

# WP 5000

## Assessment of CPP PLRM processing

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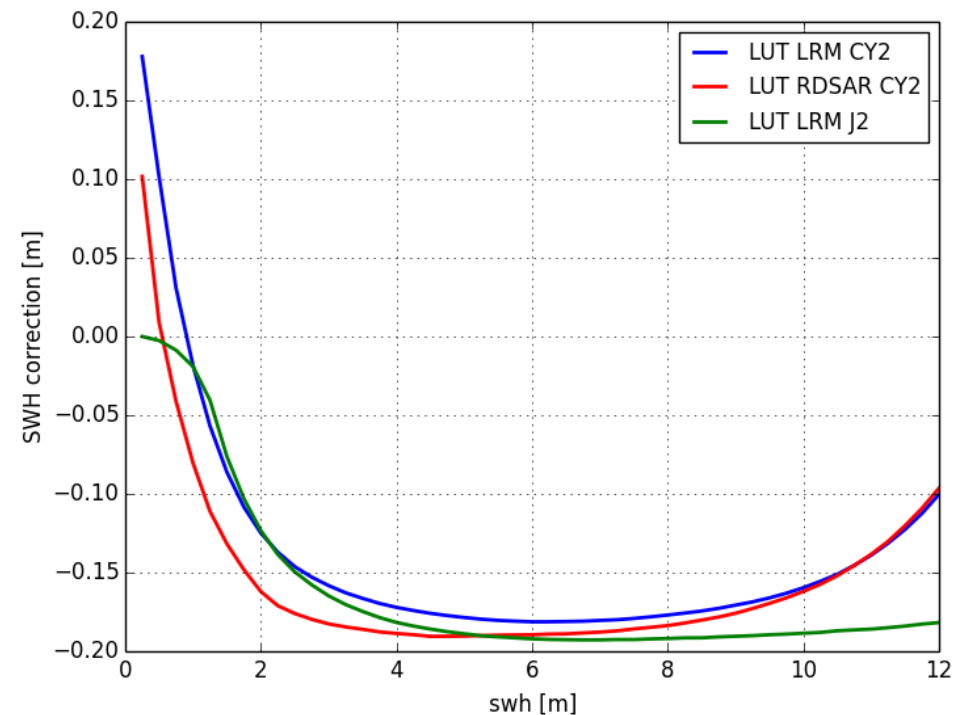
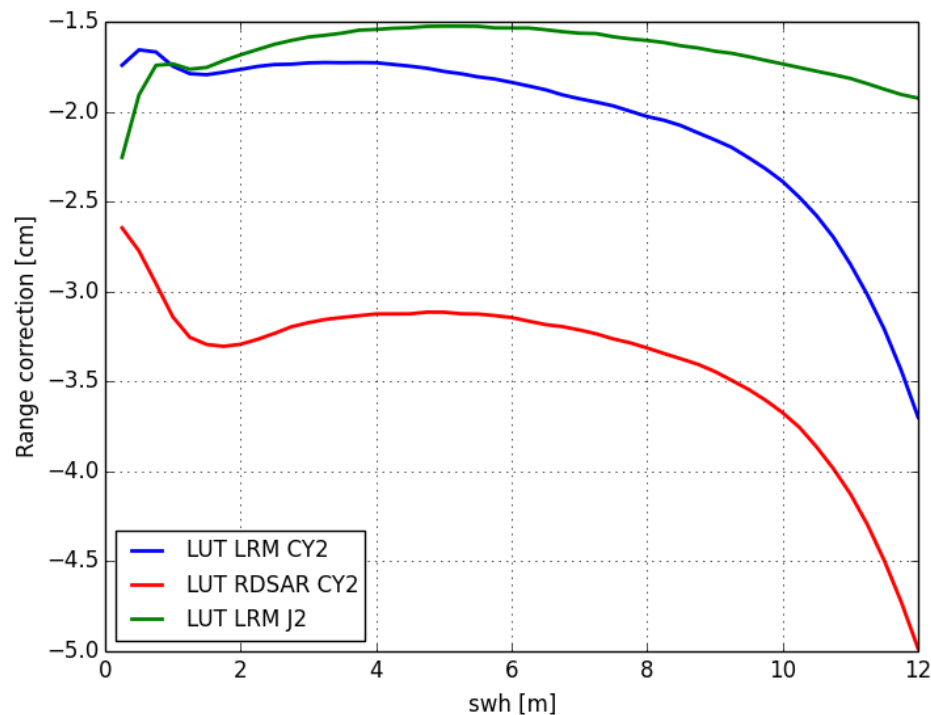


# Validation approach

- CPP PLRM processing already presented by F. Boy
- Results have been shown at several OSTST (Venice 2012, Boulder 2013), 3<sup>rd</sup> Cryosat User Workshop, Living Planet Symposium 2013
- CNES has performed the reprocessing of one year of Cryosat-2 data using the Cryosat Processing Prototype (CPP):
  - Full LRM and SARM coverage (No SARin)
  - Period from May, 2012 to April, 2013
  - All surfaces (ocean, inland waters, ice sheets)
  - Level2 products are available: same NetCDF format than J2 GDR products and close content (SLA, SWH, Sigma0, Geo Corr...)
- Two kind of metrics are presented here
  - Cross calibration with Jason-2
  - Focus on the LRM /PLRM transition

