Performance assessment Jason-1 GDR “C” /GDR “B”

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Introduction

- Jason-1 data (GDR: geophysical data record) were processed in version B until cycle 232 and in version C from cycle 232 until current cycle.
- Reprocessing of the GDR is made by JPL.
- Currently, a year of data has been reprocessed in GDR-C. The whole dataset will be available by mid-2009.
- For studies over the whole period, POE is available for cycles 1 to 239.
- JMR data are available for cycles 1 to 212

Content

- New features of GDR-C
- Global performances of GDR-C on the reprocessed period
- Analysis of new orbit on SSH calculation over the whole period
- Impact of new JMR and new orbit on mean sea level trends
- Linking of GDR-B and GDR-C series

New features of GDR-C

- Precise orbit:
  - New reference frame: ITRF2005 (vs ITRF2000 in version B)
  - new gravity field EIGEN-GL04C
  - Time-varying part and atmospheric effects
- JMR (wet tropospheric correction)
- Sea state bias fitted on MLE4 retracking algorithm (see Labroue, OSTST2006)
- High-resolution dynamic atmospheric correction (DAC)
- Pseudo time-tag bias correction
- Instrumental corrections impacting
  - Range (C-band especially ➔bifrequency ionospheric correction)
  - Sea wave height (SWH)
  - Backscatter coefficient (σ_0)

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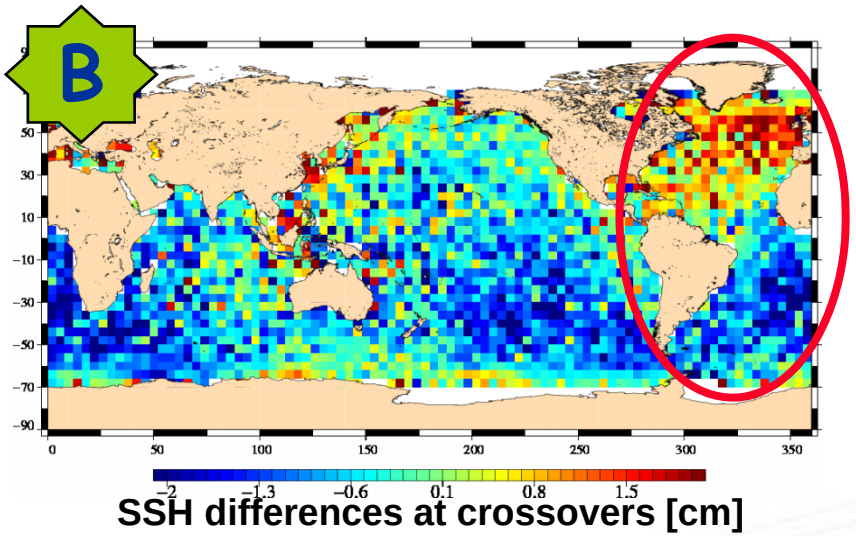
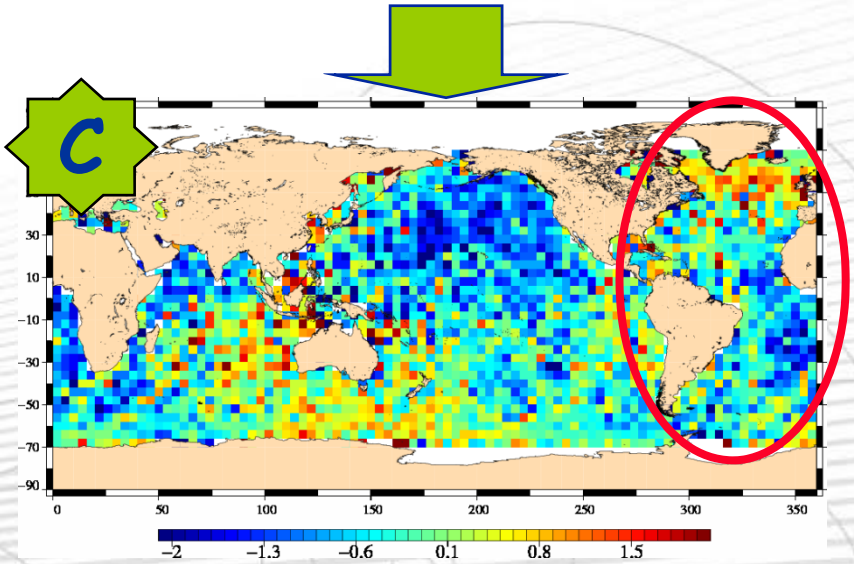
Global performances of GDR-C

