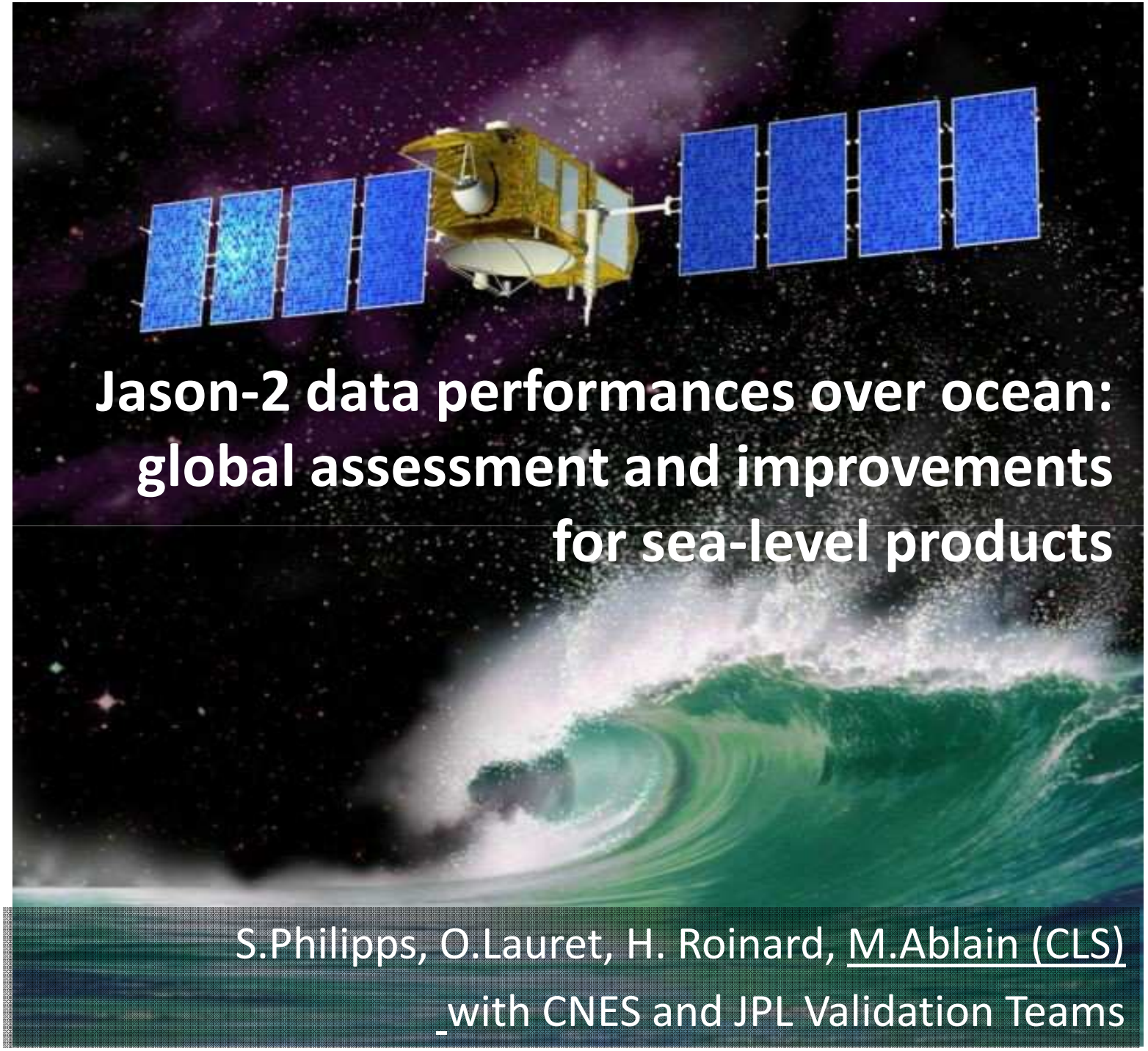


Jason-2 data performances over ocean: global assessment and improvements for sea-level products

S.Philipps, O.Lauret, H. Roinard, M.Ablain (CLS)
with CNES and JPL Validation Teams

CLS
COLLECTE LOCALISATION SATELLITES

cnes
CENTRE NATIONAL D'ÉTUDES SPATIALES

SALP
Service Altimetrie & Localisation Precise

JPL
Jet Propulsion Laboratory
California Institute of Technology

OST/ST 2015

October 20-23, 2015
Reston, VA, USA

Overview

- Part 1 : Quick look on Global Jason-2 data quality
  - Data availibilty
  - Sea level performances
  - Global Mean Sea level evolution

- Part2 : Expected improvements for Jason-2 sea-level:
  - Stability of radiometer wet troposphere correction
  - Impact of orbit solutions on the regional mean sea level trends
  - Observability of small ocean scales: retracking and editing

