Global Jason-2 Data Quality Assessment on the new Long Repeat Orbit

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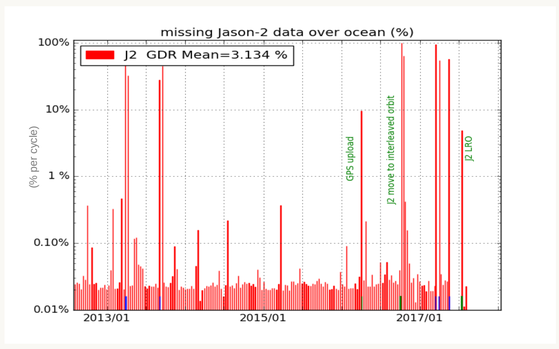
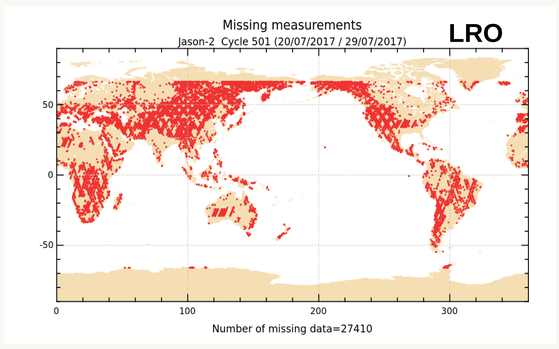
After almost 9 years in orbit as a precise altimeter mission on two different repeat ground tracks, Jason-2 had early this year an interruption of its science mission from 17th May to early July 2017. In the following, it was moved to a long-repeat ground track. Though this orbit is less interesting for the tandem mission with Jason-3 to observe mesoscale ocean signals, the mission can still provide valuable and useful data for several applications.
Therefore, the objective of this study is to provide an overview of the global data quality of Jason-2 data on the new orbit. Firstly, the stability of the altimeter and radiometer parameters is carefully monitored and the system performances assessed. This consists in long-term monitoring of the parameters, as well as comparison to Jason-3 data, in order to assess the possible impact of the lower altitude (~-27km) on the altimeter data. Furthermore the impact of the new orbit on the sea-level performances is accurately analysed.

Main performance metrics

➢ Data availability

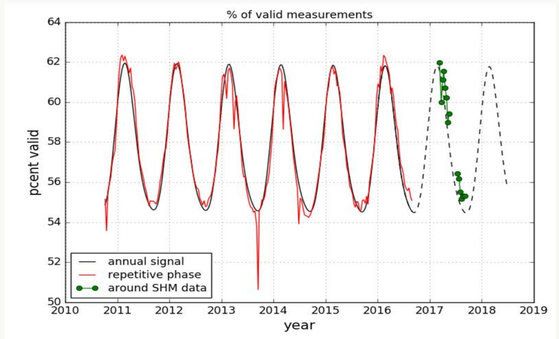
Data availability over ocean is good over the repetitive phase, and seems to continue in that way over Long repeat Orbit

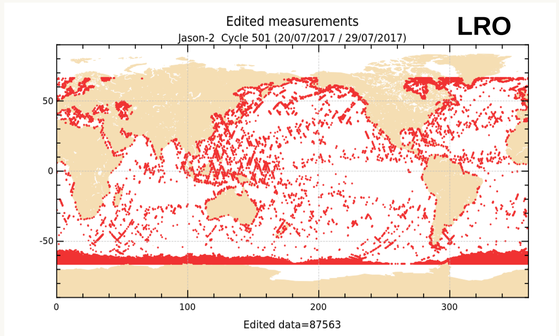




➢ Rejected data

The number of rejected data is in good agreement before and after move to LRO.

