OSTST-2019, Chicago

Hy-2B surface topography assessment and contribution in the altimetry constellation

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Context

- ❑ Hy2-B is the 2nd satellite of the CNSA dedicated to the ocean sea surface topography monitoring

- ❑ It was launched in October 2018 and overflights the Hy-2a 14-days repetitive orbit (Hy-2a moved on geodetic ground track on March 2016)

- ❑ As for Hy-2A, in the frame of the partnership between NSOAS and CNES, we performed a global assessment of the Hy-2B altimeter performances.

➔ The final objective is the Hy-2B integration in the DUACS system to improve the quality of CMEMS L4 Sea Level products

Data coverage : Open Ocean & Sea Ice

Missing Measures HY-2B 2019-08-03 to 2019-18-08
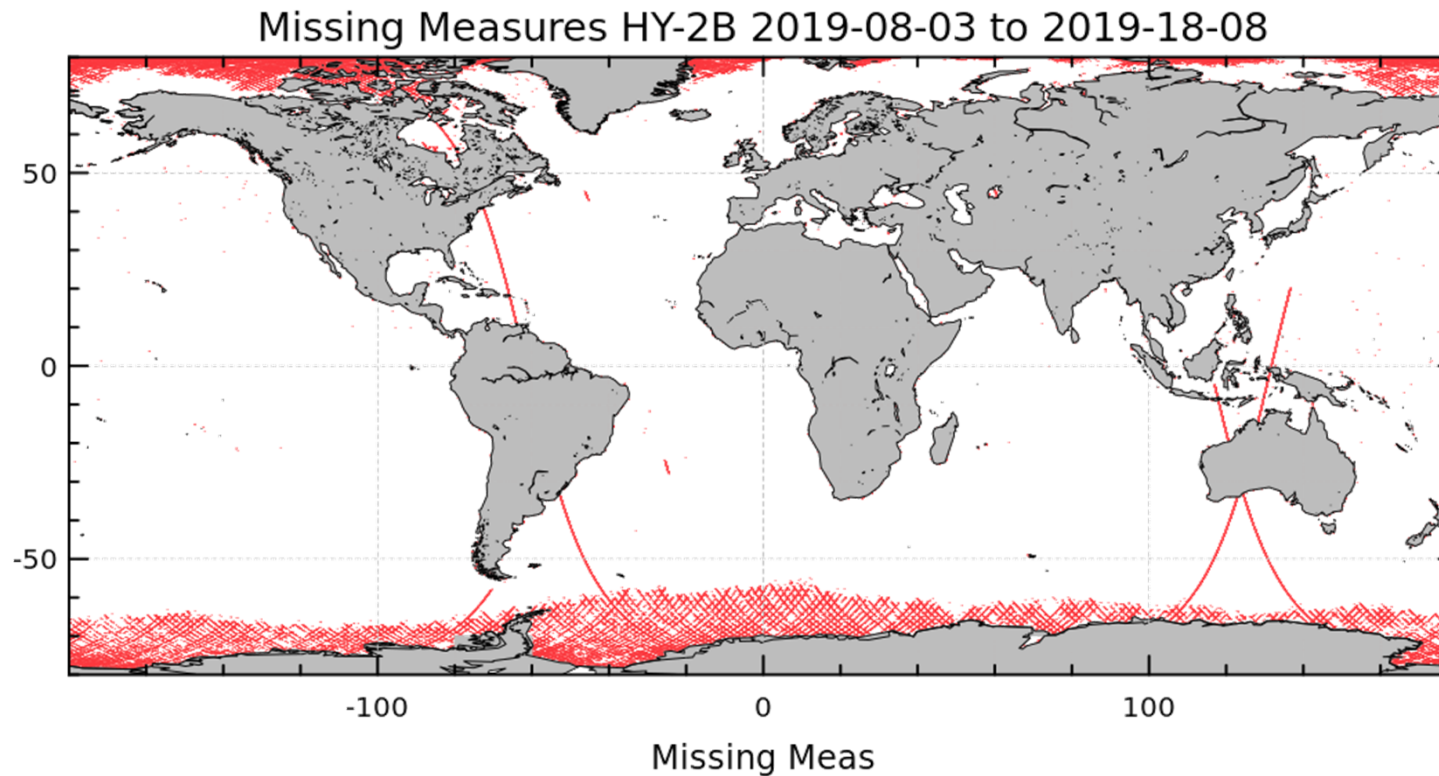
Missing Meas

