

Global Ocean Data Quality Assessment of SARAL/AltiKa's GDR-F products

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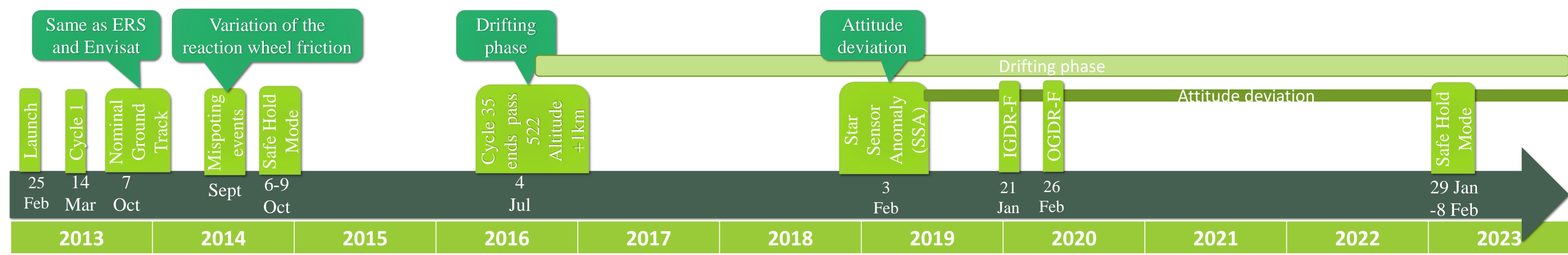
1. CLS, Toulouse, France
2. CNES, Toulouse, France
3. CLS/ALTEN, Toulouse, France



SARAL/AltiKa is a joint CNES/ISRO mission that was successfully launched on February, 25th 2013.

The first reprocessing of the full altimetry dataset took place in 2020, all analyses and results below use this reprocessed dataset (GDR-F).

SARAL/AltiKa is the first altimetry mission to operate at Ka-band.