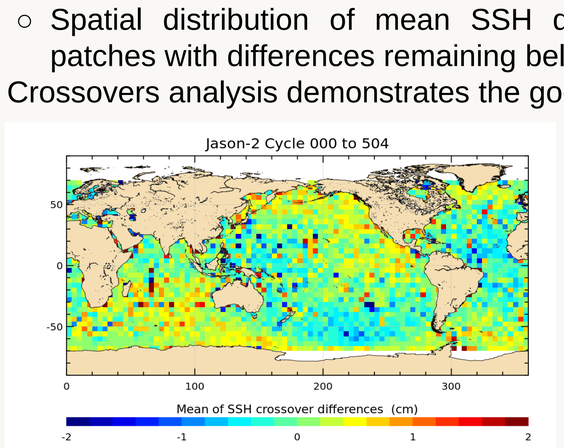


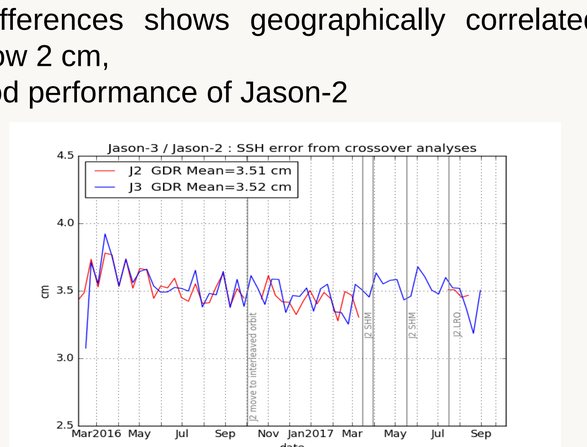


➢ Crossovers

- 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) ⇒ SSH error is close to **3.5 cm** for temporal scales < 10 days
- Mean difference between ascending and descending tracks is near zero (-0.1 cm for GDR, stable since move to LRO),
- Spatial distribution of mean SSH differences shows geographically correlated patches with differences remaining below 2 cm,

⇒ Crossovers analysis demonstrates the good performance of Jason-2





**Performance at crossovers: left: map of mean SSH differences (cycle 000 to 504).
right: SSH error deduced from SSH crossovers (using radiometer data, with selection on |latitudes| < 50°, bathy<-1000m, oceanic variability < 20 cm)**

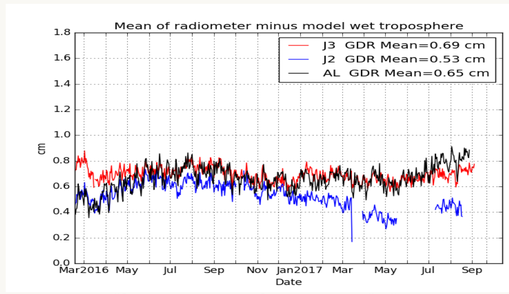
CAUTION: due to an error in ground segment processing, it is advised not to use IGDR data for cycles 505 and 506

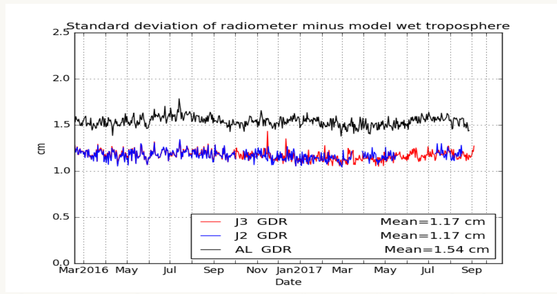
➢ Standard deviation of mean sea level :

In order to insure a better performance on LRO, Jason-2 products contain the CNES/CLS2015 solution for mean sea level (already delivered in L2P products):
this solution improves this performance metric as 20 years of data are used instead of 7years. (see → on figure)

Radiometer behavior

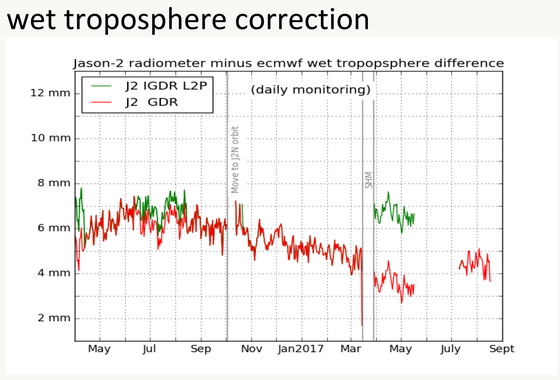
Compared to other missions, Jason-2 radiometer wet troposphere correction minus ECMWF model difference is drifting over the first quarter of year 2017

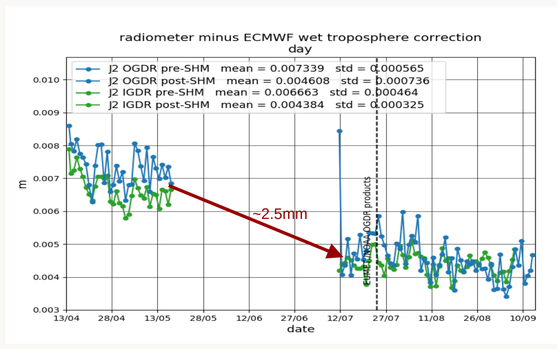




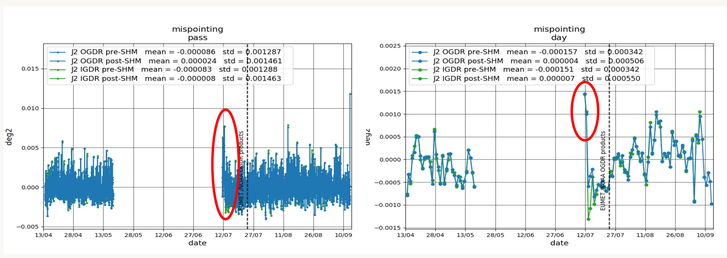
Radiometer minus model wet tropospheric correction compared to other missions