- Current reprocessing : cycles 194 to 232

Crossover analyses

- Mean of SSH at crossover differences more homogenous ➔ better asc/des track coherence
- Significant impact in Atlantic ocean
- Causes:
  - new POE
  - Introduction of the pseudo time-tag bias correction

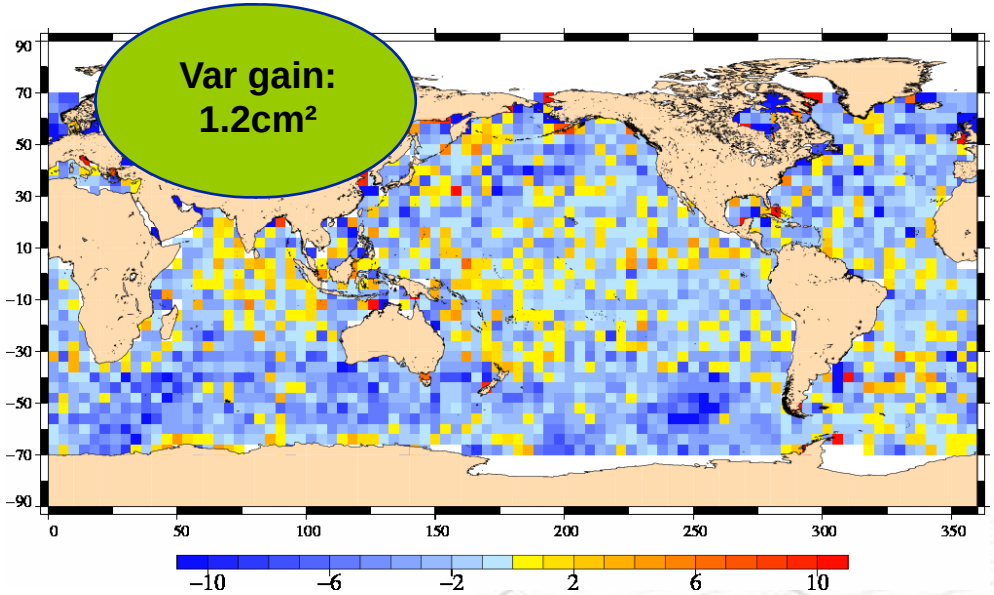




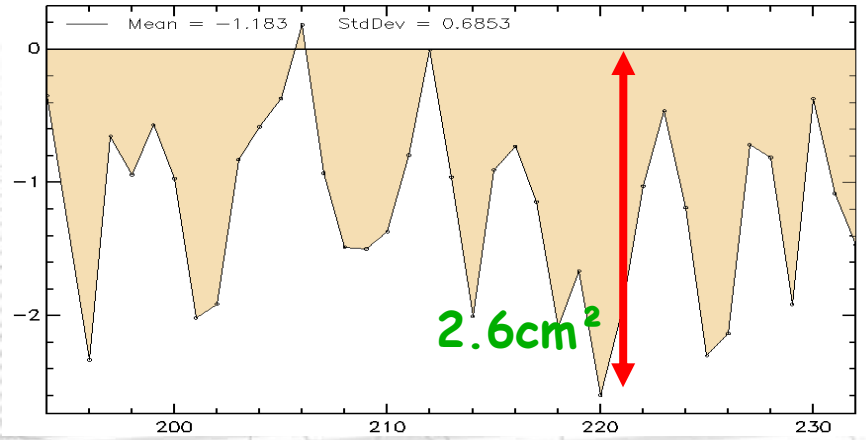
Global performances of GDR-C

Crossover analyses

- Clear variance gain (blue areas)
- Average gain: 1.2cm²
- Causes:
  - New POE
  - New JMR
  - Introduction of the pseudo time-tag bias correction