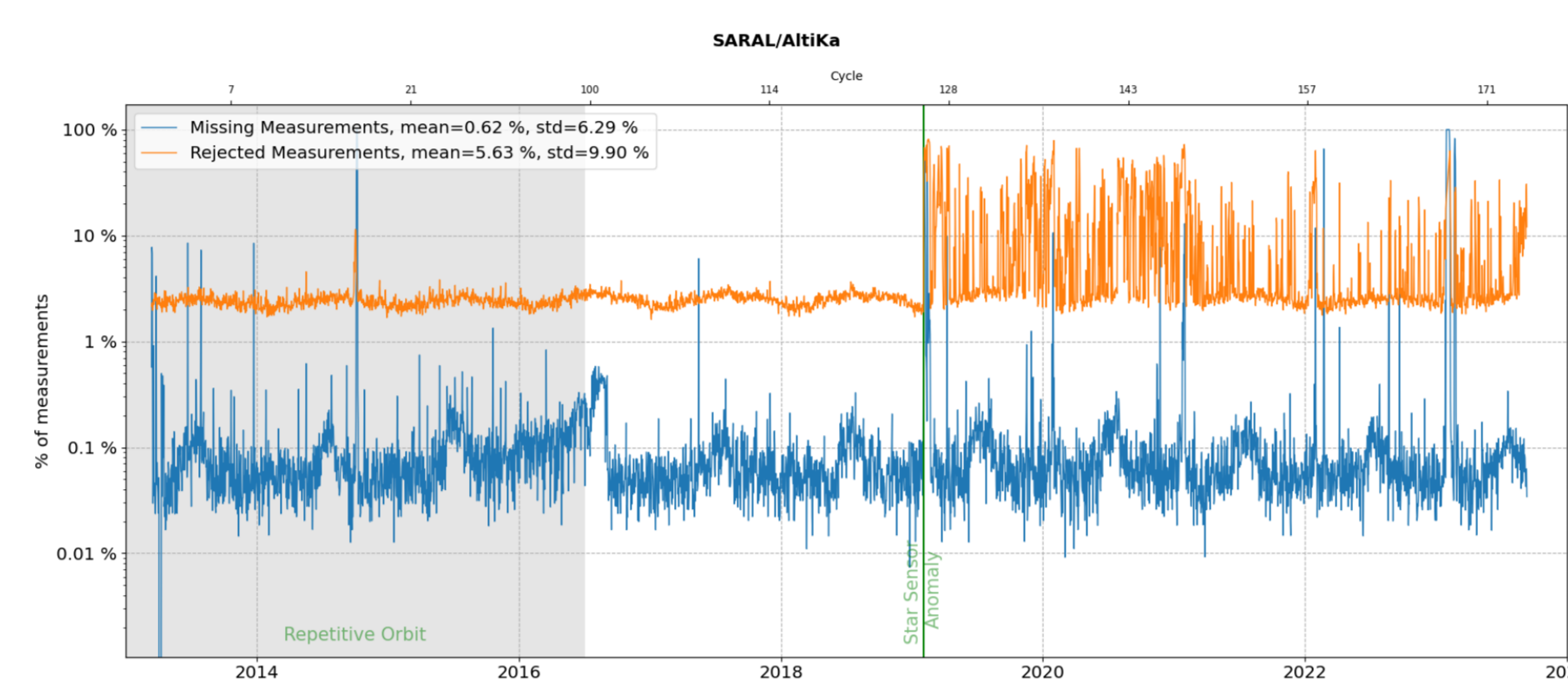


Main performance metrics

Data availability

Since the beginning of the mission, data availability over ocean is excellent with more than 99.3 % of available data, SHM period included.

The editing rate is heavily impacted by the Star Sensor Anomaly (off-nadir angle out of threshold) but remains below 6% of all data.



Crossovers

Typical standard deviation of SSH differences at crossovers is 5.0 cm for GDR data.

Mean difference between ascending and descending tracks is slightly negative around -0.1 cm.

Spatial distribution of mean SSH differences shows no geographically correlated patches with differences remaining below 2 cm (Fig2 right).

Crossovers analysis demonstrates the excellent performance of SARAL/AltiKa.

Neither the change of orbit nor Star Sensor Anomaly have had significant impact on data quality (Fig2 left).