Data availability

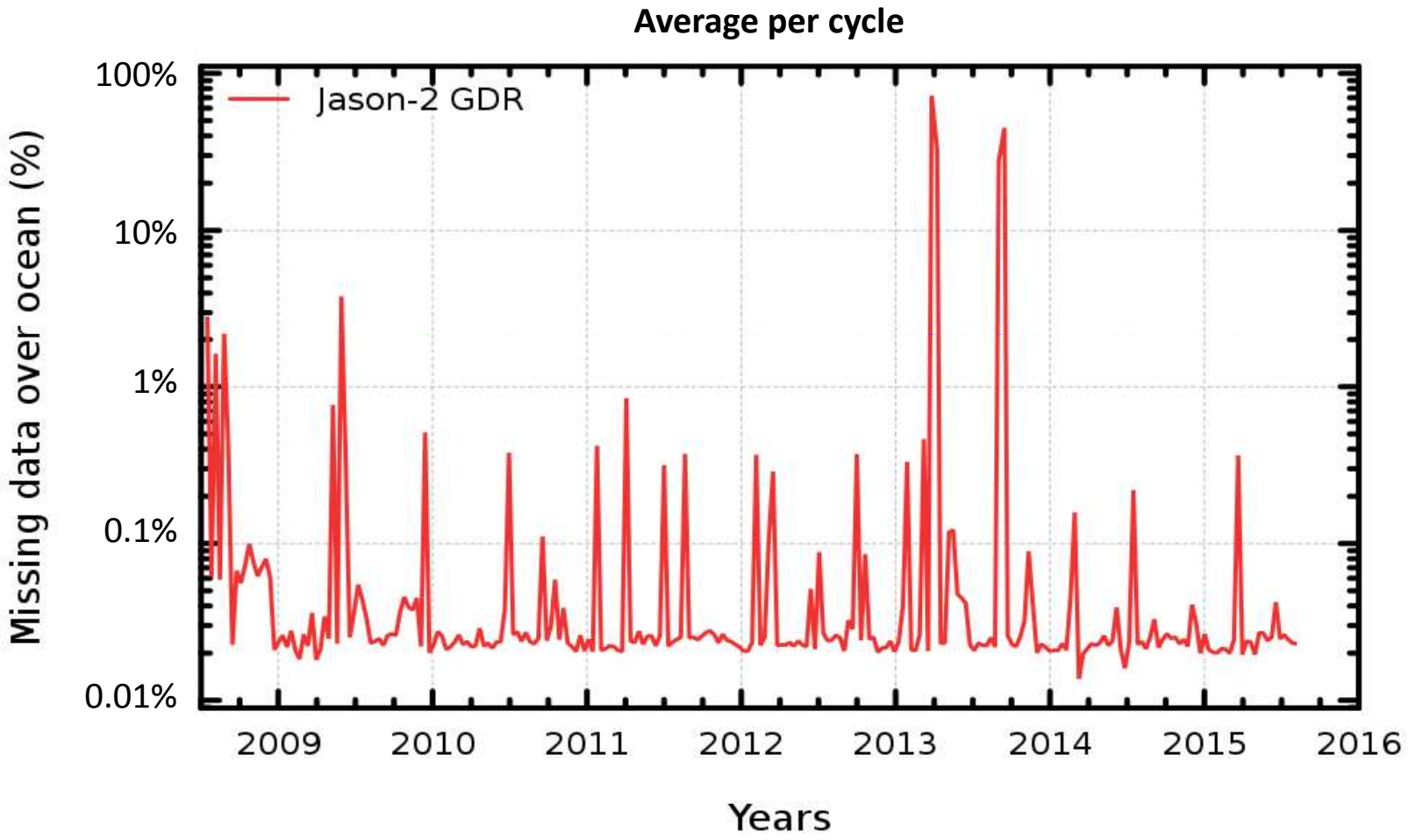
- Very good data availability over ocean : **99.23 % calibrations and incidents included**
- After removing calibrations and incidents : **99.97 % data are available over ocean**

Safe Hold Mode

Calibrations

Software upload

Telemetry gaps

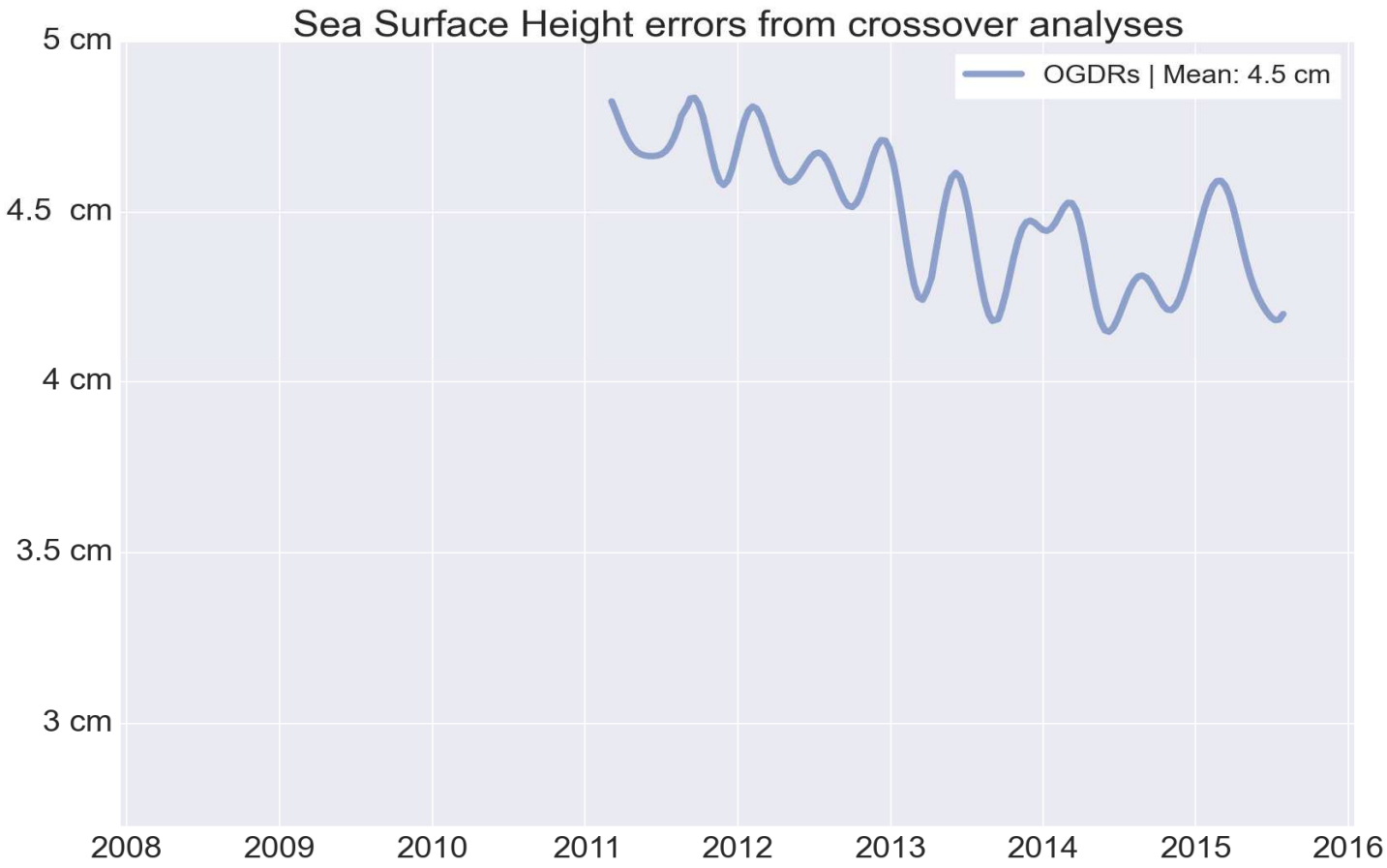


Sea-level performances

- SSH error for Jason-2 is deduced from crossovers analyses using radiometer data
  - selecting |latitudes| < 50°, bathy<-1000m, oceanic variability < 20 cm