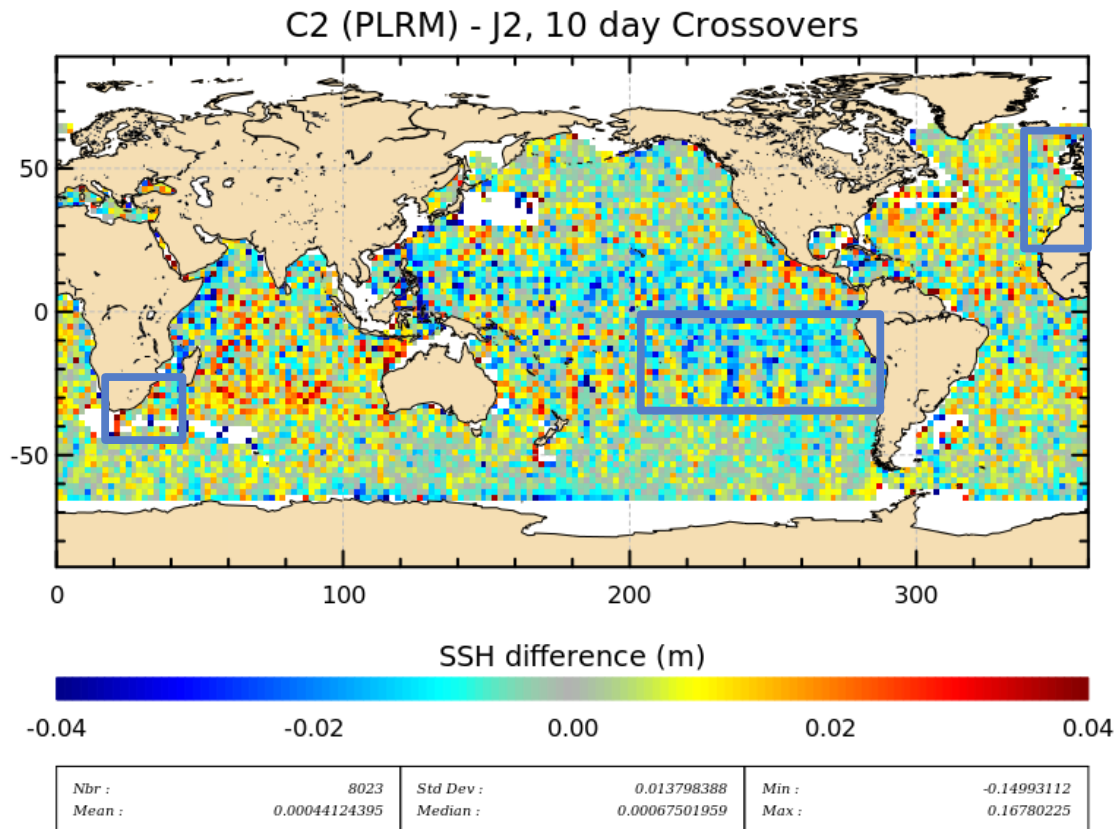
# Improving PLRM processing

- LUT have been computed to correct for the PTR approximation and take into account the larger speckle on PLRM waveforms



# Cross calibration with Jason-2

Crossovers between C2 and J2 over the 11 months. Jason-2 SSH is computed with the same geophysical corrections to cancel ionosphere and troposphere errors



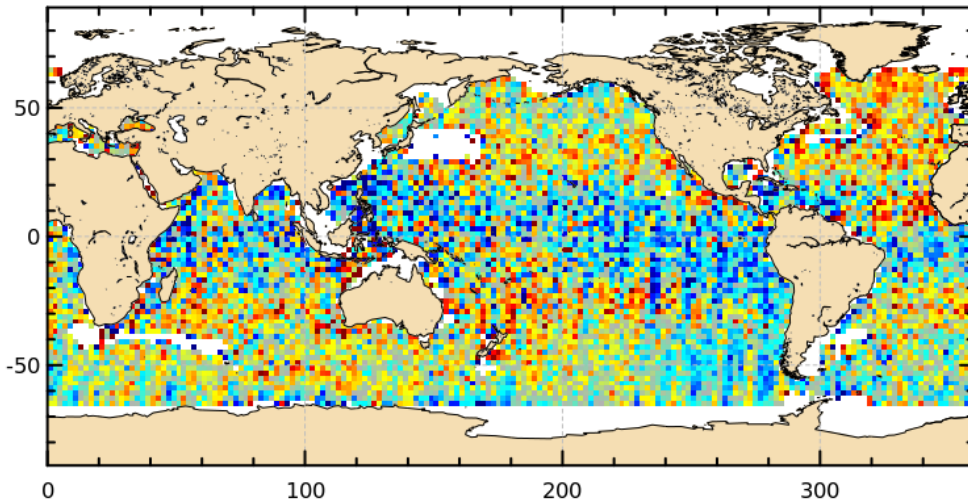
Very good agreement between C2 and J2 SLA

Geographical patterns of +/- 2cm linked to residual orbit error and possibly to residual ionospheric errors (difference in local time between J2 and C2).

Seamless transition between LRM and PLRM modes over the 3 largest SAR boxes.

# Cross calibration with Jason-2

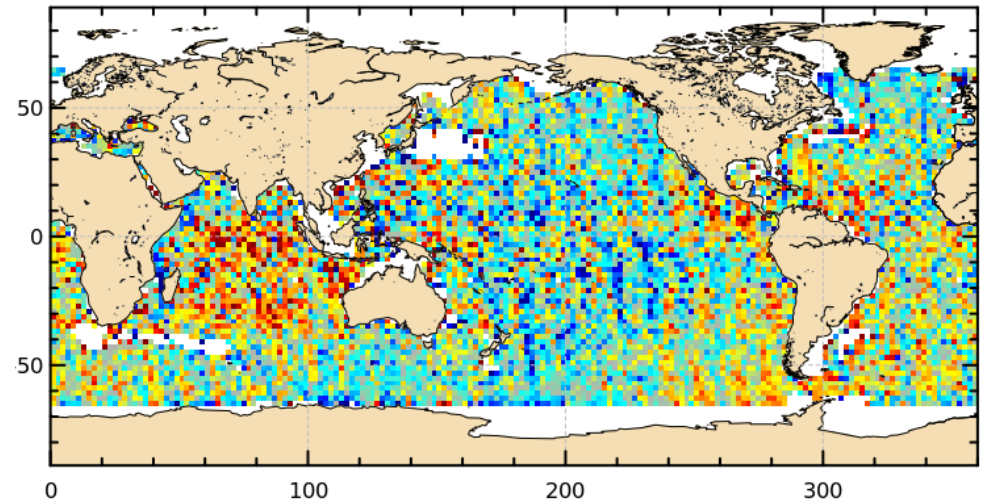
C2 (PLRM) Descending - J2, 10 day Crossovers



SSH difference (m)