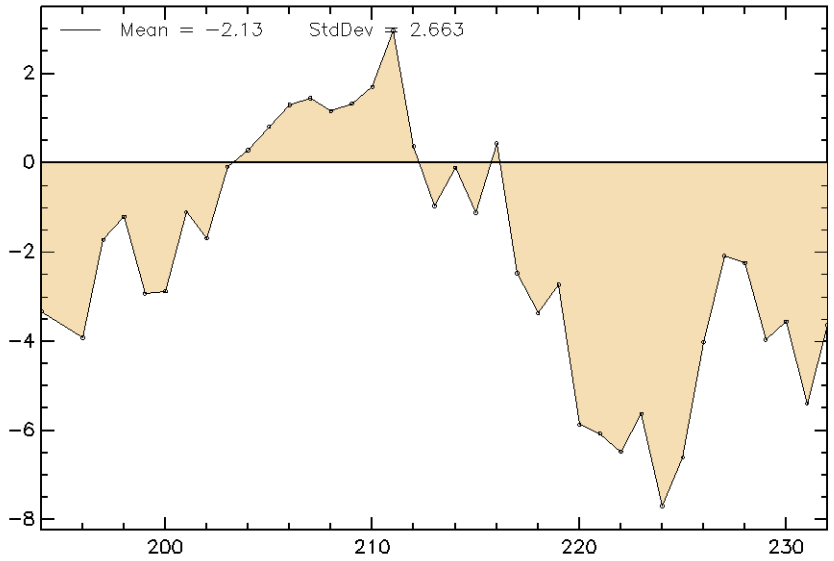
- Time variations of the variance gain (0-2.6cm²)



Global performances of GDR-C

Along-track analyses

- Annual signal
- Globally, variance reduction
- Cause: orbit change



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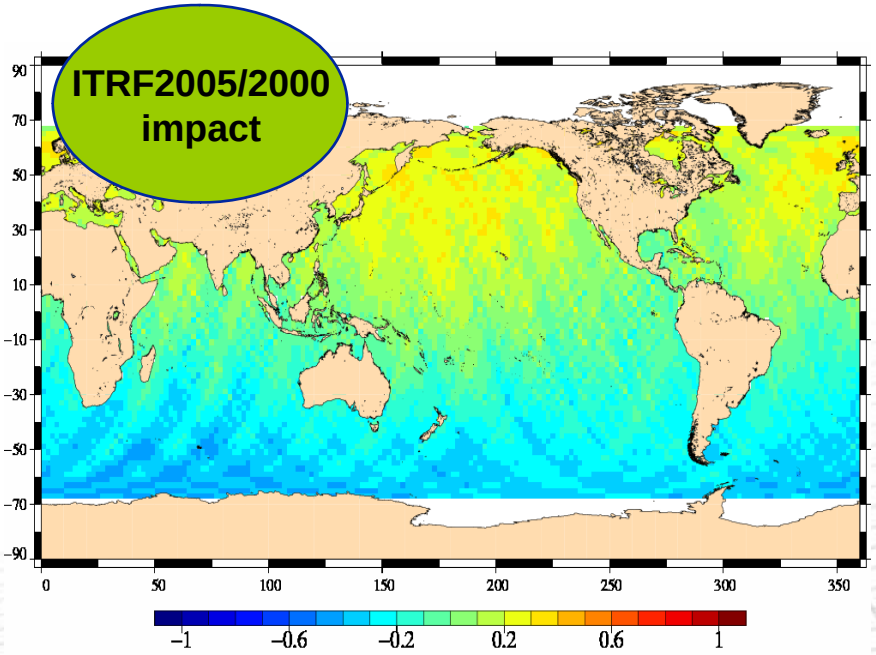
Analysis of new orbit

- New reference frame: ITRF2005 (vs ITRF2000 in version B)
- New gravity field: EIGEN-GL04C (GRACE)
- Time-varying part and atmospheric effects