- ❏ Very good data availability over ocean (> 90%)
- ❏ Reach 81° of lat ➜ Huge potential for Sea ice sampling but low data availability, possibly related to the altimeter tracking performances
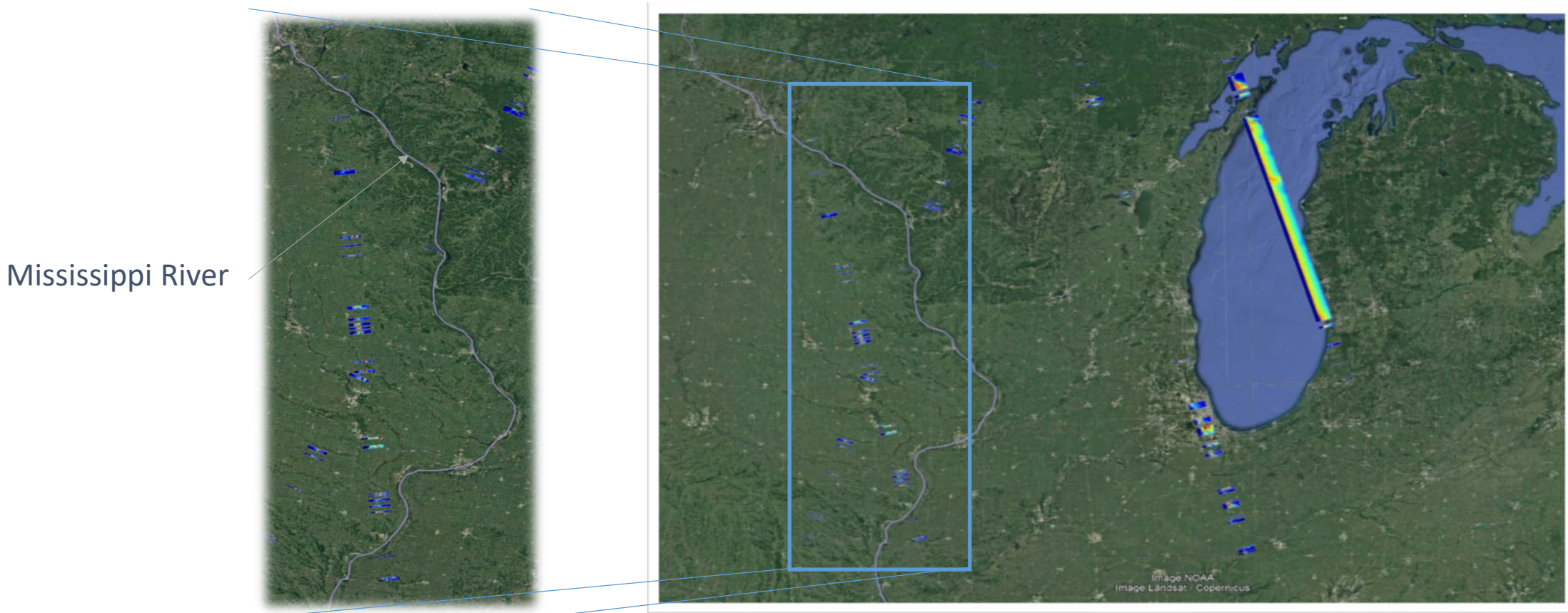
Data coverage : Inland Waters & Land Ice