-0.04 -0.02 0.00 0.02 0.04

C2 (PLRM) Ascending - J2, 10 day Crossovers

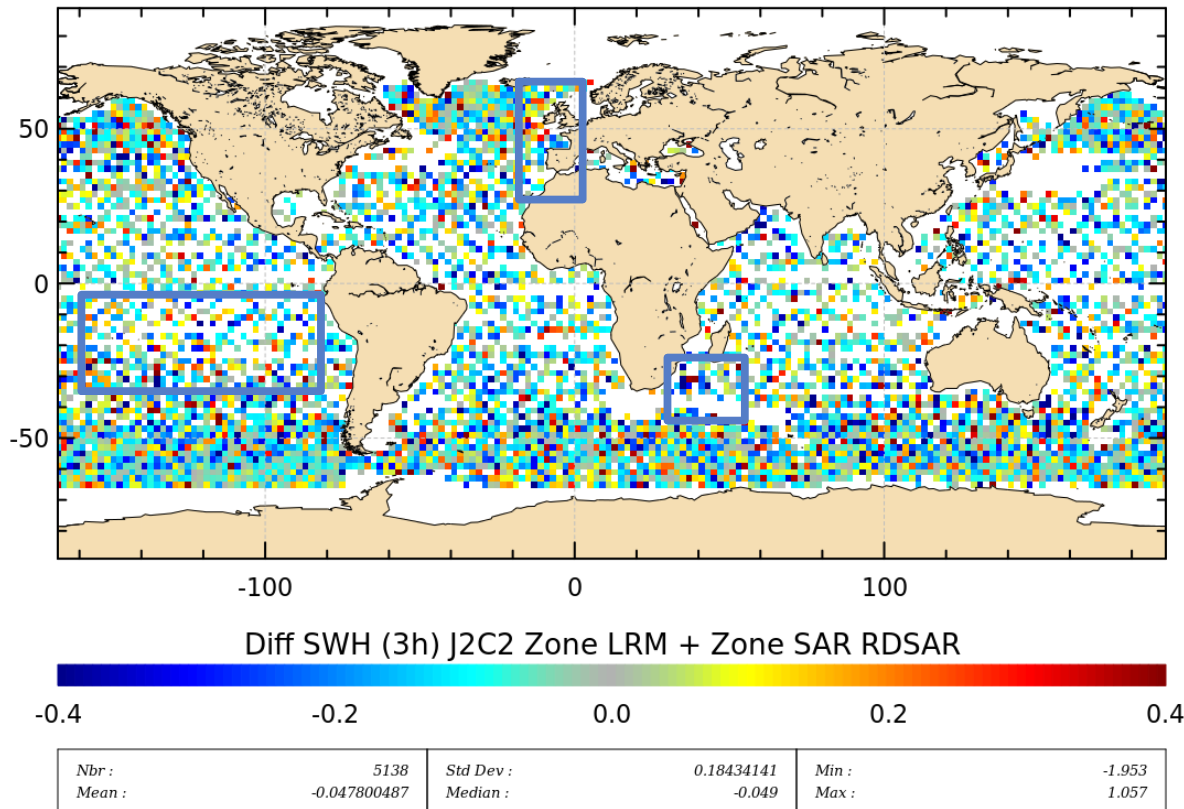


SSH difference (m)

-0.04 -0.02 0.00 0.02 0.04

# Cross calibration with Jason-2

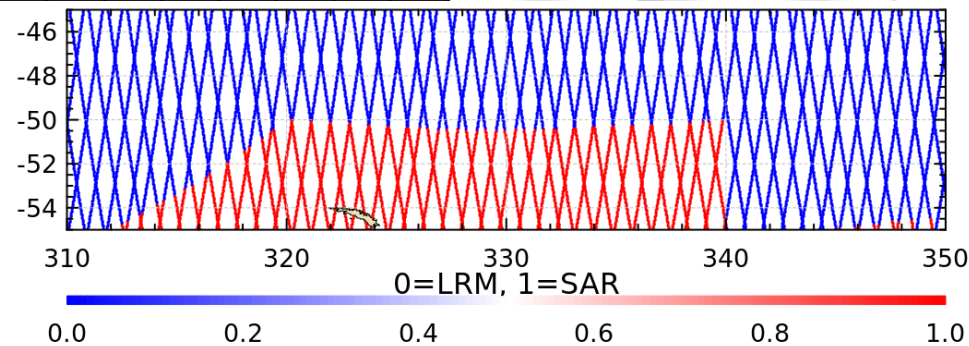
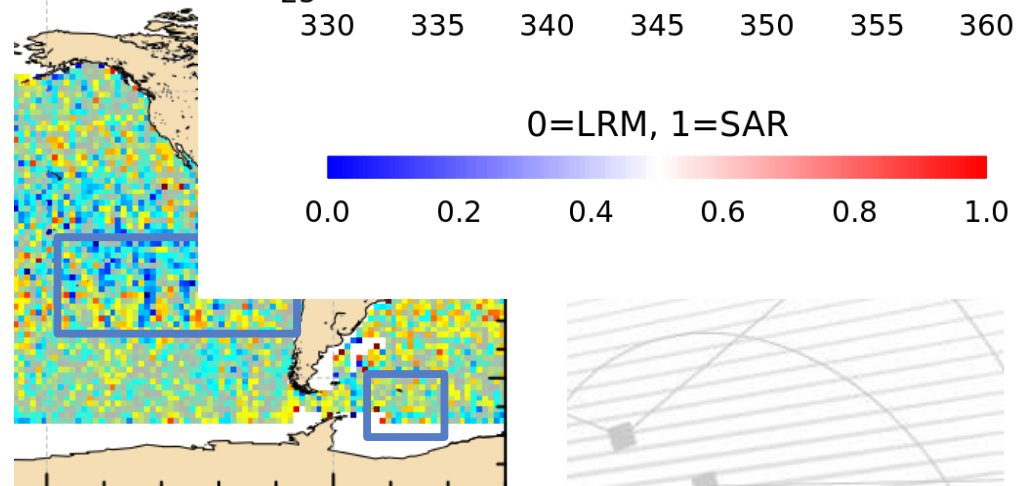