- Availability : cycle 1 to 239

- N/S bias: ITRF change

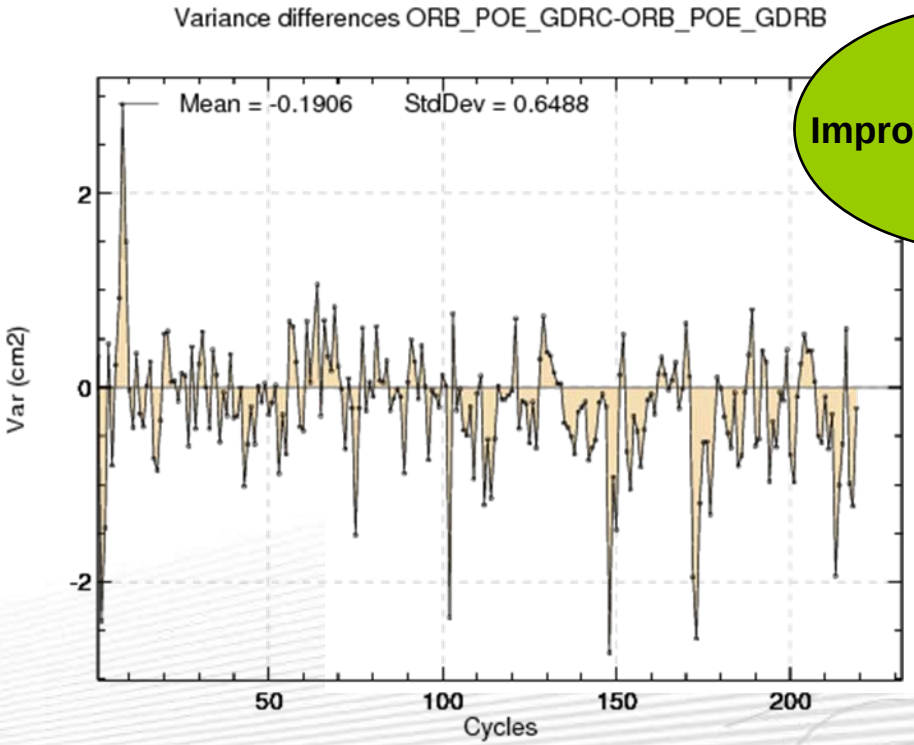


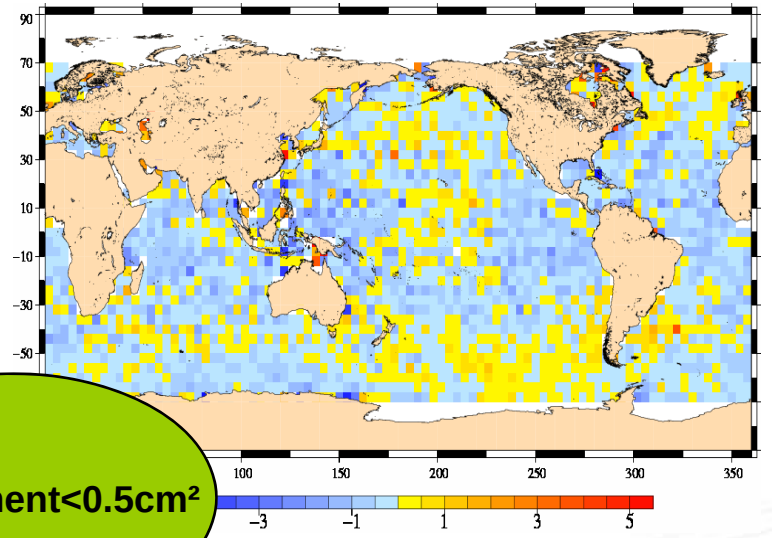
ORB_POE_GDRC – ORB_POE_C (cm)

Analysis of new orbit

Crossovers:

