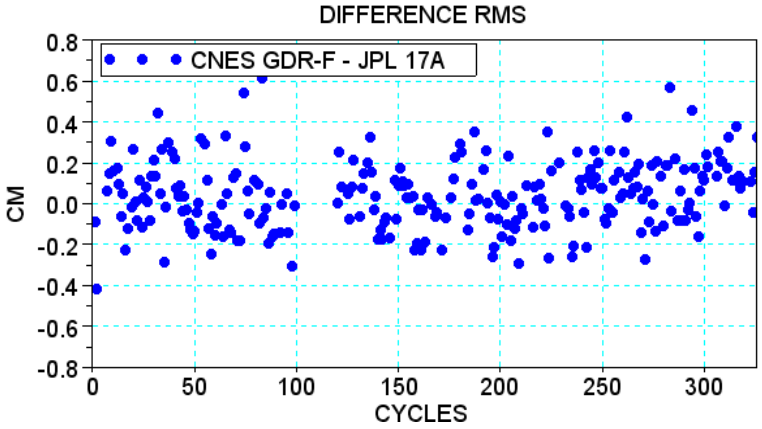


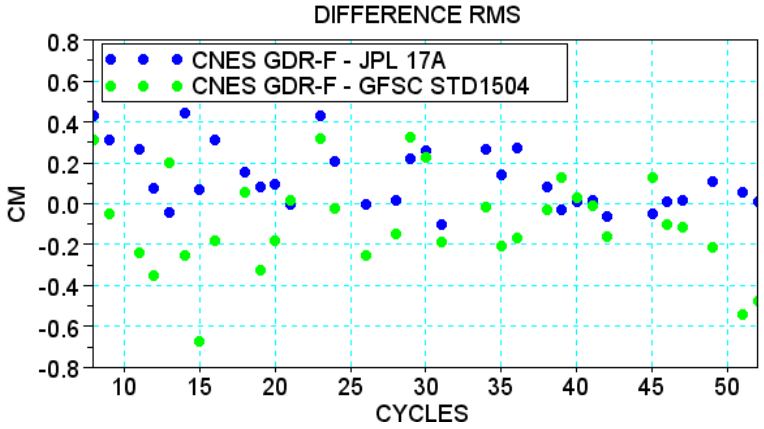
CNES GDR-F JASON-3 orbits closest with JPL than GFSC (DORIS SLR)

GFSC JPL, RMS SLR COMPARISONS









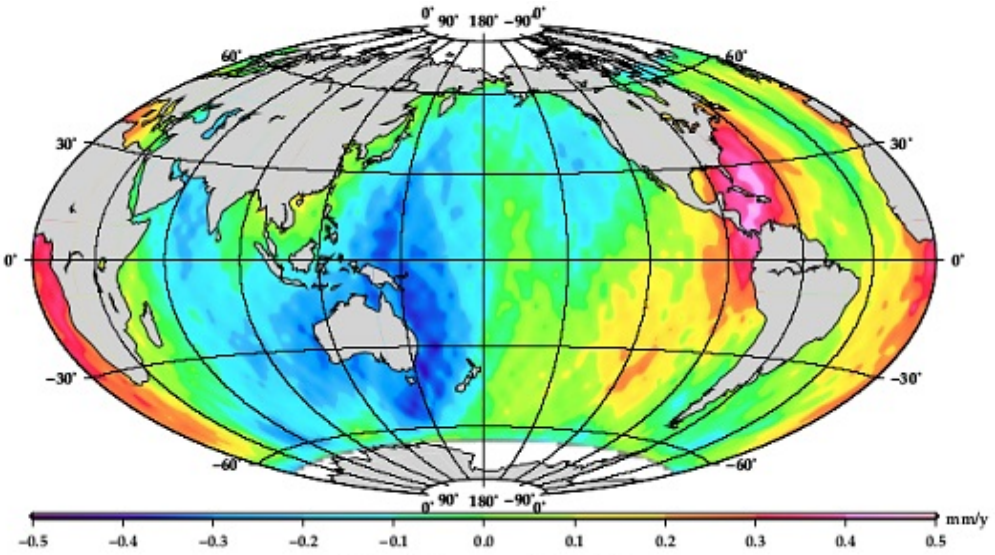
mission	GDR-F - JPL
JASON-2	*0.4 MM*
JASON-3	*0.8 MM*