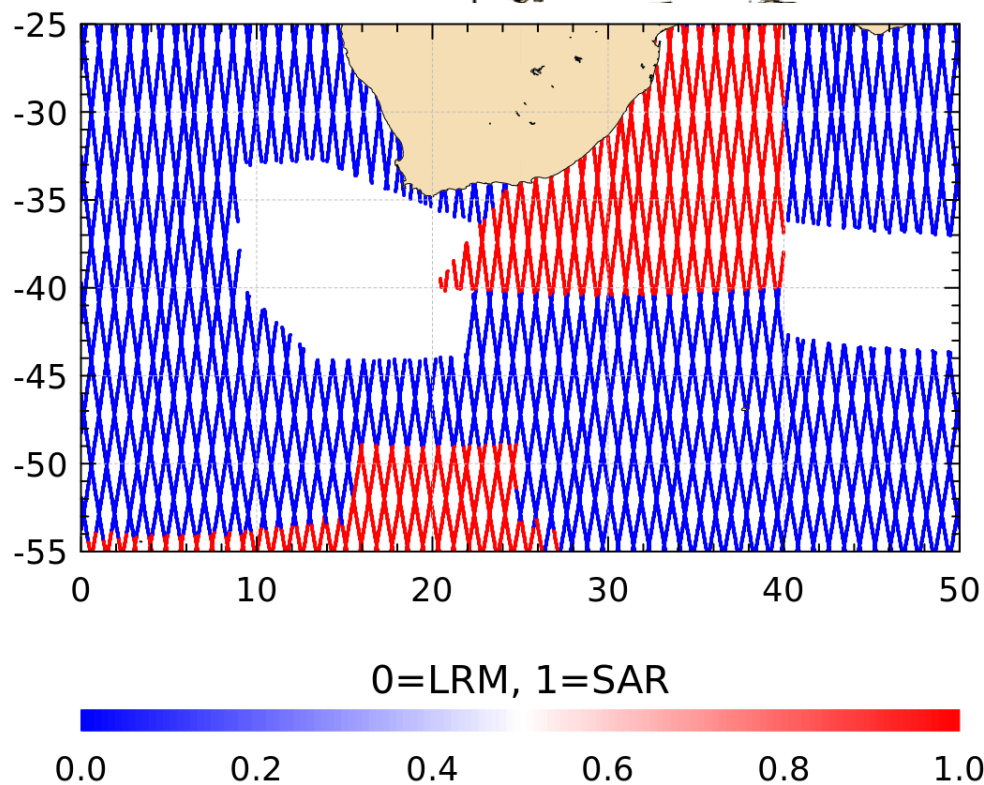
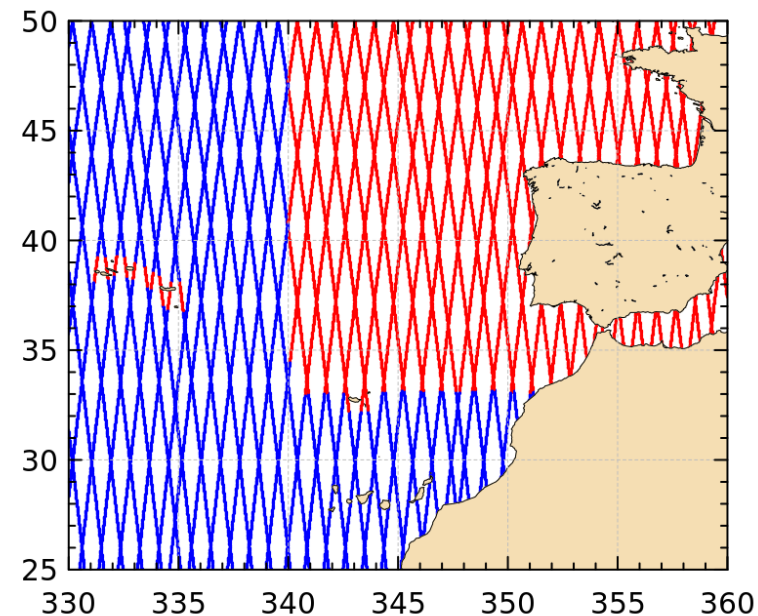
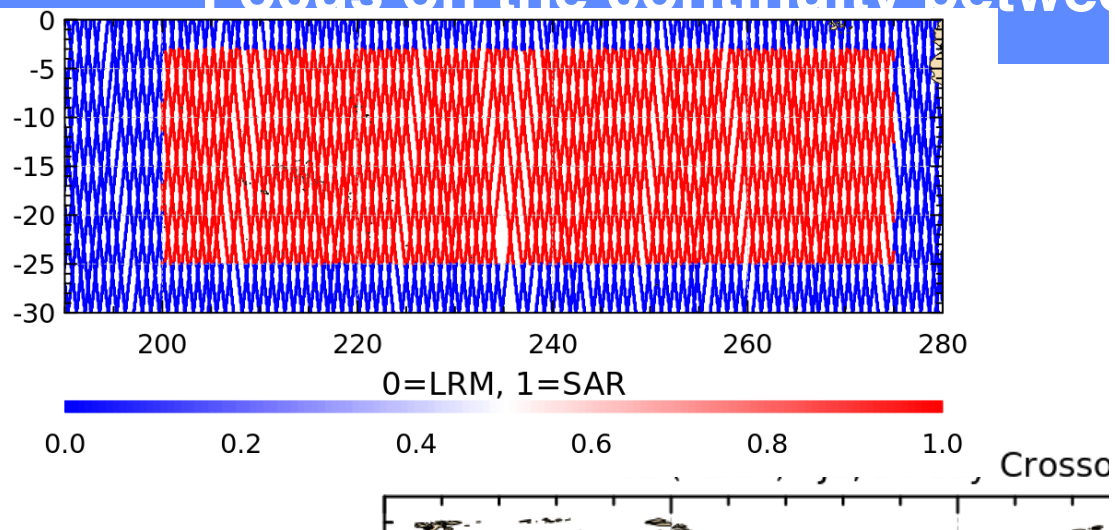
Crossovers between C2 and J2 over the 11 months. The time lag is limited to 3 hours since the sea state varies much more rapidly than the sea level.