- Orbit change affects little the crossover performances



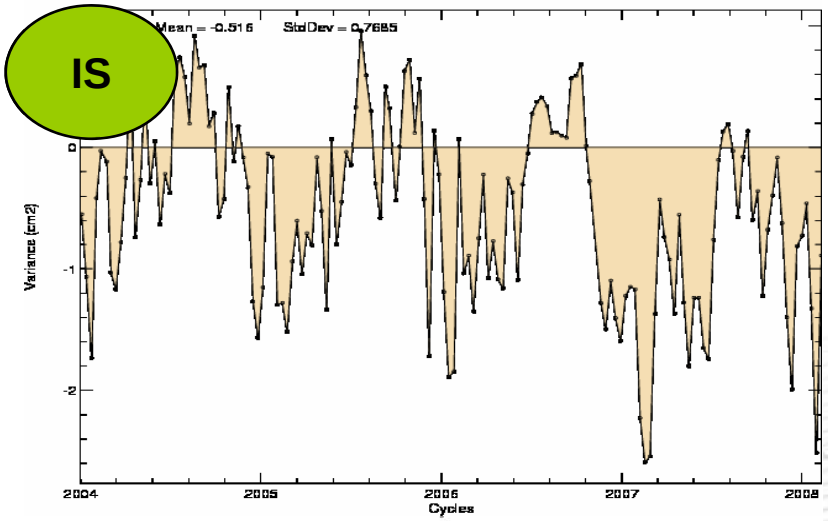


Improvement<0.5cm²

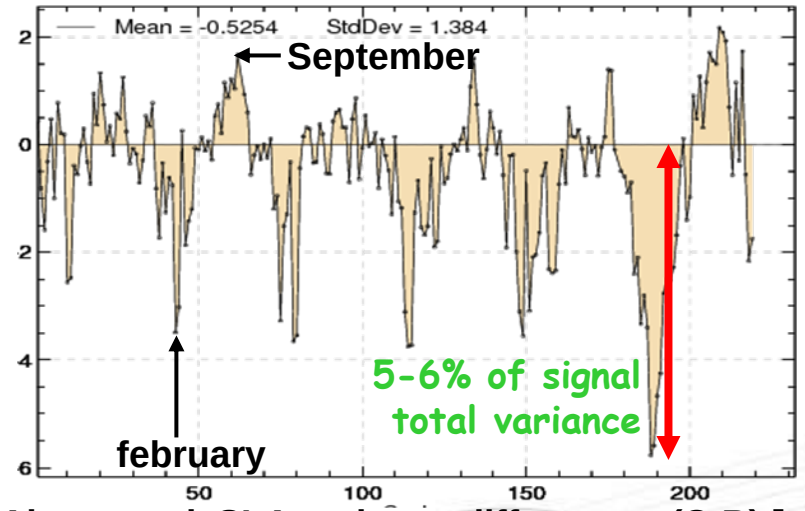
…ifference of SSH Variance (C-B)

Analysis of new orbit

- Important impact on along-track SLA variance
- Annual signal + amplitude increases at the end of the series



Var(SLA_{GDRC}-SLA_{IS}) – Var(SLA_{GDRB}-SLA_{IS}) [cm²]



Along-track SLA variance differences (C-B) [cm²]

- Same annual pattern when comparing altimeter/tide gauges and altimeter/in situ profiles for GDR-C and GDR-B
- Orbit change does not affect the wavelength of the observed mesoscale ocean signal

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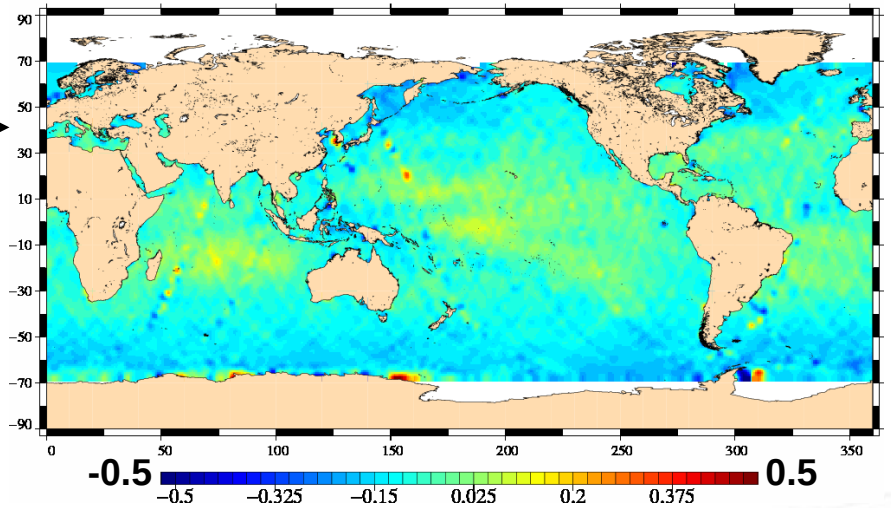
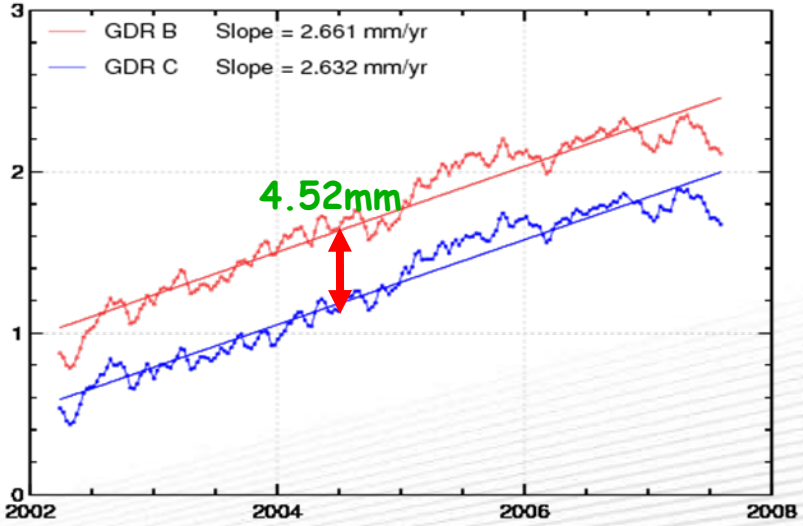
Impact of new JMR and orbit on MSL trends