Product	Jason-2
OGDR	4.52 cm
IGDR	
GDR	

Products	Jason-1
OGDR	8.66 cm
IGDR	4.09 cm
GDR	3.60 cm

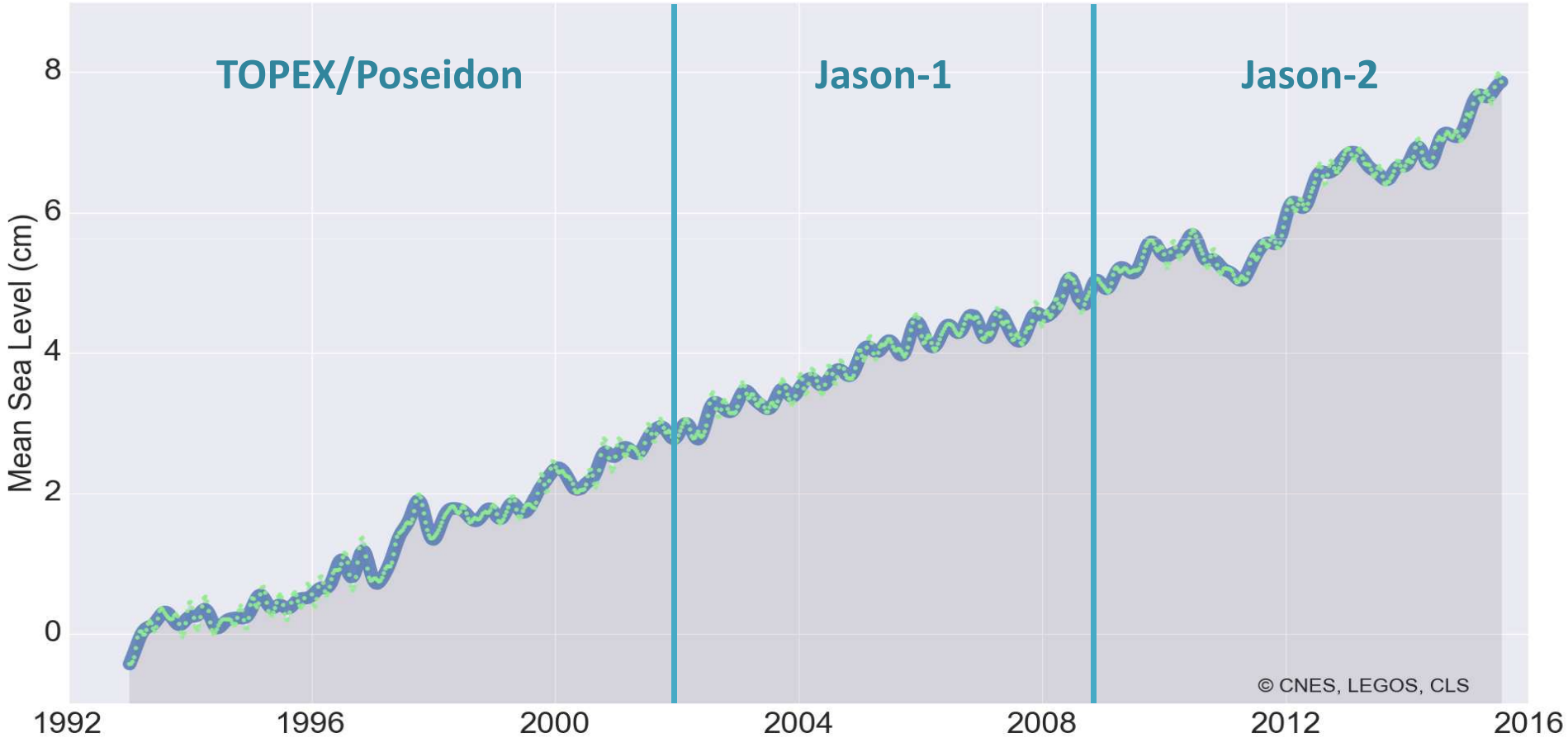


Mean Sea Level evolution and stability

- MSL Jason-2 is used as the reference to compute the MSL from 2008 onwards

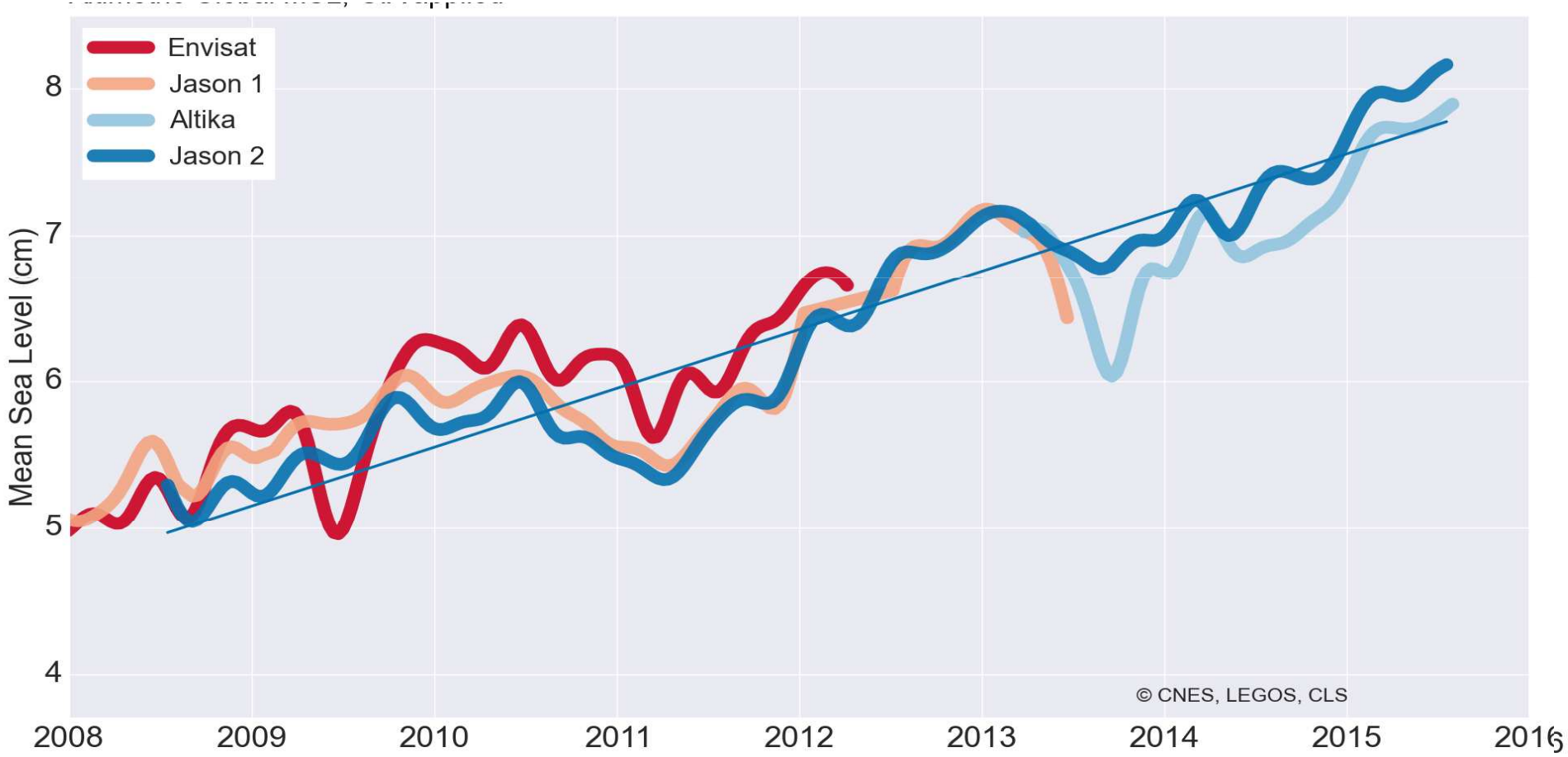
  Aviso+ website, MSL : http://www.aviso.oceanobs.com/msl