Each SHM (in March and in September) introduces a jump of radiometer minus model wet troposphere correction



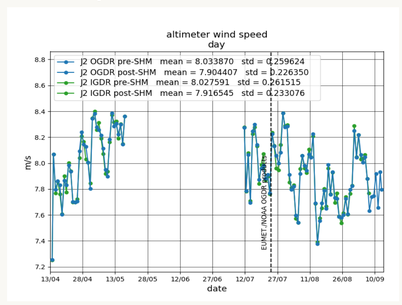


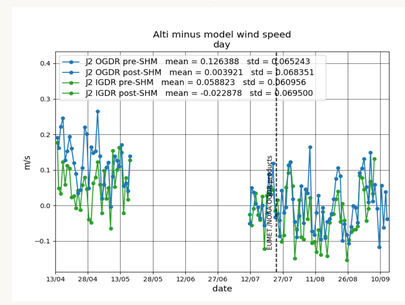
SHM (17/05 > 11/07) : impact on altimeter parameters

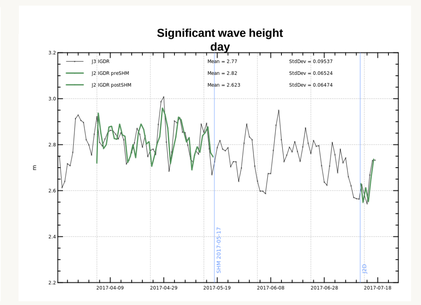


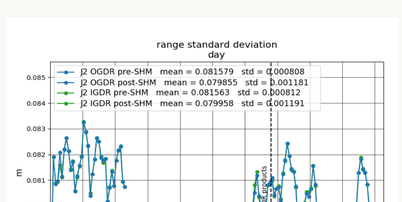
mispointing was slightly increased just after SHM,
but only on the first passes:
it has been nominal since new instrumental parameters LTM have been applied.

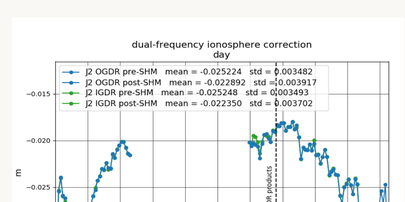
Other parameters behave as expected, taking account the seasonal variations :

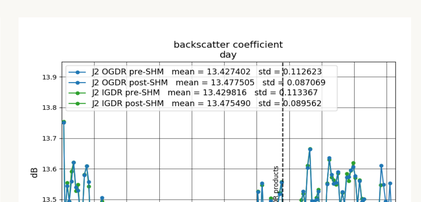




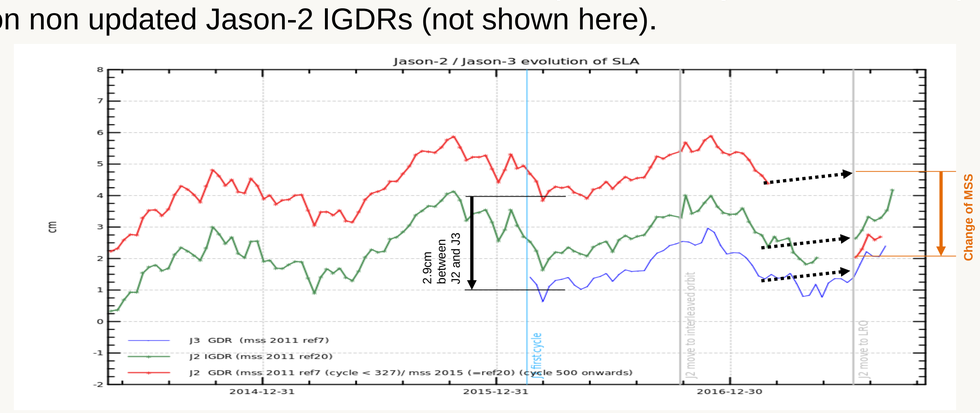








The SLA evolution for Jason-2 L2P IGDR (dark green) is in accordance with Jason-3 (blue). GDR data (red) shows a jump at cycle 500, this difference is expected and is due to the use of the new mean sea surface on LRO (from GDR cycle 500 onwards); it is also visible on non updated Jason-2 IGDRs (not shown here).



Note that there is a global bias of -2.4cm
from MSS CNES/CLS 2011 [ref7years] to MSS CNES/CLS 2015 [ref20years]

Conclusions :

- ✓ **The Jason-2 mission provides performance of excellent quality on the historical TOPEX/Poseidon and Jason-1 ground track**
- ✓ **When available, data quality on Long Repeat Orbit is as good as the one observed on the historical ground track (except for IGDR cycles 505 and 506 that are advised not to be used).**
- ✓ **The use of the last CNES/CLS2015 mss solution on LRO allows a better performance of the mission on its drifting orbit**

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