Missing Measures HY-2B 2019-08-03 to 2019-18-08
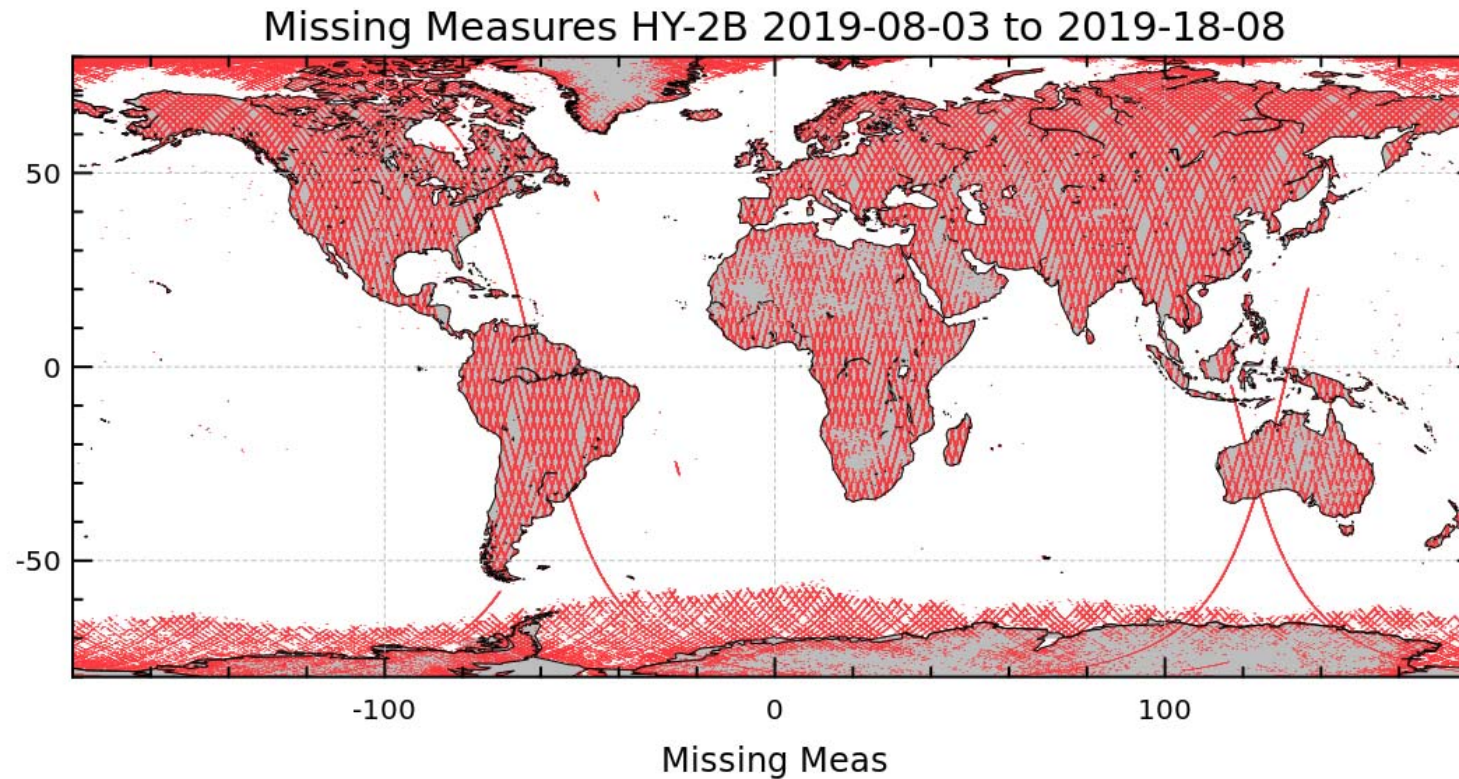
❏ Large amount of missing measurements over Land (in average : 59 % missing). Similar result was observed for Hy-2A.
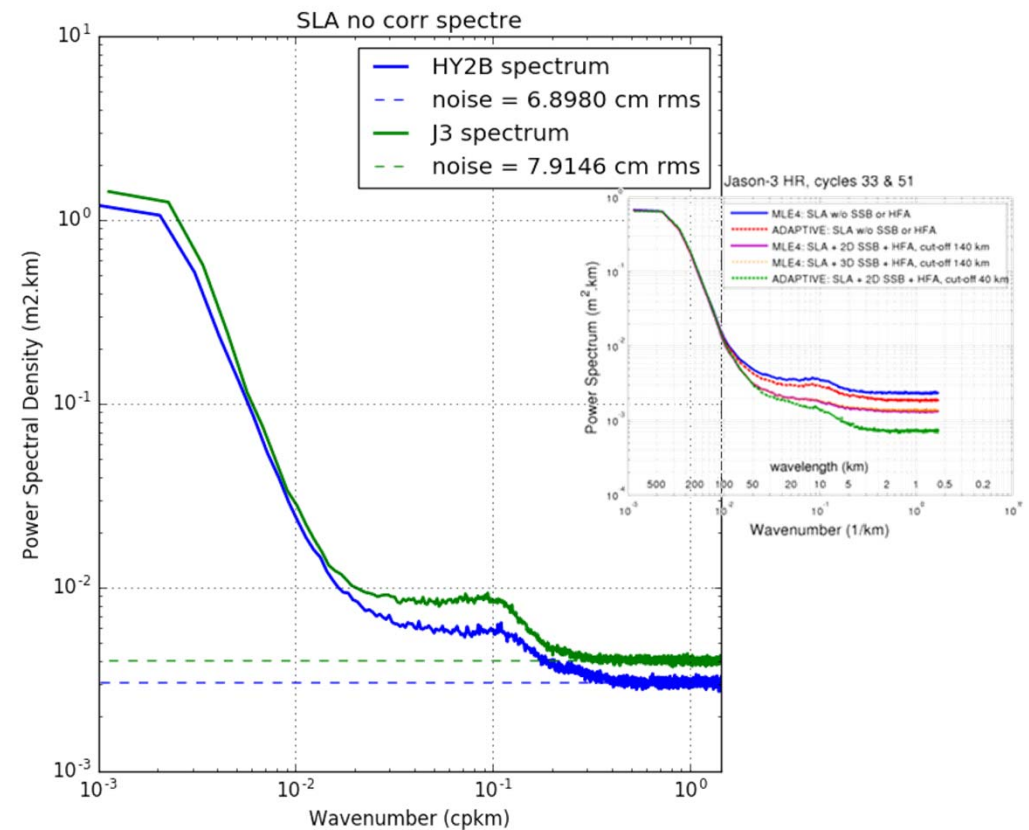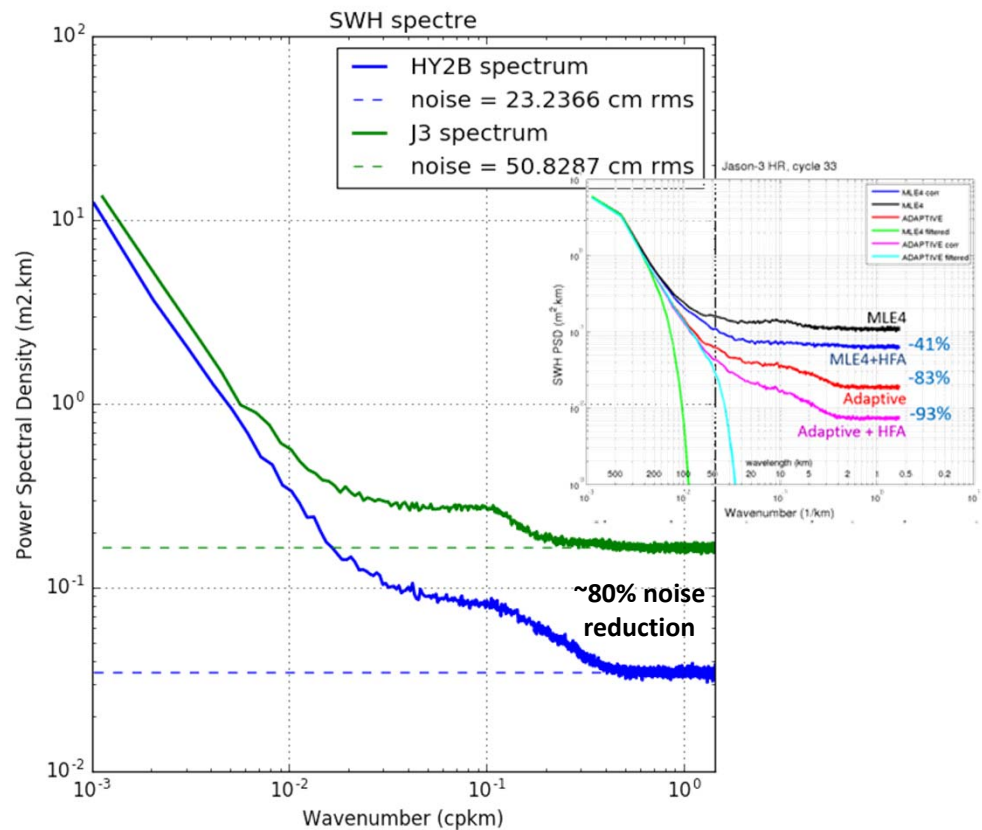
Data coverage : Inland Waters & Land Ice