GMSL trend= 3.31 mm/yr +/- 0.5mm/yr (Ablain et al., 2015)



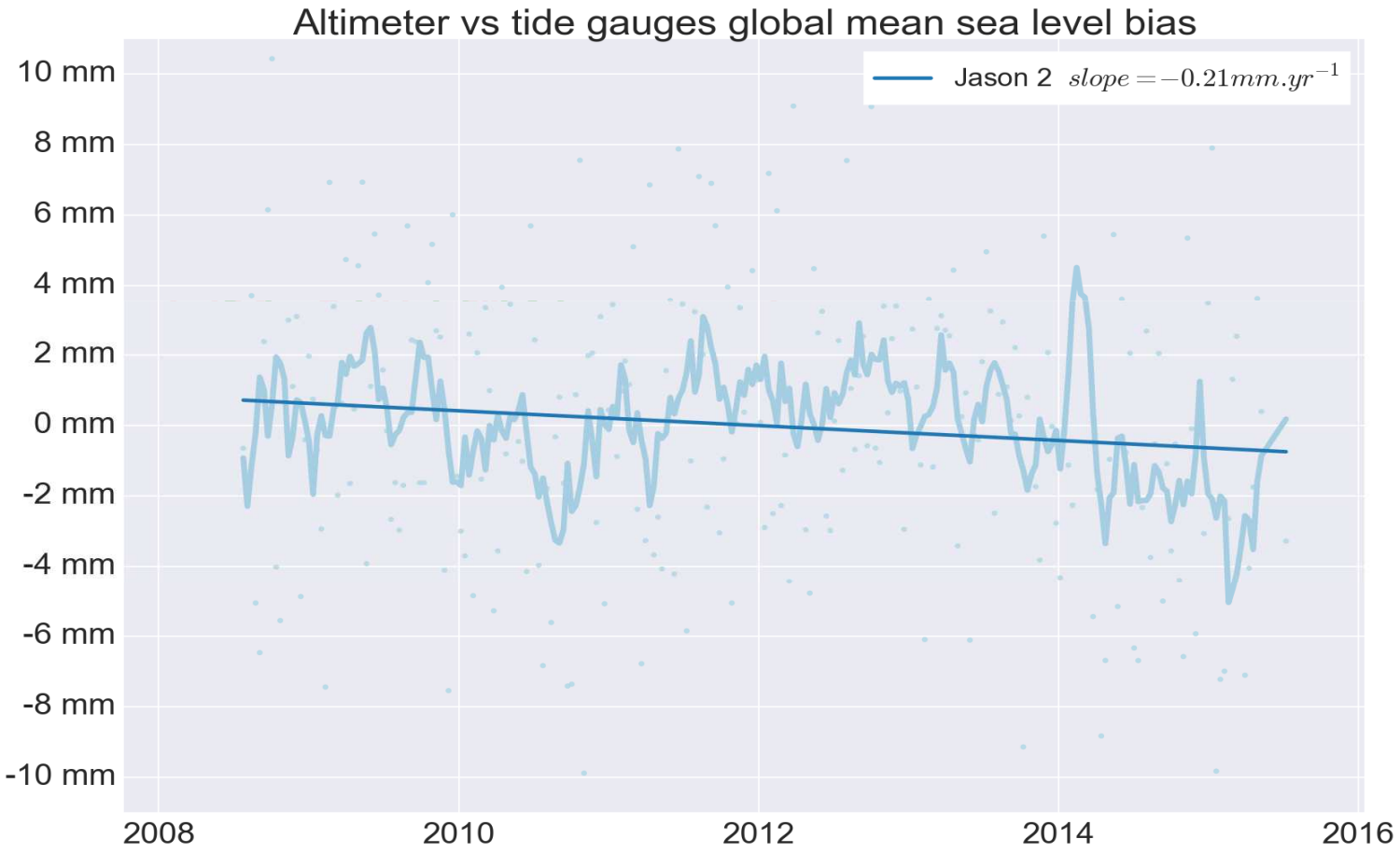
Mean Sea Level evolution and stability

- Focusing on Jason-2 period, GMSL trend rises to **4.02 mm/yr**
- Good agreement with other altimeter missions



Mean Sea Level evolution and stability

- Jason-2 GMSL stable with TG (within an uncertainty of 0.7 mm/yr, *see Prandi's Talk*)
- Better agreement between Jason-2 and Tide Gauge than with other missions