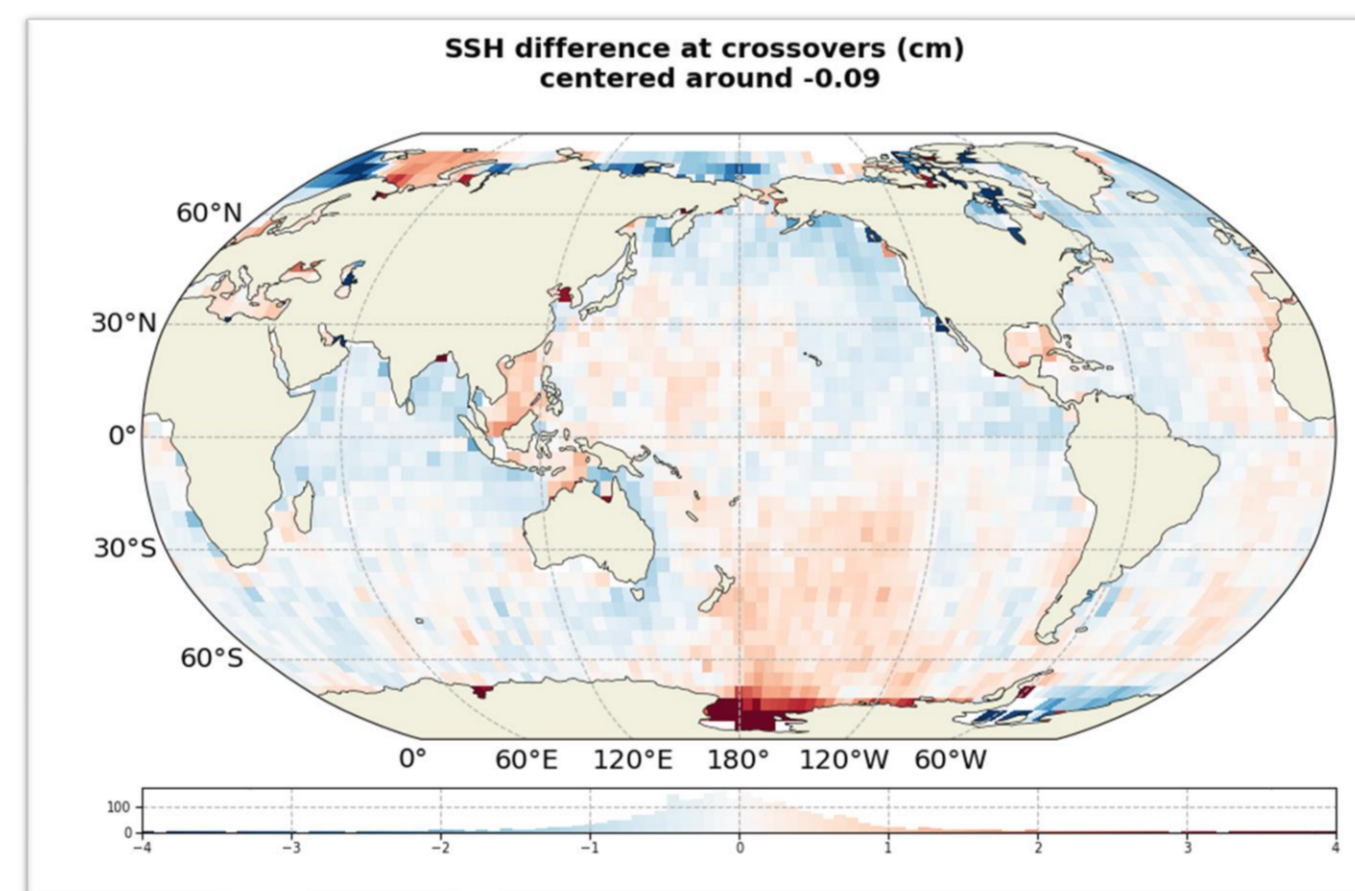
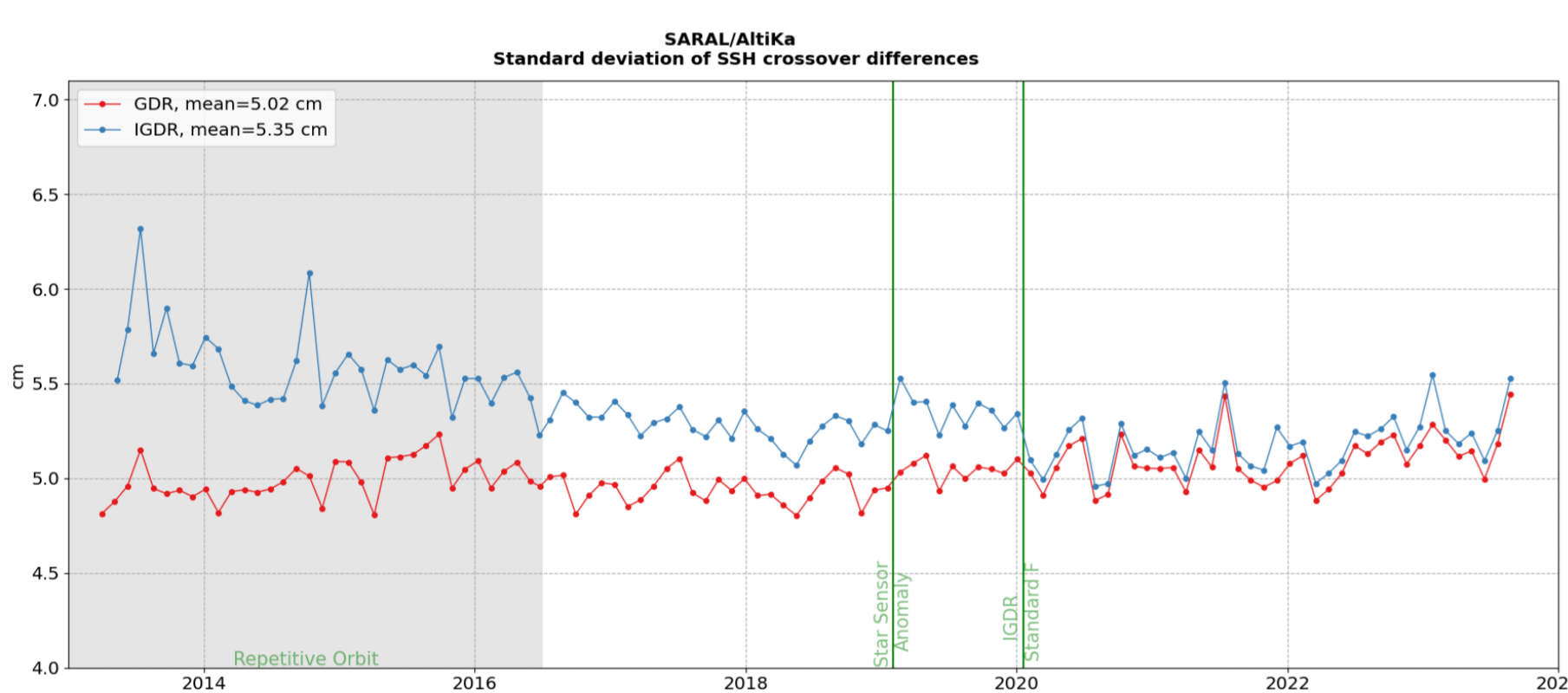