Mississippi River

- ❑ Good tracking performances over lakes
- ❑ The Nothern part of the Mississippi river is not sampled at all ➜ tracking performances not good enough for river Water Surface Height monitoring
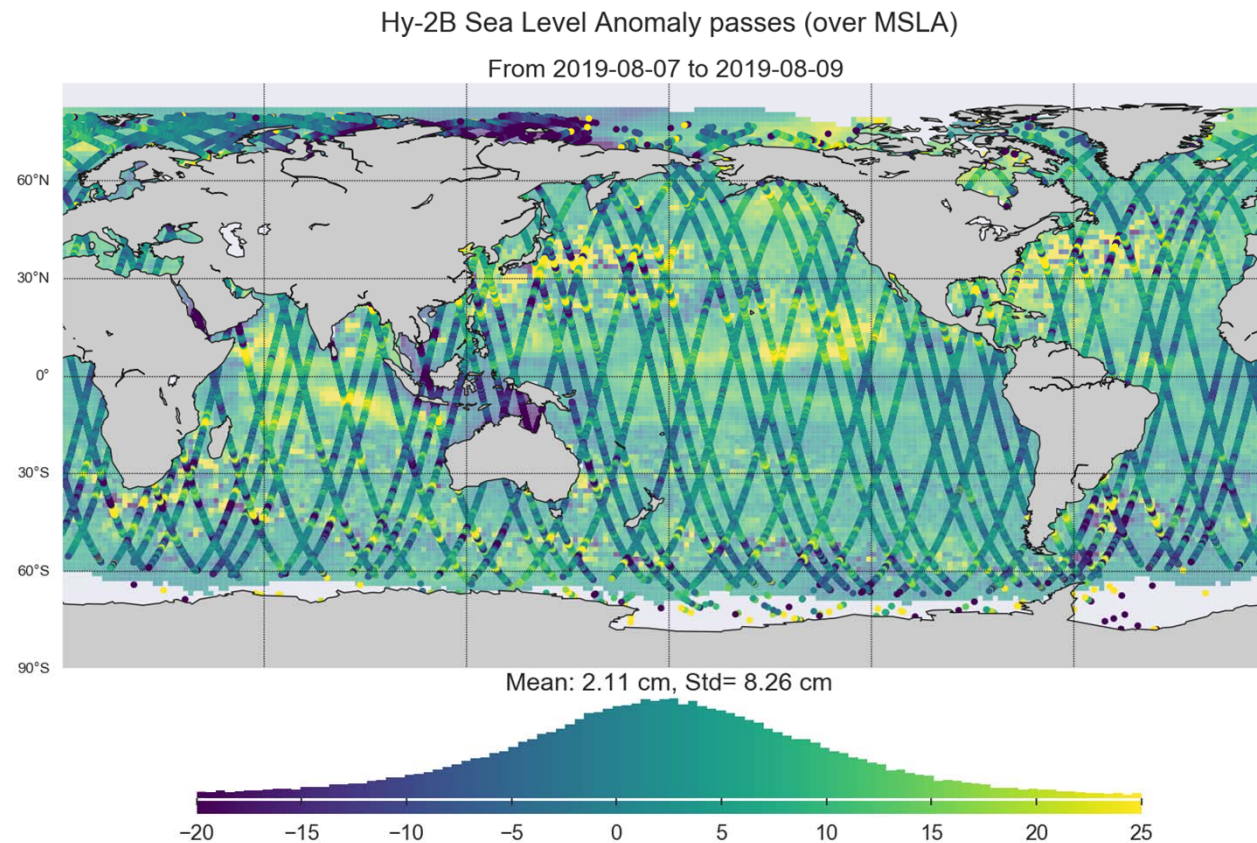
Data Quality over Ocean: Short wavelengths assessment

- ❑ Improved performances for wavelengths < 100 km thanks to dedicated on-ground processing ➜ Lower level of noise on range and especially on SWH.