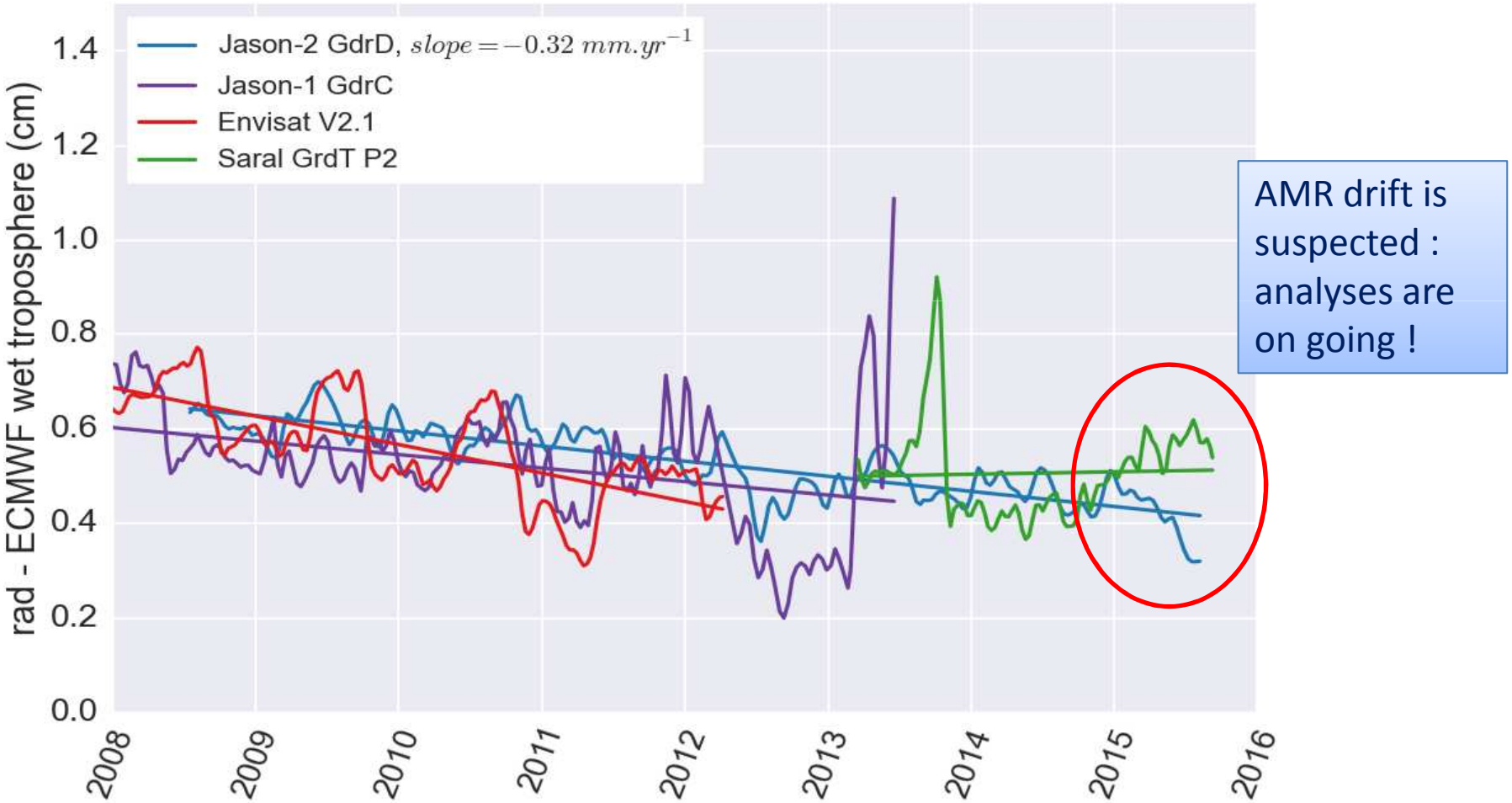
Overview

- Part 1 : Quick look on Global Jason-2 data quality
  - Data availibilty
  - Sea level performances
  - Global Mean Sea level evolution

- Part2 : Expected improvements for Jason-2 sea-level
  - Stability of radiometer wet troposphere correction
  - Impact of orbit solutions on the regional mean sea level trends
  - Observability of small ocean scales: retracking and editing

Stability of AMR correction

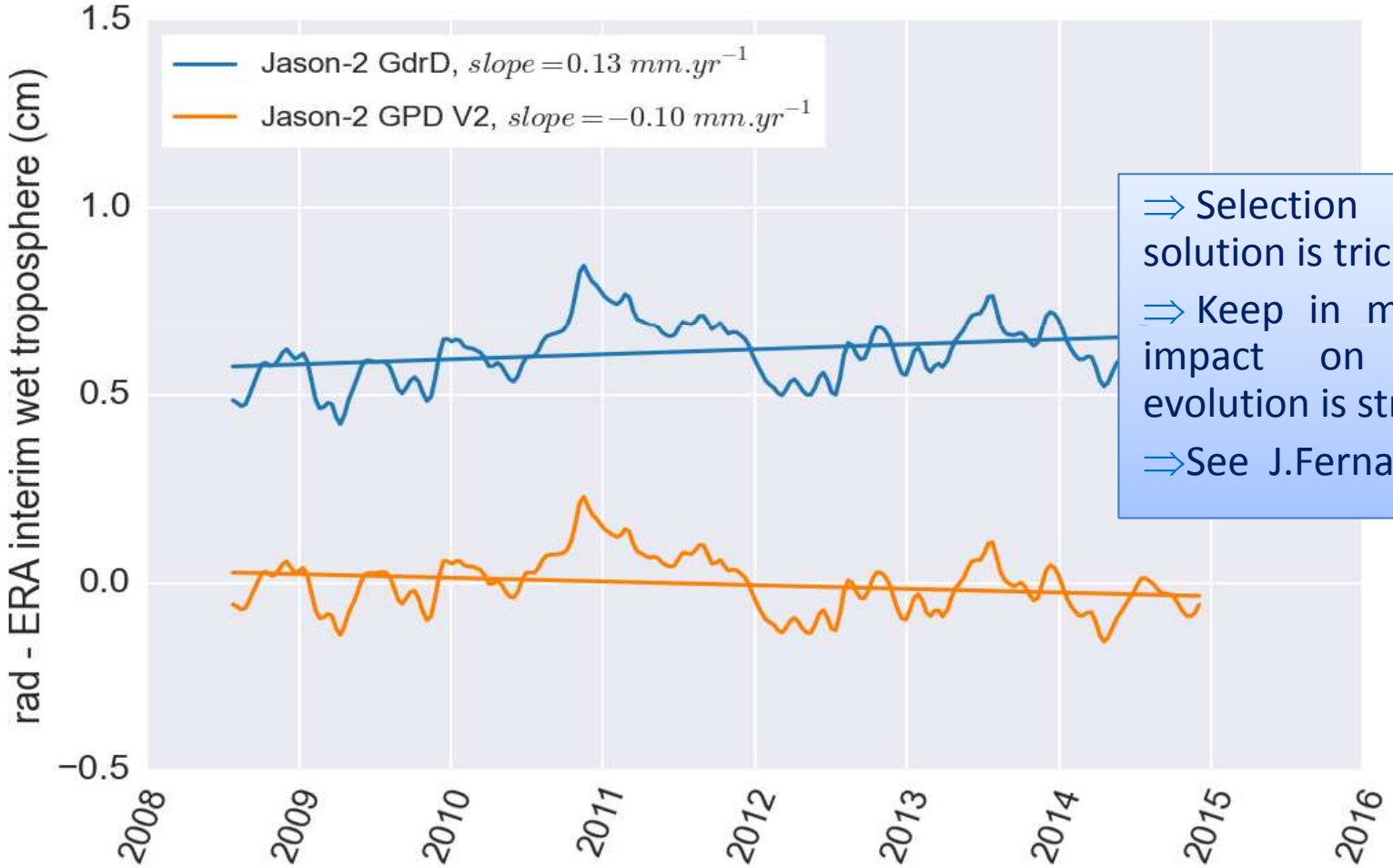
- Drift uncertainty of Wet Troposhere correction is 0.3 mm/yr (Legeais et al., 2014)
- Main source of error for the the GMSL evolution



AMR drift is suspected : analyses are on going !