mission	GDR-F - GFSC
JASON-3	*-1.1 MM*

CORE NETWORK AND HIGH ELEVATION

CNES GDR-F JPL 17A, GEOGRAPHICALLY CORRELATED

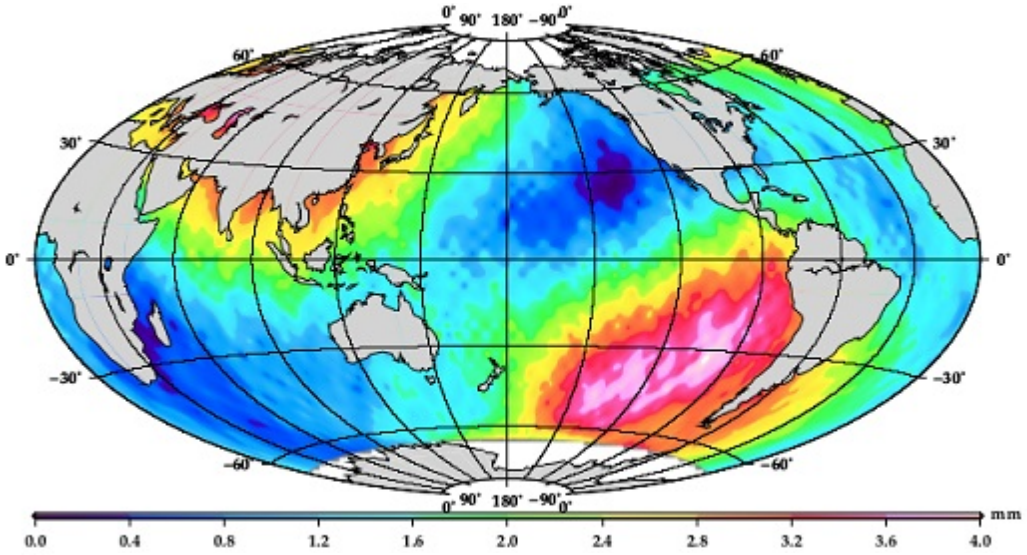
CNES GDR-F vs JPL 17A, cycles 1→326



-0.5 ⟷ 0.5mm/y

drift amplitude

CNES GDR-F vs JPL 17A, cycles 1→326



0. ⟷ 4.0mm

annual amplitude

Difference between GDR-F reduced dynamic and JPL 17A orbits

CNES MOE vs POE ORBITS COMPARISONS

MOE : rapid orbit products, daily delivered
POE : precise orbit products taken as a reference

Cycle JASON-2	MOE DORIS RMS (MM)	MOE DORIS+GPS RMS (MM)
504	*7.1*	*3.1*
505	*6.3*	*3.4*
506	*6.1*	*4.3*

MOE products get closer to POE products !

Cycle JASON-3	MOE DORIS RMS (MM)	MOE DORIS+GPS RMS (MM)
056	*7.2*	*3.1*
057	*7.0*	*3.1*
058	*6.9*	*6.2*

CONCLUSION

Preliminary GDR-F standard shows small improvement in CNES orbits for JASON-2, more important for JASON-3 (fixed ambiguities)

Further improvements are expected with the final GDR-F standard.

CNES GDR-F JASON-2 and JPL orbits are very close.

CNES MOE DORIS+GPS products show good performances, 4mm

… THANK YOU FOR YOUR ATTENTION , ANY QUESTIONS ? …