Fig2 Performance at crossovers : [left] monitoring of standard deviation of SSH differences and [right] map of mean SSH differences

Comparison to other missions

To account for the uneven distribution of crossover points, we estimate weighted statistics of crossovers differences where the weights applied are based on the crossovers density. This allows to better compare two missions that do not share the same ground track. Equivalent results are obtained for the SARAL/AltiKa and both reference missions using their radiometer wet tropospheric correction (Fig 3).

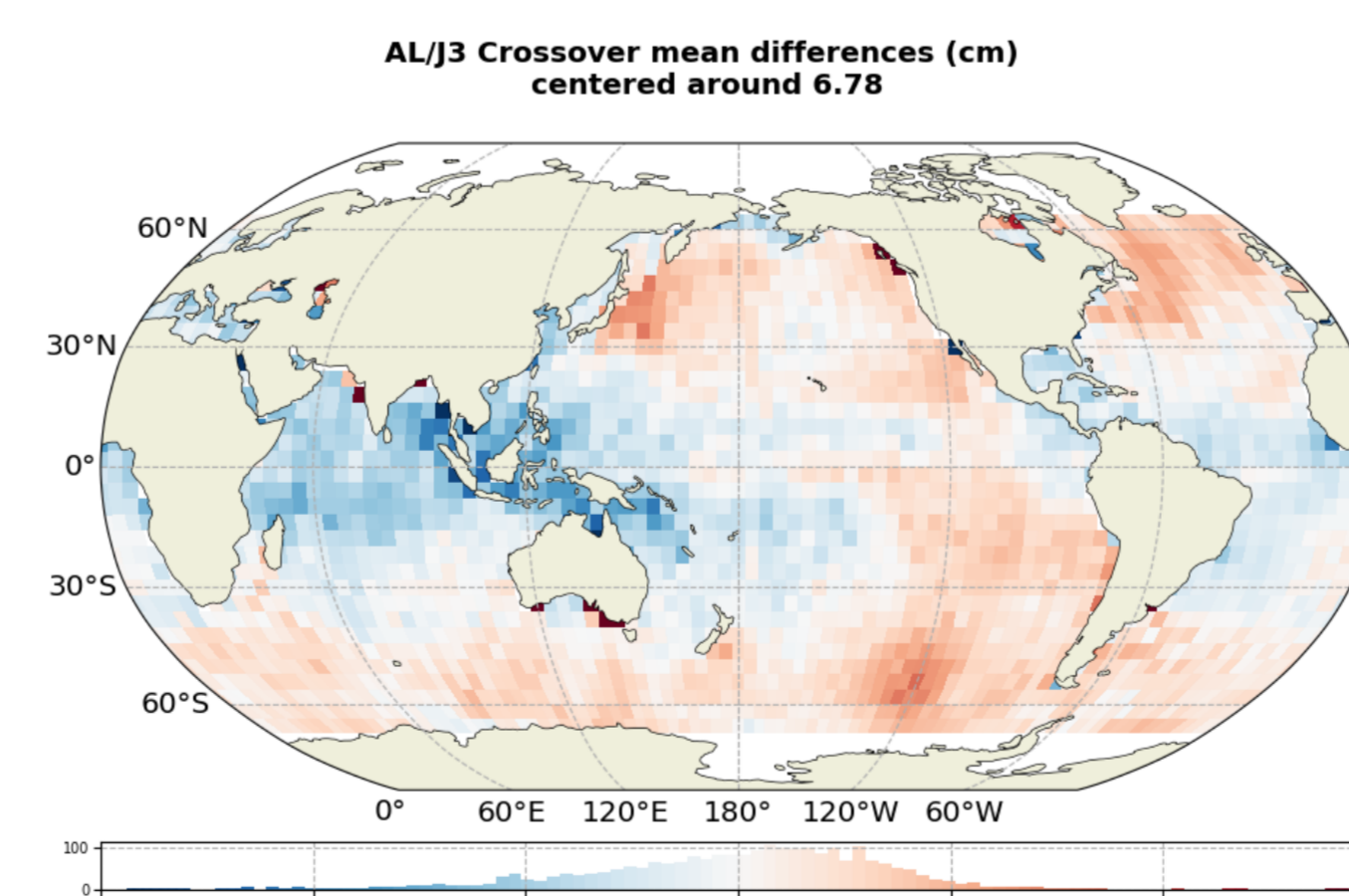
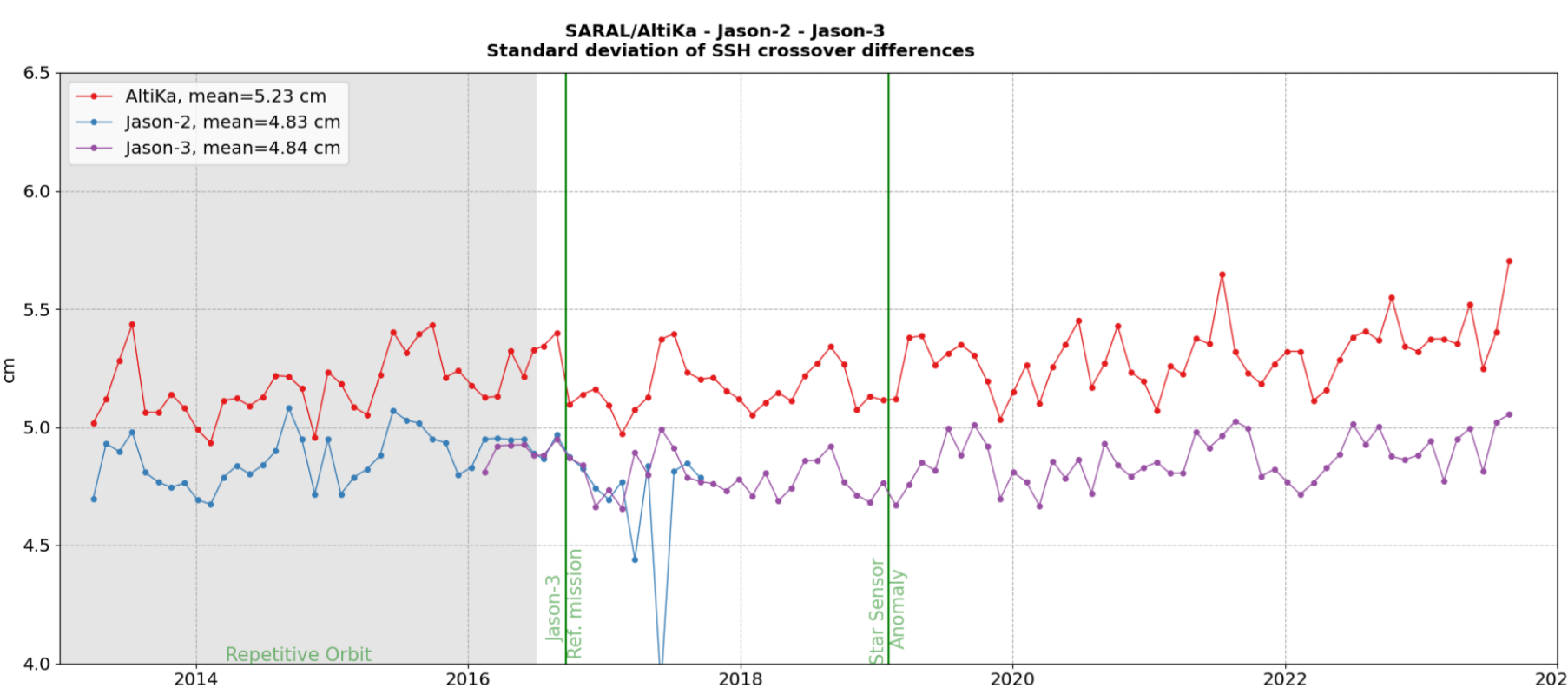