Stability of AMR correction

- AMR and ERA-interim differences highlights a drift of +0.13 mm/yr
- New GPD correction (J.Fernandez et al, 2015): drift with ERA is -0.10 mm/yr



⇒ Selection of the best solution is tricky

⇒ Keep in mind that the impact on the GMSL evolution is strong

⇒See J.Fernandes' talk

Impact of orbit solutions on MSL trends

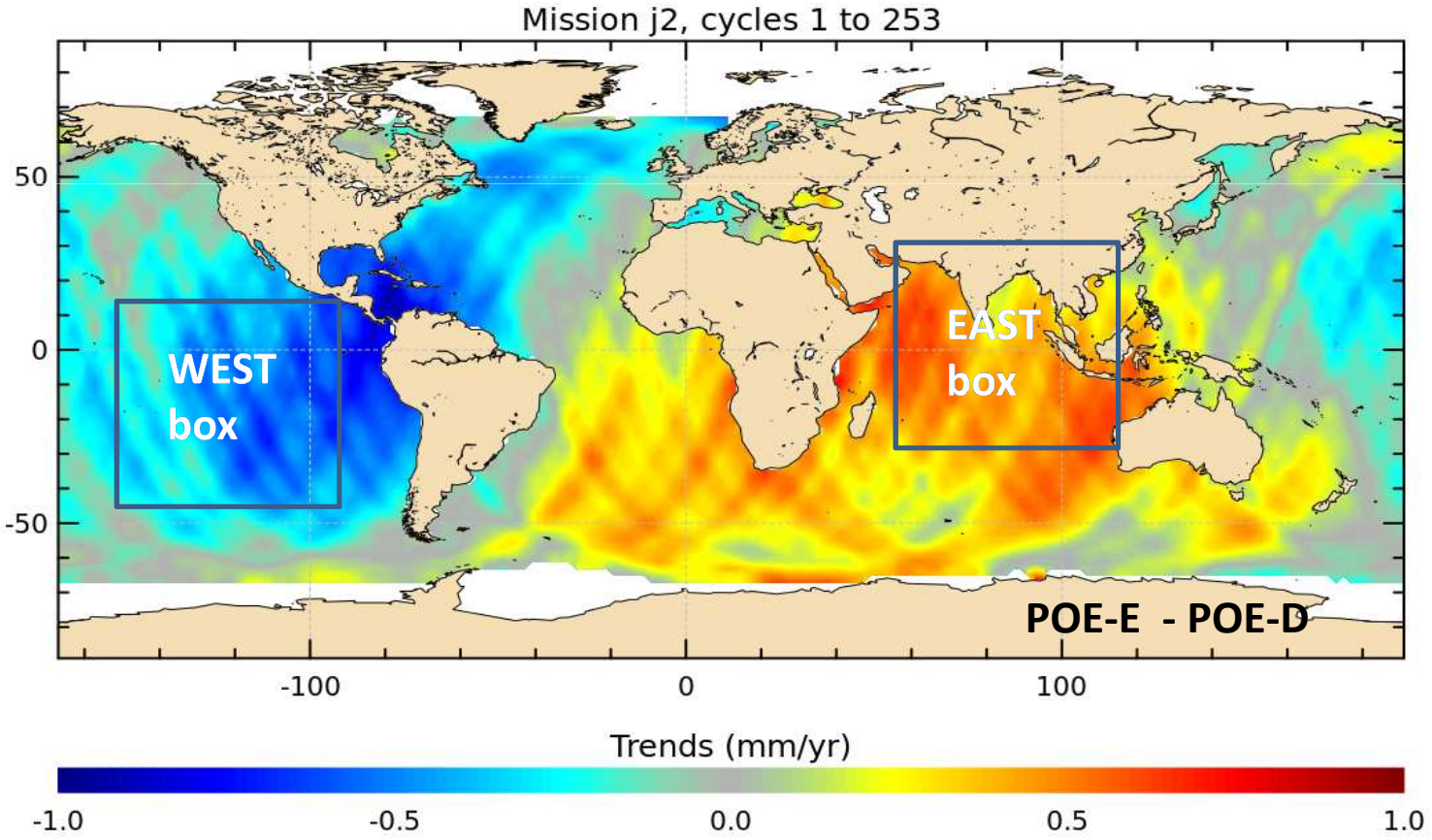
- Orbit solutions : main source of errors for regional MSL trend estimations

⇒ between 1 mm/yr and 2 mm/yr(Couhert et al, 2014; Ablain et al., 2015)

- Strong improvements these last years :

⇒ Orbit standard C => D (2013): reduction of geographical trend errors (Couhert et al, 2014)

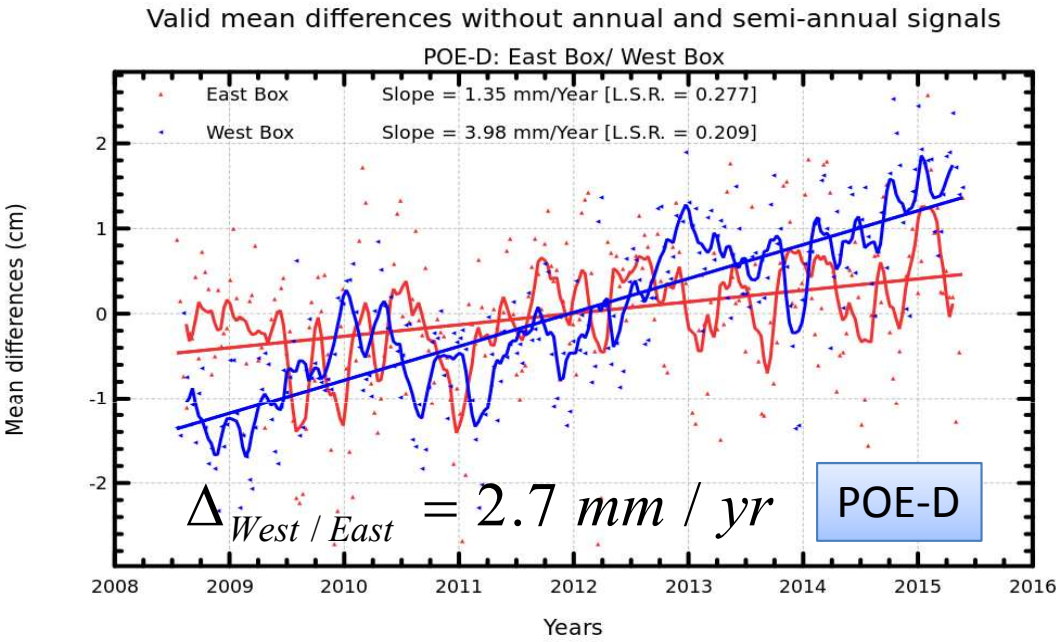
⇒ Orbit standard D => E (2015): also strong impact on regional MSL trends