- Little impact of JMR on MSL slopes
- No impact on global trend



MSL slope differences with JMR GDR-C/GDR-B [mm/year]

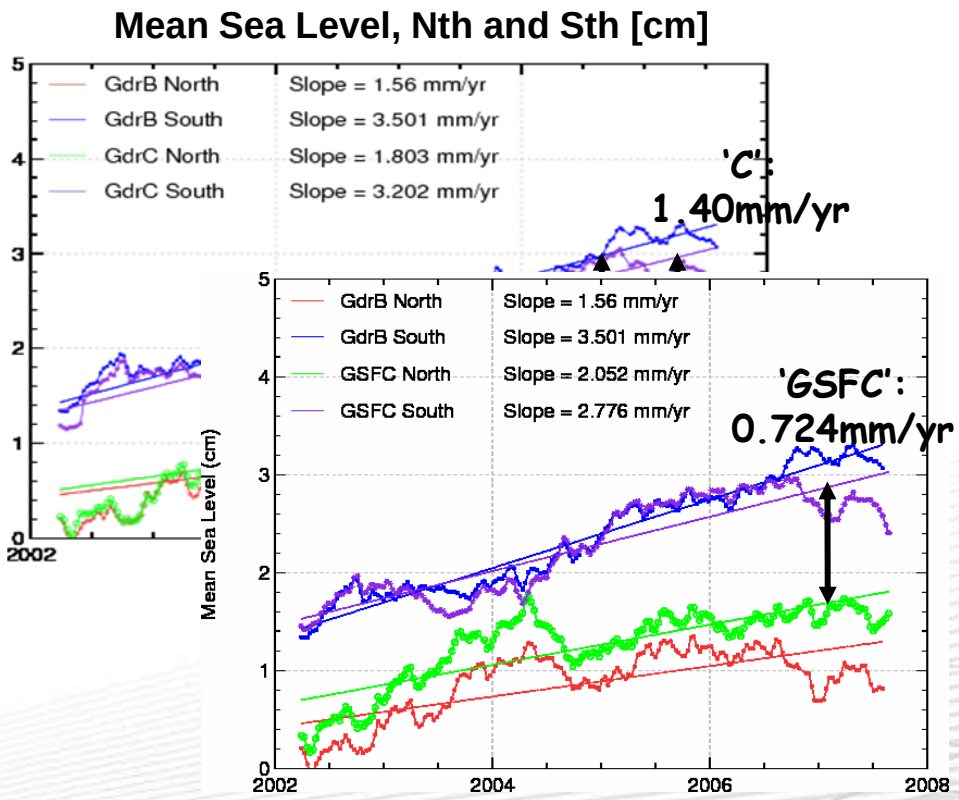
Mean Sea Level [cm]