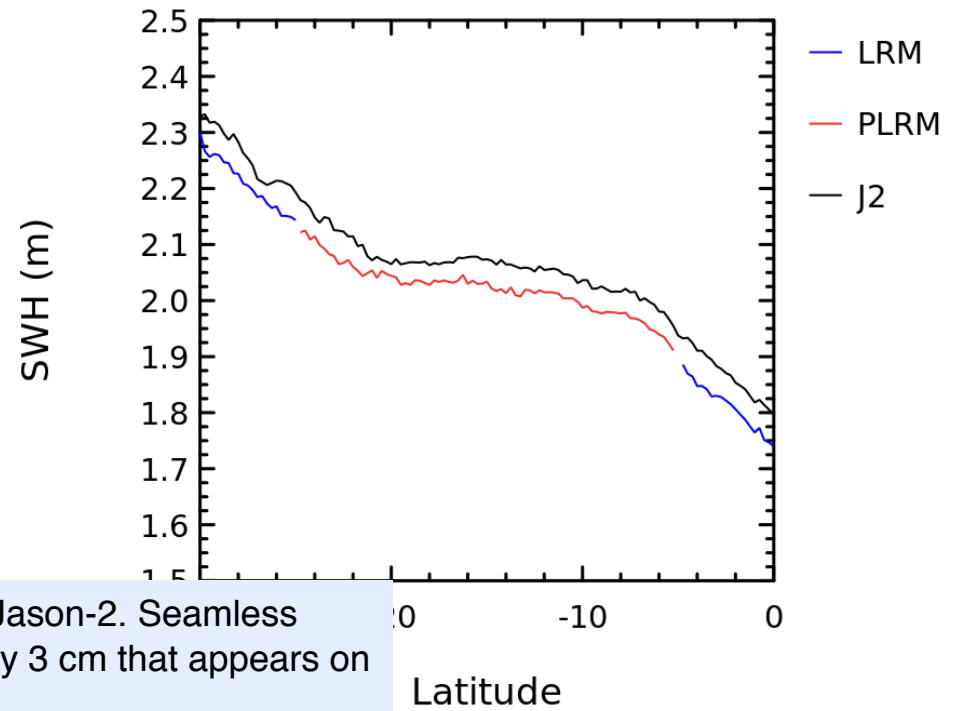
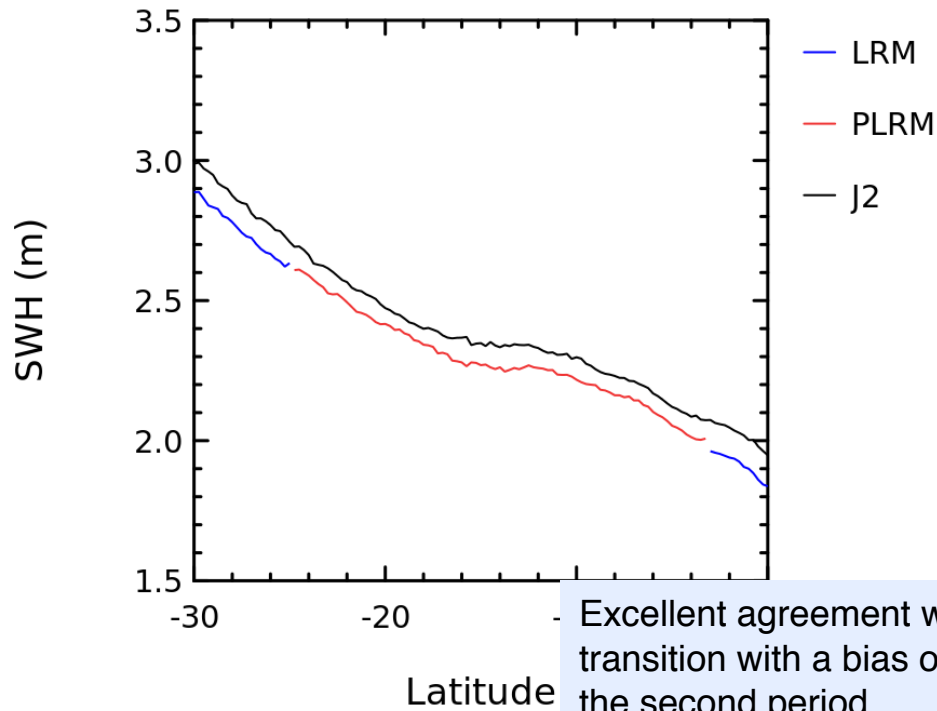
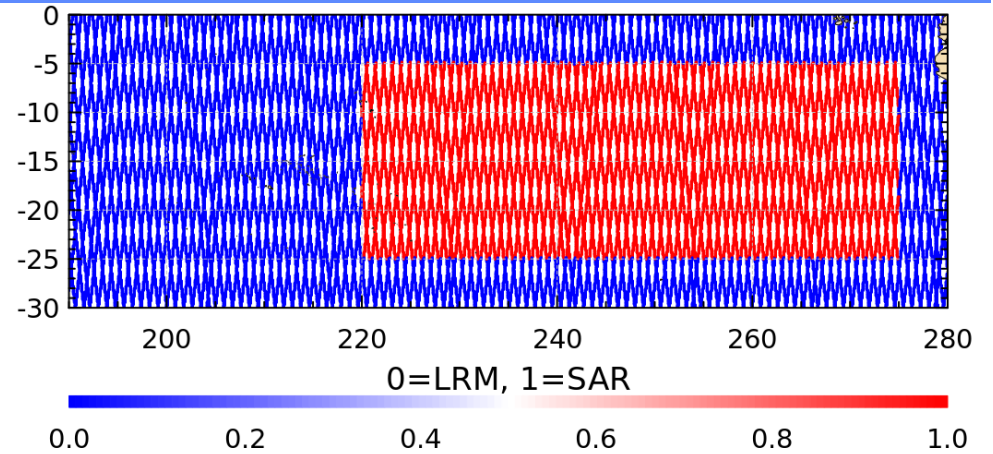
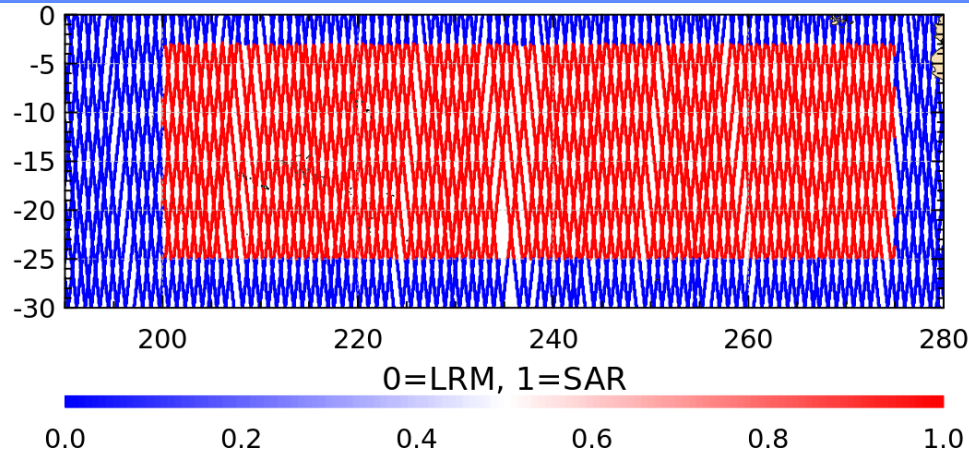
Very good agreement between C2 and J2 SWH