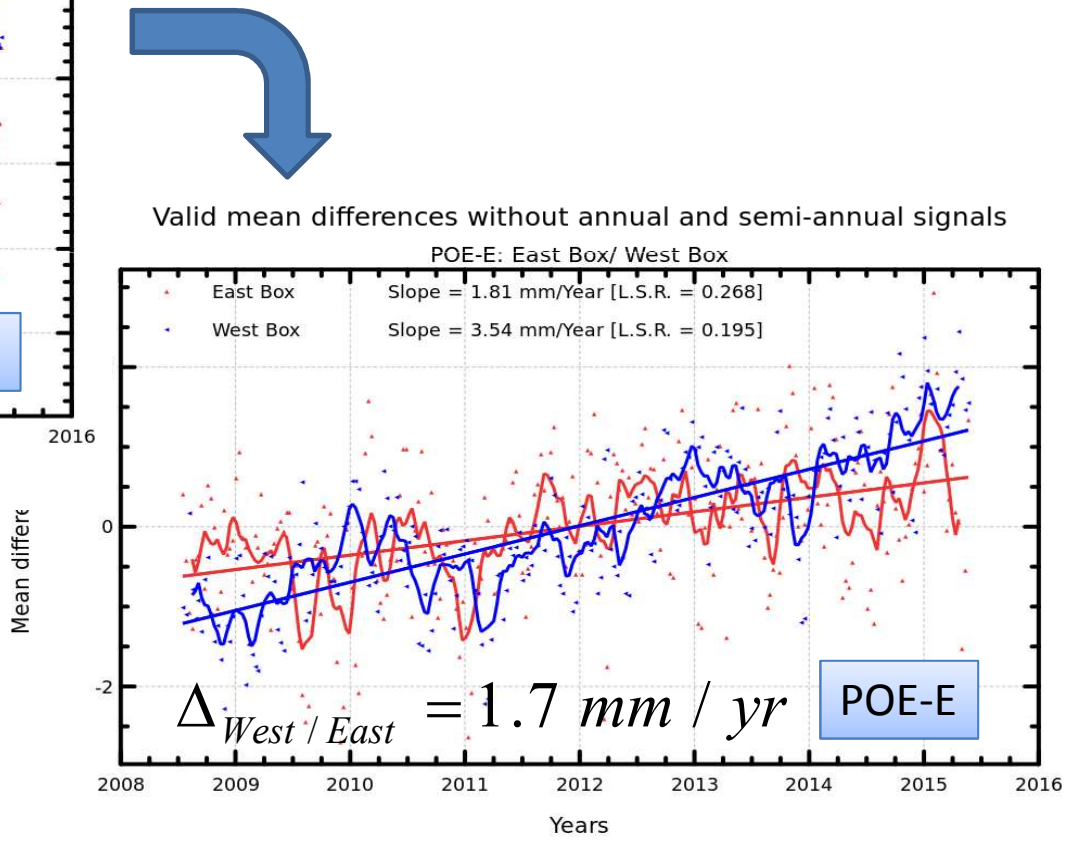


Impact of orbit solutions on MSL trends

- Comparison to temperature/salinity profiles (ARGO) : ***see Legeais' Poster***

⇒ reduction of east/west differences (~1mm/yr) between Jason-2 and T/S profiles

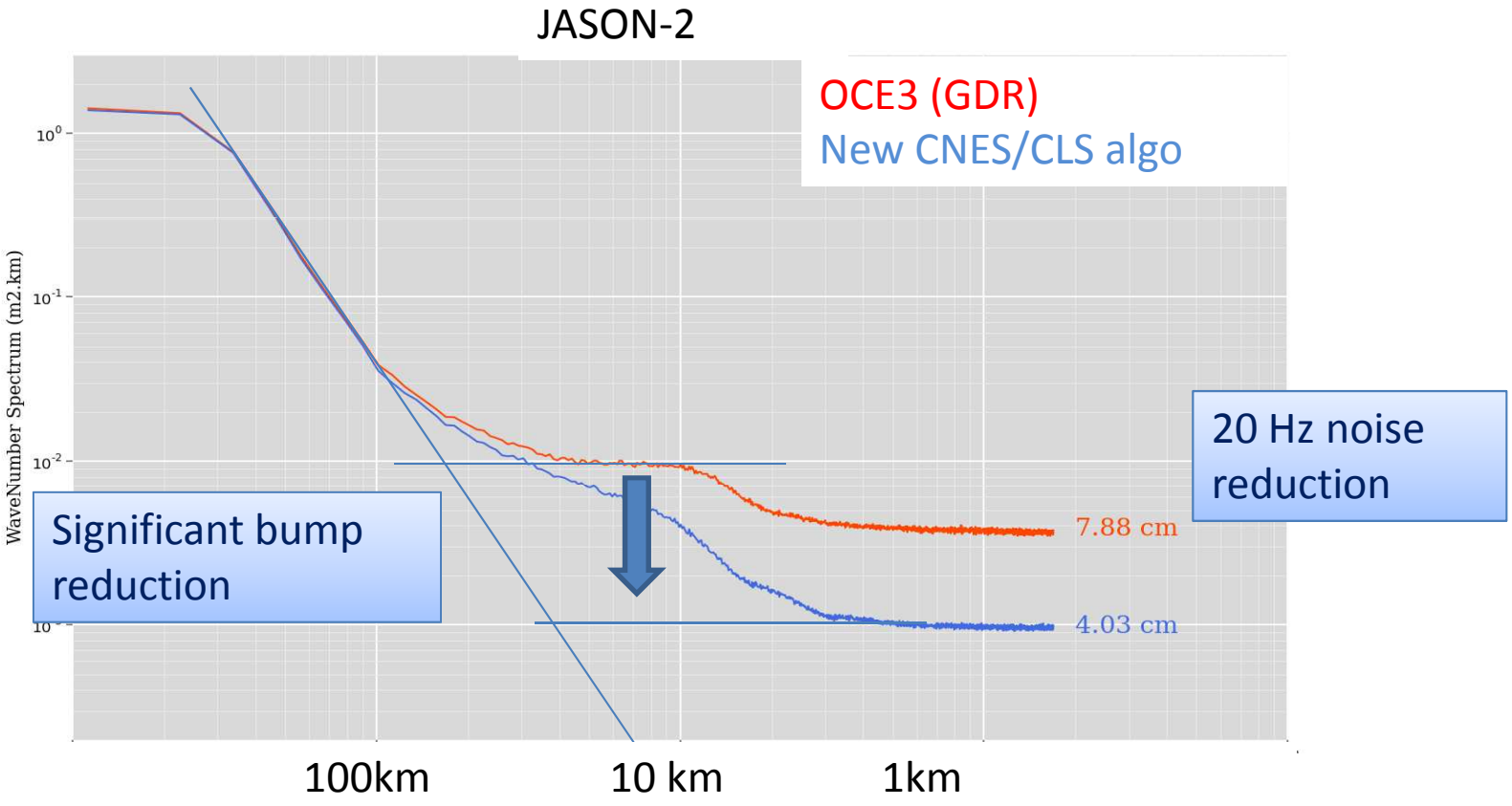




We are close to the method uncertainty:
~1 mm/yr (Couhert et al., 2014)