Fig3 [left]: Standard deviation of SSH crossovers differences for Jason-2/Jason-3 [right]: AltiKa /Jason-3 crossover mean differences using wet tropospheric models, regional biases with Jason-3 are below 2cm

Platform behavior

Altitude loss during drifting orbit

Thanks to a particularly weak solar activity till end of 2021, the altitude of SARAL/AltiKa has decreased by less than 250 m in 6 years of unmaintained orbit. The slowly decaying altitude does not impact at this stage the good mesoscale sampling capability of the mission.

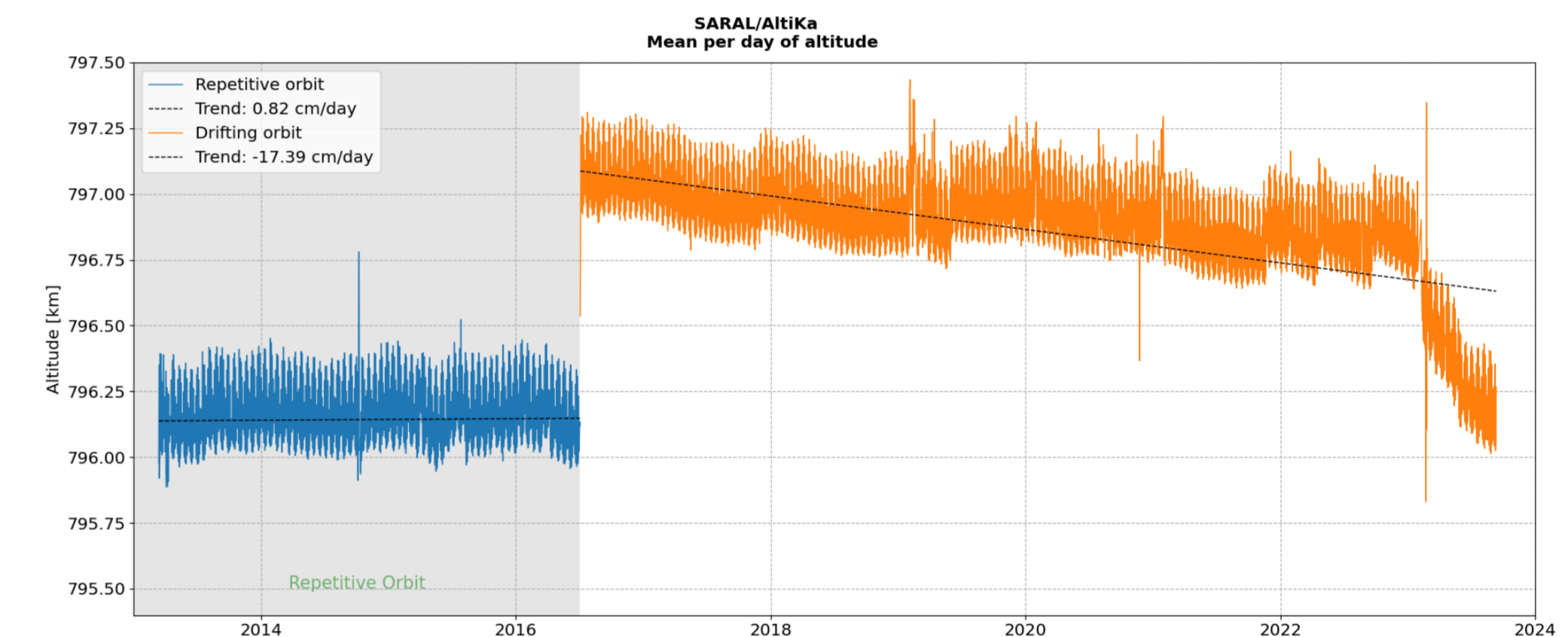


Fig4 Daily mean of altitude [km]

Mispointing events

Following the loss of the reaction wheel, ISRO has started sending platform pointing information derived from onboard star trackers. These data are available in GDR-F products and are very useful to perform comparisons between platform and waveform mispointing.