Mean bias of -5 cm.

# Focus on the continuity between



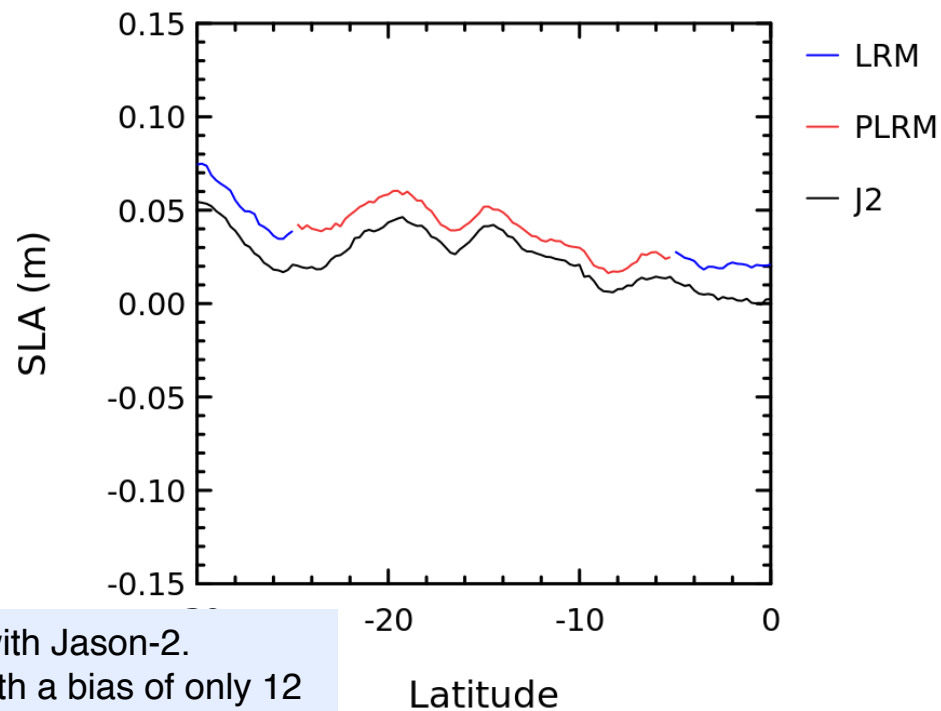
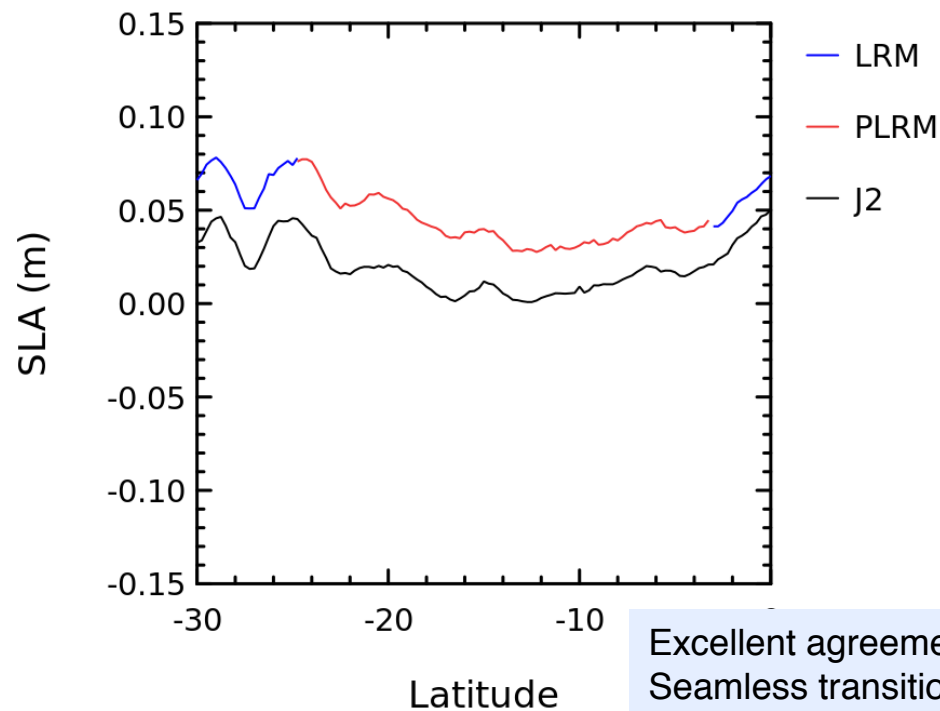
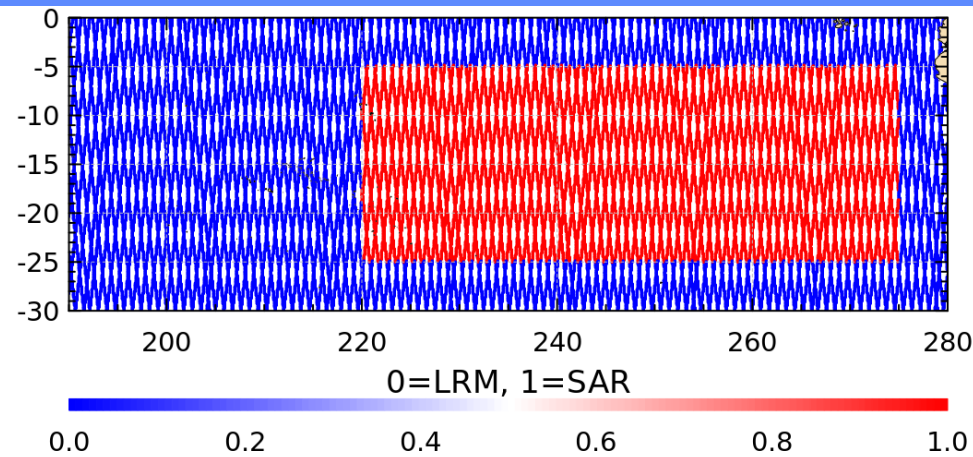
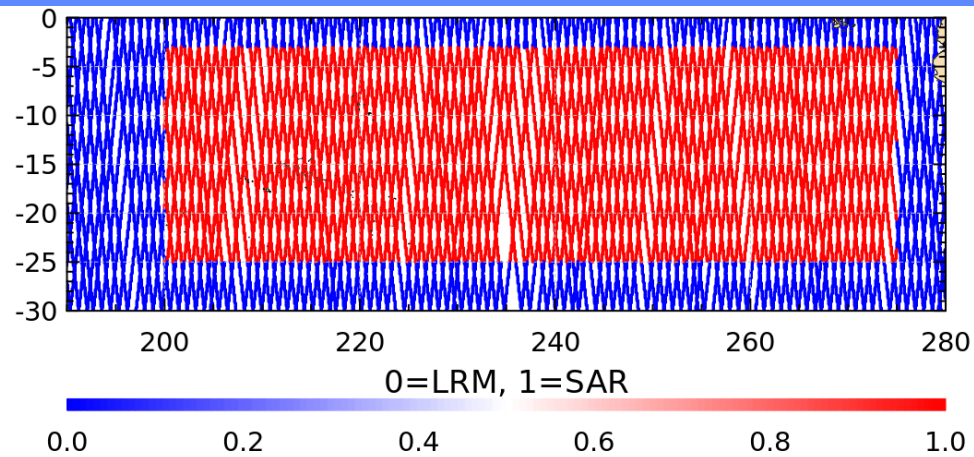
# Equatorial Pacific transition



Excellent agreement with Jason-2. Seamless transition with a bias of only 3 cm that appears on the second period.  
Bias of 10 cm and 5 cm on LRM and PLRM SWH