Improving small ocean scale content

- Dibarboure et al., 2014: a bump artefact on all SLA spectra derived from LRM measurements prevents the observation of small ocean scales (< ~70 km)
- New retracking algorithms (Amarouche et al., OSTST 2014 ; Garcia et al., 2014) improve the observation of smaller scales (between 30 and 70 km) : ***see P.Thibaut's talk***

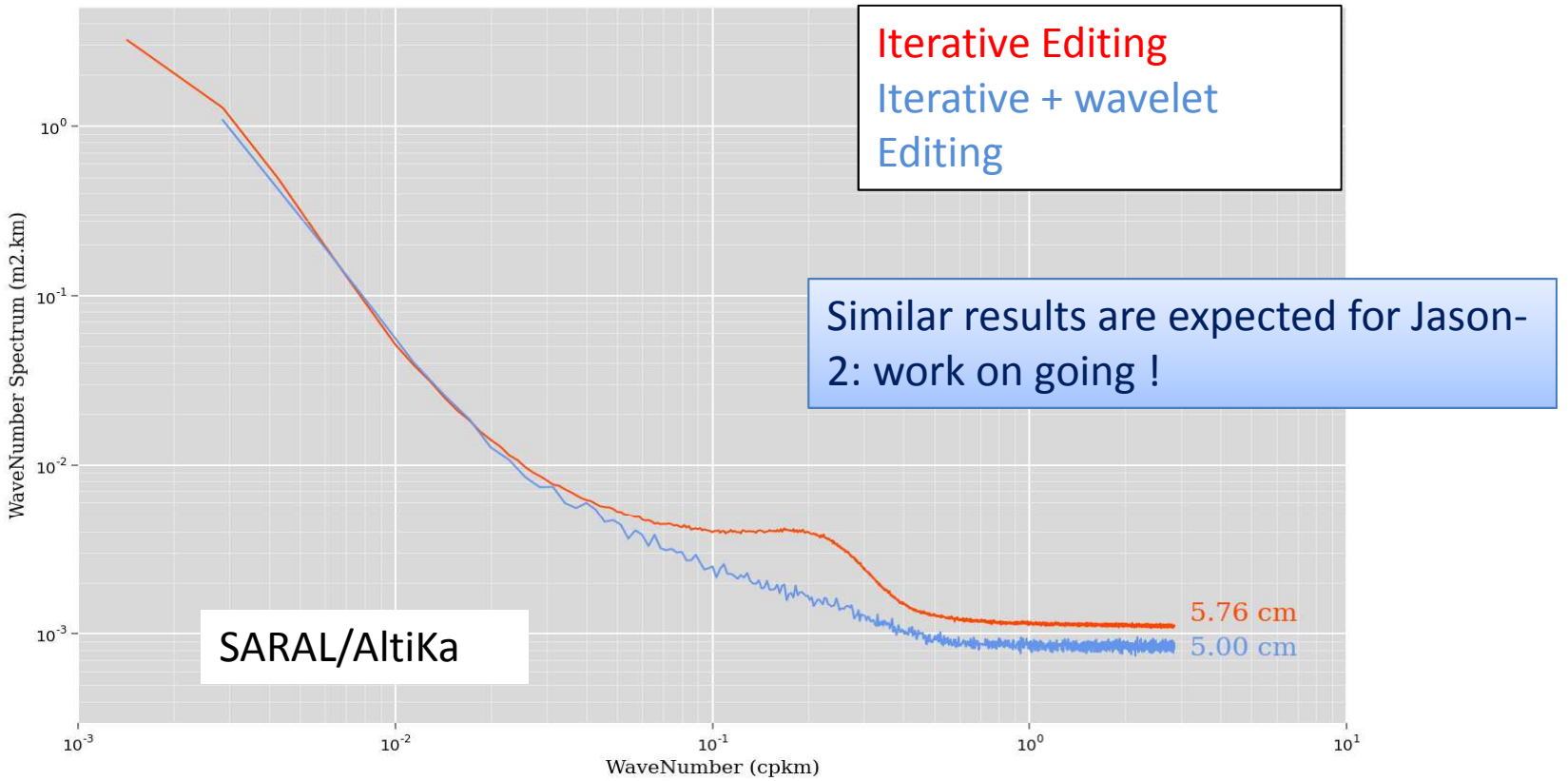


Improving small ocean scale content

- New editing strategies to remove spurious sea-level measurements have been recently developed : Thibaut et al., OSTST 2014

⇒ Based on 20 Hz measurements, a strong bump reduction in SLA spectrum is observed

⇒ However a high percentage of measurements is edited



Conclusions

- Jason-2 measurements quality are **excellent**, in terms of :
  - Ocean data availability (**99.2 %**)
  - Sea Level performances (close to **3.5 cm** for temporal scales < 10 days)
  - Global Long term sea level stability (**≤ 0.5 mm/yr**)

- Nevertheless improvements of Jason-2 sea level are expected:
  - **For climate scales** : orbit, radiometer wet troposphere correction…
  - **For mesoscale**: retracking (bump noise and reduction, new editing strategies…
  - New geophysical corrections: ocean tides, atmospherical corrections, sea state bias…

- Excellent Jason-2 data quality and expected improvements are of great interest:
  - **Validation of Jason-3:** To insure the seamless transition between Jason-2 and Jason-3 especially for **MSL studies**
  - After the Jason-3 verification phase, Jason-2 will continue to contribute to the observation of **mesoscale** on its interleaved ground track

CLS
COLLECTE LOCALISATION SATELLITES

cnes
CENTRE NATIONAL D'ÉTUDES SPATIALES

SALP
Service Altimetrie & Localisation Precise

OST/ST 2015

October 20-23, 2015
Reston, VA, USA

Contact: spilipps@cls.fr,mablain@cls.fr