(long wavelengths differences are related to the different periods used to compute spectra)
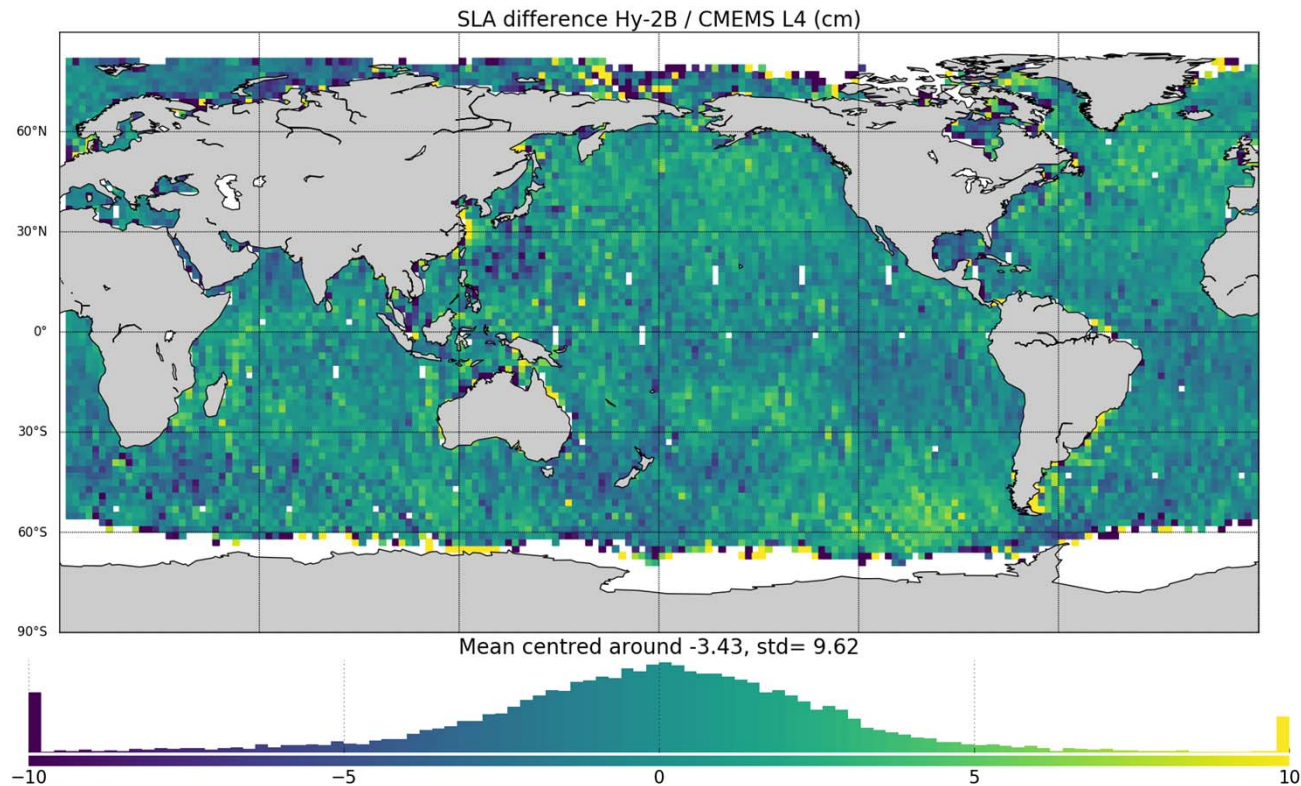
Data Quality over Ocean: Long wavelengths assessment

Hy-2B Sea Level Anomaly passes (over MSLA)

From 2019-08-07 to 2019-08-09

Mean: 2.11 cm, Std= 8.26 cm

❏ 2 days of Hy-2B SLA overlapping the CMEMS L4 gridded product
➔ Very good agreement at long wavelengths

Data Quality over Ocean: Long wavelengths assessment

SLA difference Hy-2B / CMEMS L4 (cm)