In February 2019, SARAL/AltiKa encountered a Star Sensor Anomaly, affecting the nadir pointing accuracy. Since that day, the spacecraft attitude is maintained using waveform derived pointing information (square off nadir angle) to regularly correct the star trackers drift. Still, most of SARAL/AltiKa's mispointing events remain within the altimeter pointing specifications.

Fig 5 compares waveform and platform mispointing estimates. Over time, there is a good agreement between waveform and platform estimation. However, since the SSA, platform pointing derived from onboard star trackers is no longer relevant.

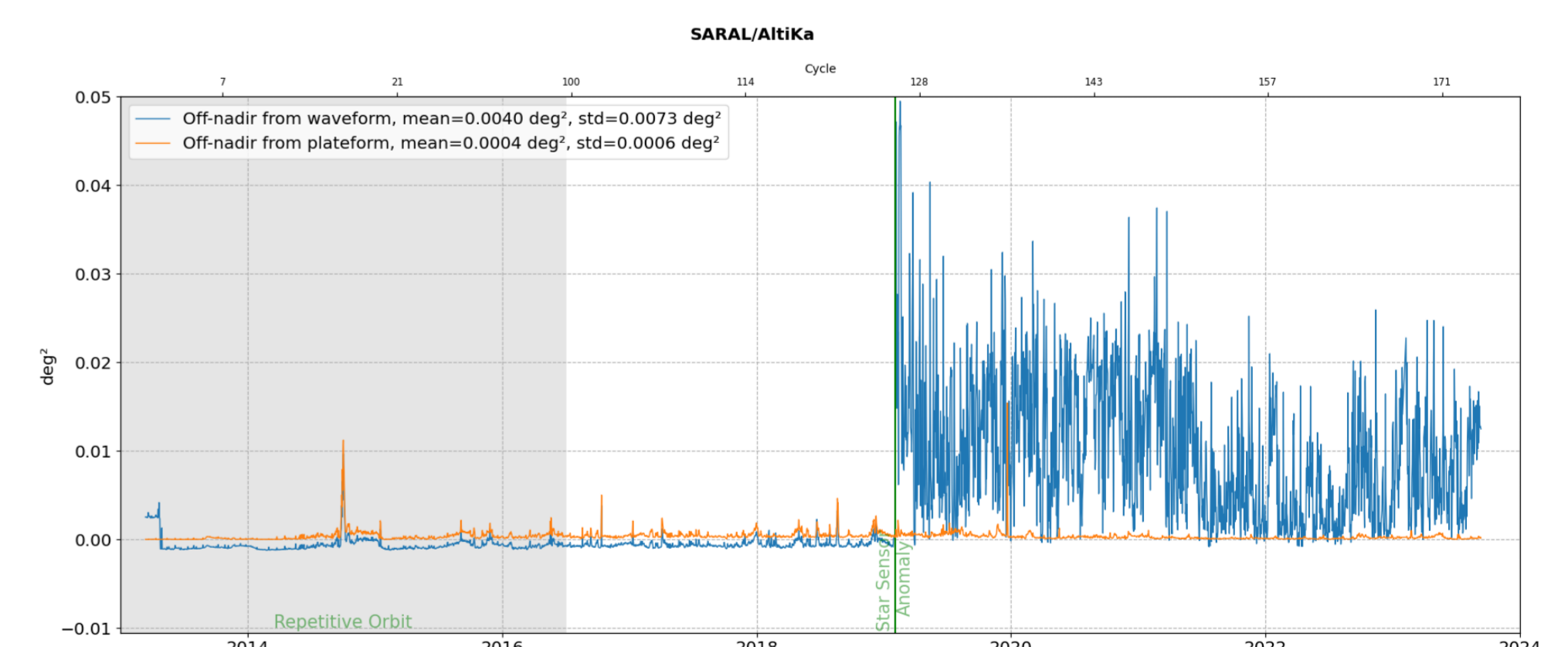


Fig5 Platform stability (from waveform mispointing estimate and ISRO information)

Conclusions

- The SARAL/AltiKa mission is now in the middle of its eleventh year and has been on a drifting orbit for more than seven years.
- Mission performance remains excellent, compared to Jason-2 and Jason-3.



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