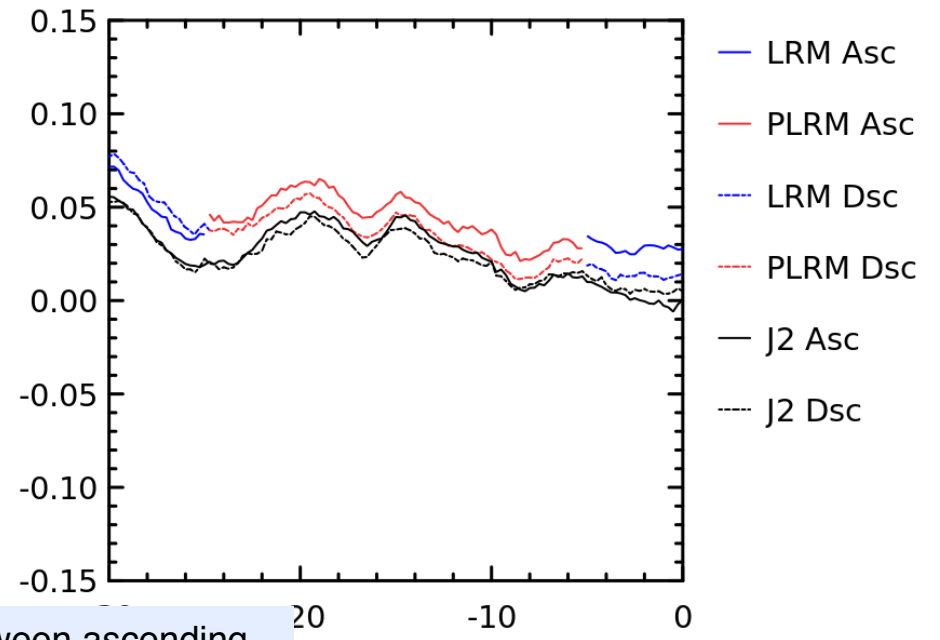
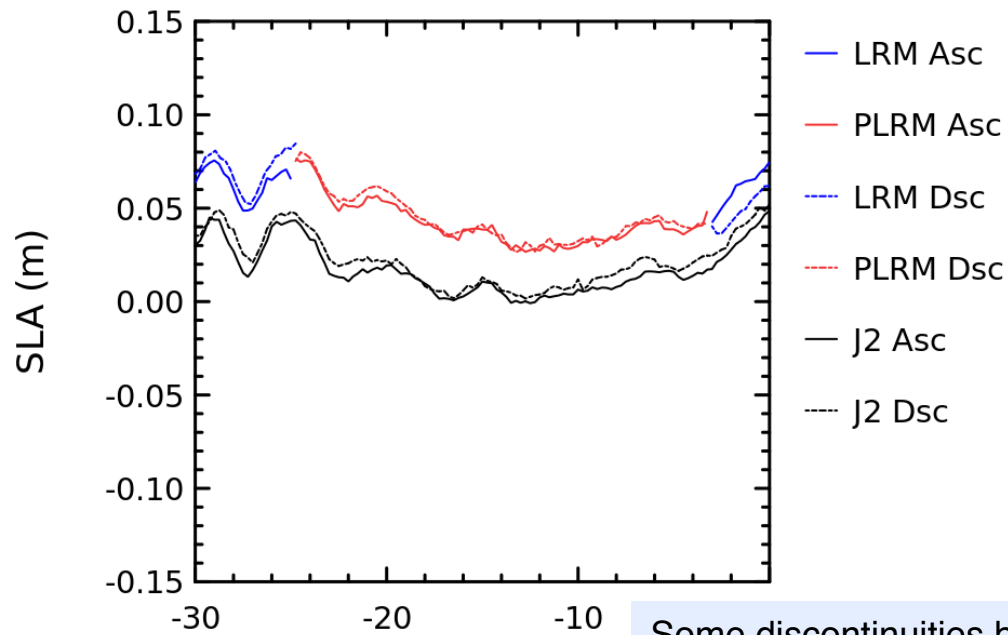
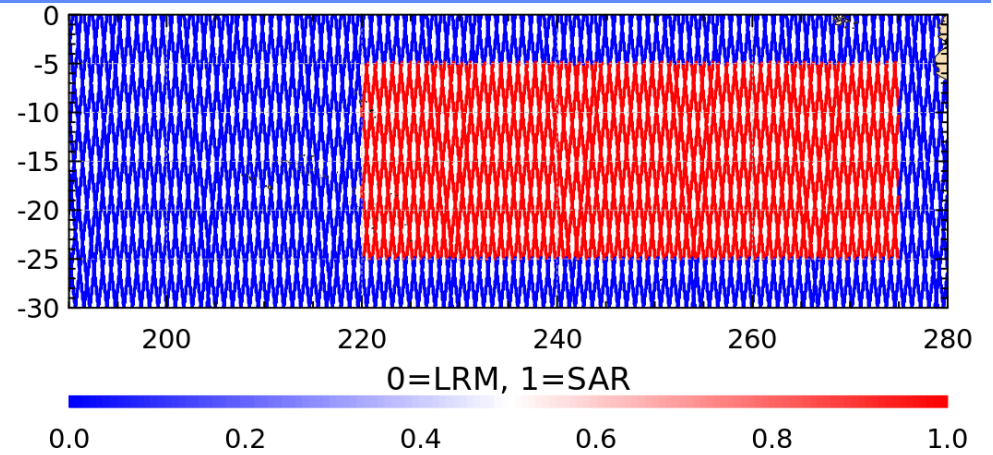
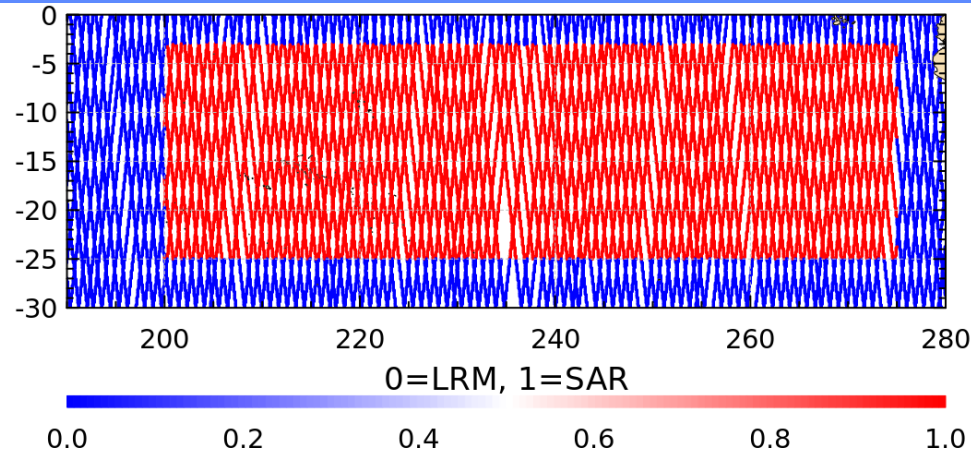