Mean centred around -3.43, std= 9.62

❑ Comparison with respect to the CMEMS L4 gridded products does not highlight strong geographical patterns ➔ Good consistency between Hy-2B and current altimeters constellation at long wavelengths
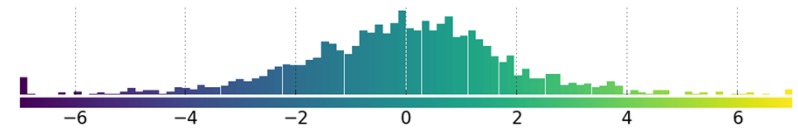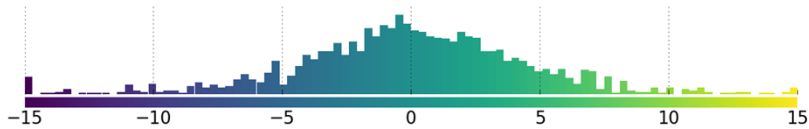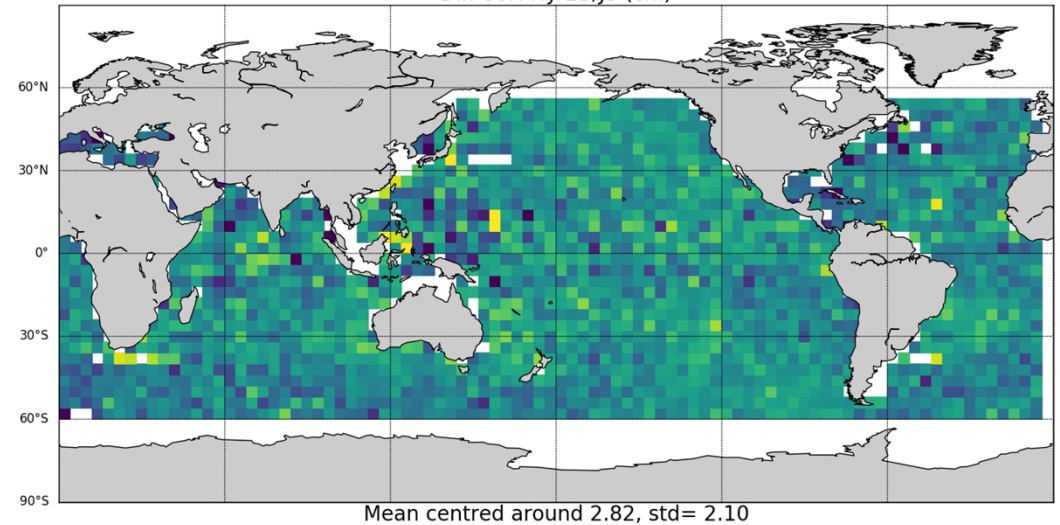
Data Quality over Ocean: Long wavelengths assessment

SSH Diff Hy2b/Hy2b (cm)