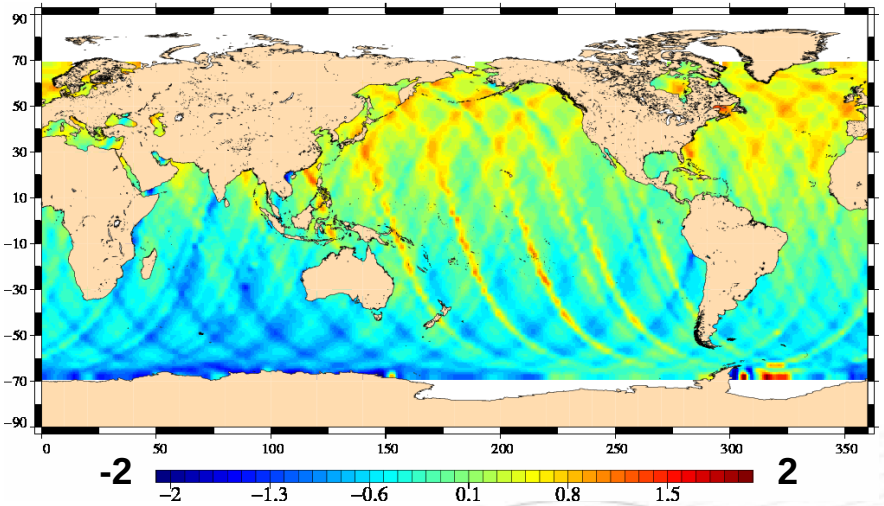


- Almost constant 4.52mm bias

Impact of new JMR and orbit on MSL trends

- North/South bias : ITRF2005/2000
- -1.5 (south) to +1.5mm/yr difference
- Global impact on trend <0.1mm/yr





MSL slope differences with POE GDR-C/GDR-B

[mm/year]

- North/South slope divergence reduced with GDR-C
- But not as much as with GSFC ITRF2005 solution

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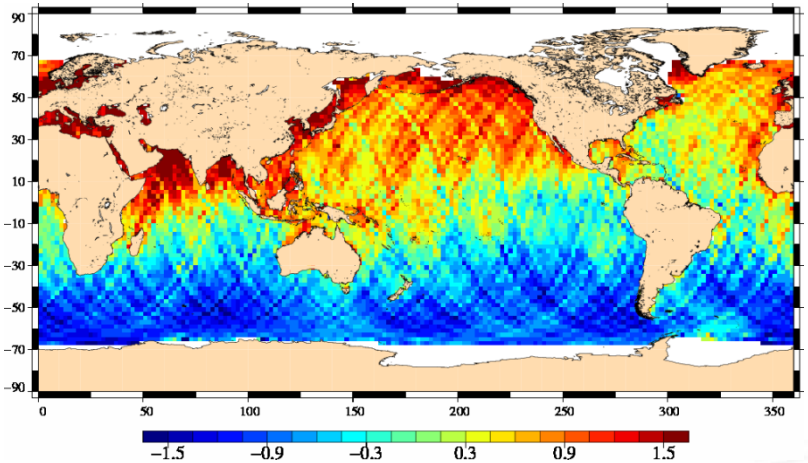
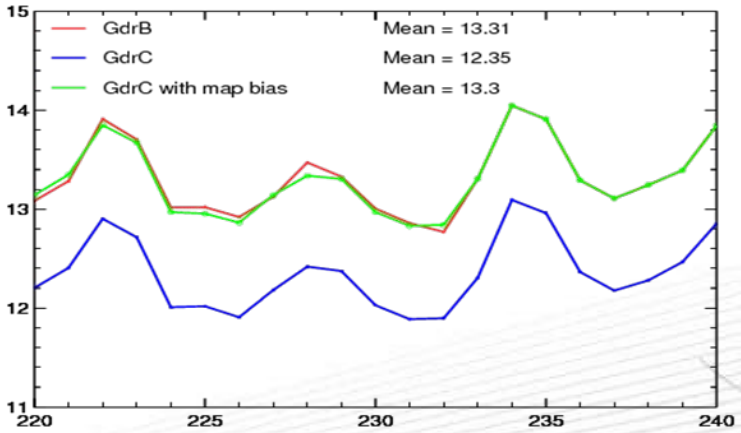
Linking of GDR-B and GDR-C series

- Global bias : -9.5mm with JMR, -5.75mm with ECMWF wet tropospheric correction
- Mean of SLA differences (C-B) from cycle 229 to 232
- N/S bias ➔ ITRF change



Raw Mean Sea Level [cm]



- The above map must be subtracted from GDR-C data for local MSL studies

- **Cf. http://www.aviso.oceanobs.com/msl**

Conclusion

- Good performances for crossover (1.2cm² variance gain) and along-track statistics (8cm²=7% of signal variance), for the reprocessed cycles and for the whole dataset regarding the orbit solution.

- New JMR calibration and orbit do not affect global Mean Sea Level. The new orbit solution impacts on the local slopes, but this effect can be corrected. Bias linked to JMR: -4.52mm. Orbit: -9.5mm

- GDR-Cs do not prevent from doing MSL studies.