# Equatorial Pacific transition



Excellent agreement with Jason-2.  
Seamless transition with a bias of only 12 mm that appears on the second period

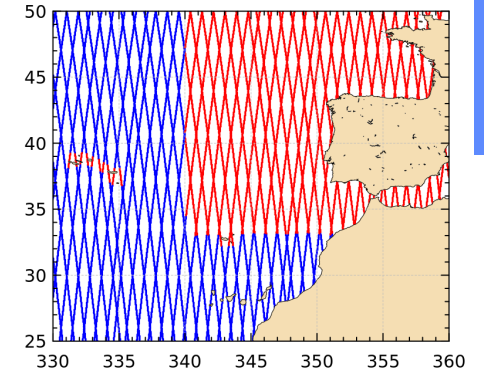
# Equatorial Pacific transition



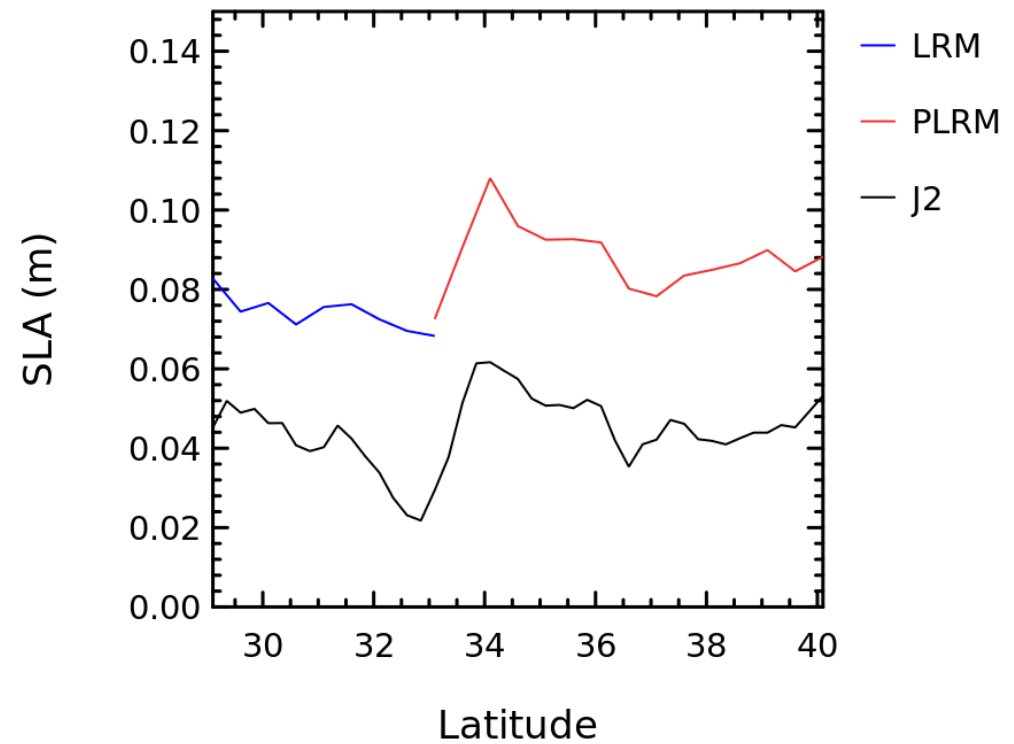
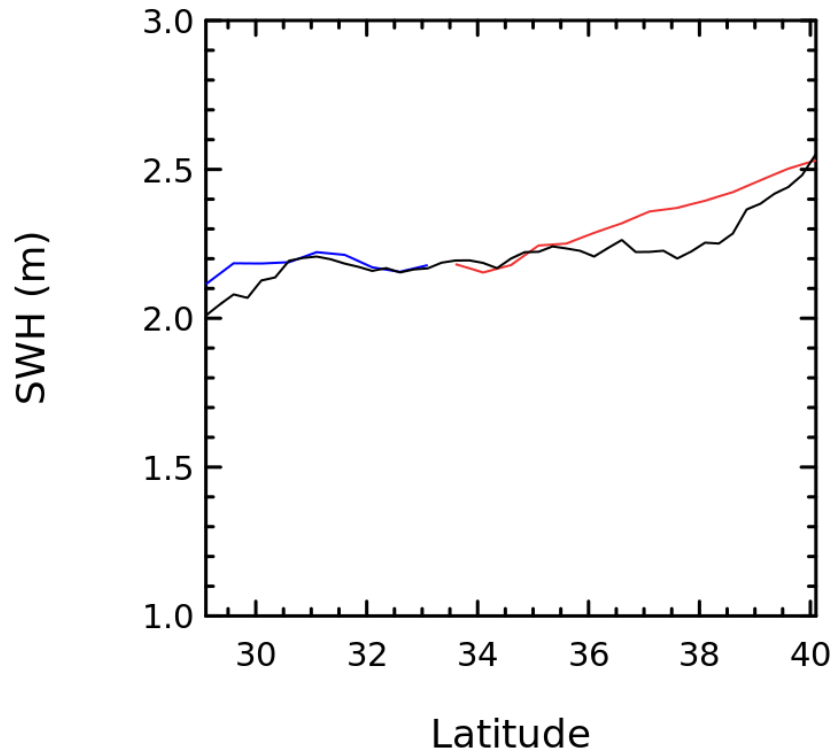
Some discontinuities between ascending and descending passes but < 1 cm (better match for descending passes)

# Atlantic transition

Excellent agreement over the Atlantic transition both for SWH and SLA.



0=LRM, 1=SAR



# Conclusions

- This analysis shows that the PLRM provide a seamless transition with LRM data for SWH.
- We find a bias of 5 to 10 cm on LRM and PLRM SWH, SWH being too low compared to Jason-2 SWH.
- This analysis shows that the PLRM provide a seamless transition with LRM data for SLA over most of the analysed cases.
- Going below the centimetre to check the seamless transition between LRM and PLRM in all cases is certainly quite challenging, given the few areas in SAR mode and the complexity of the signals that have to be taken into account.  
=> getting transitions at centimeter level in all the cases analysed in this study is excellent and it fully validates the PLRM processing compared to the LRM standard that we are used to in altimetry

## If we want to go further...

- Over the Pacific, a bias of 12 mm appears on the SLA averaged during the second period. There is no explanation for having a bias that would evolve with time, except that the instrumental drift of the altimeter would not be properly tackled in the CPP processing.
  - IF mask applied in the CPP processing is constant
  - Possible drift of the PTR is not accounted for.

=> We would need a longer time serie to further check the temporal evolution of the bias between LRM and PLRM processing.
- We also observe discrepancies between ascending and descending transitions over the Pacific, suggesting that an error would affect ascending tracks in the Pacific area.