Mean centred around -0.07, std= 4.76

Diff SSH Hy-2B/J3 (cm)
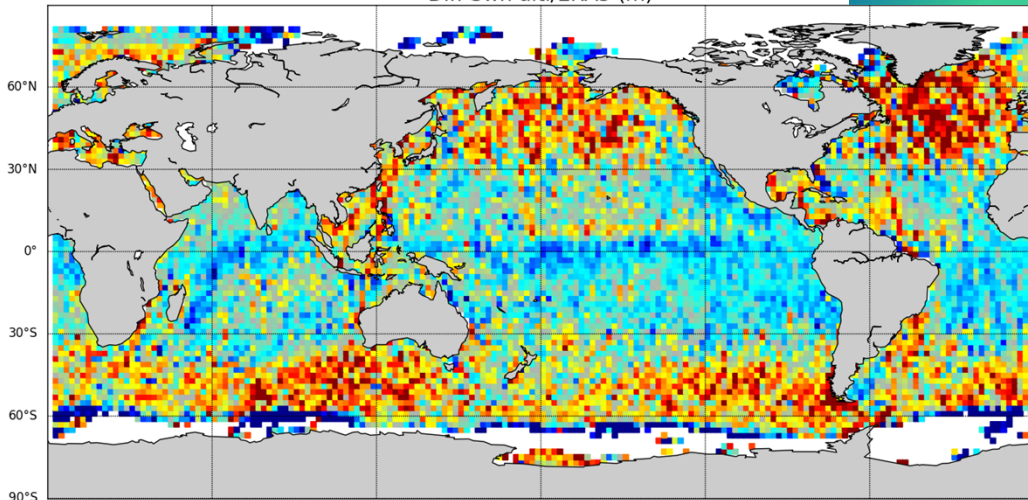
Mean centred around 2.82, std= 2.10
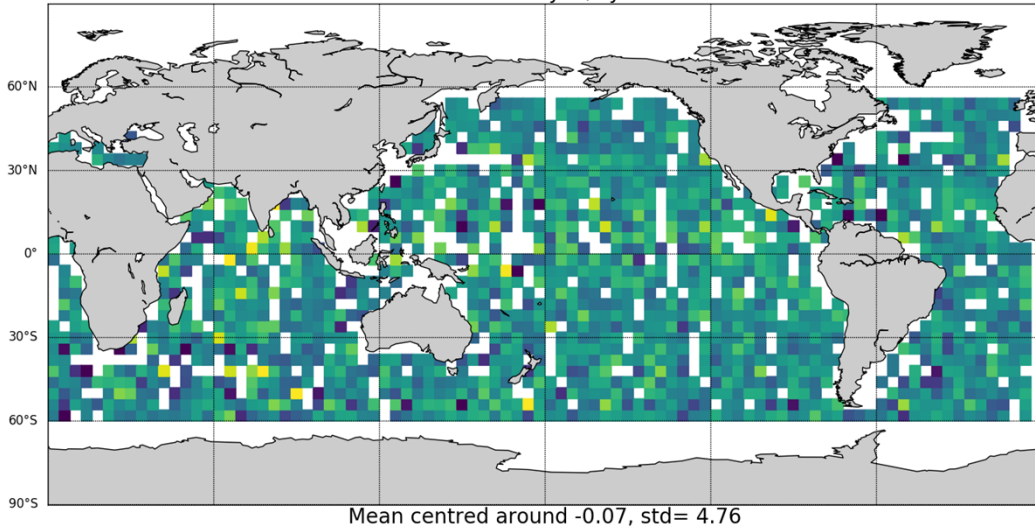
- ❑ Mono Mission crossovers show that no pseudo time tag bias is observed ➔ very good consistency between ASC & DSC tracks.
- ❑ SSH differences wrt Jason-3 at crossovers: differences ranged between -5 and 5 cm
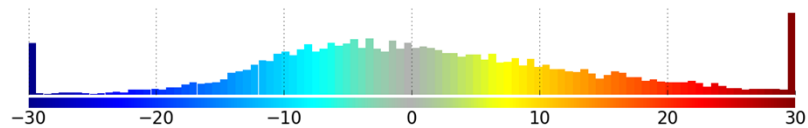- ➔ Very good quality of Hy-2B SSH at long wavelengths

Data Quality over Ocean: SWH
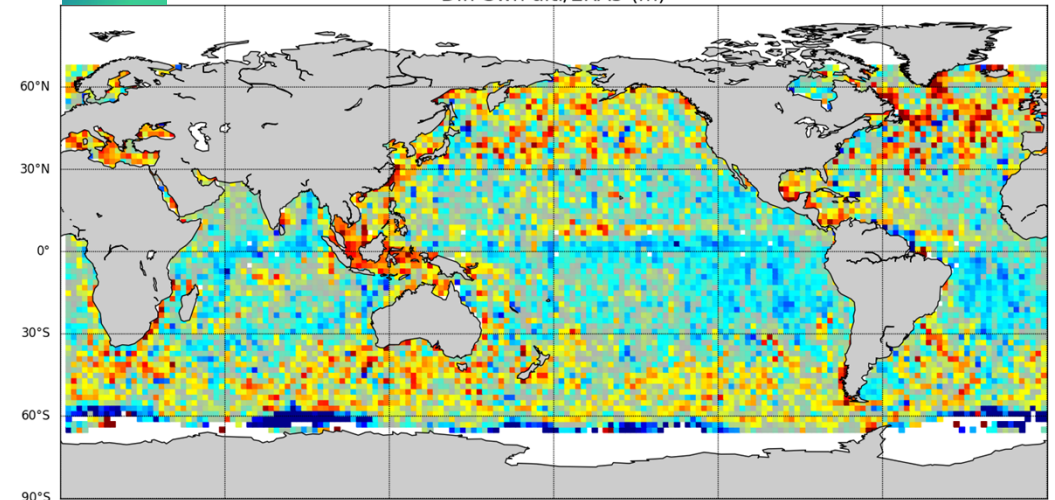

Diff Swh alti/ERA5 (m) — Hy-2b
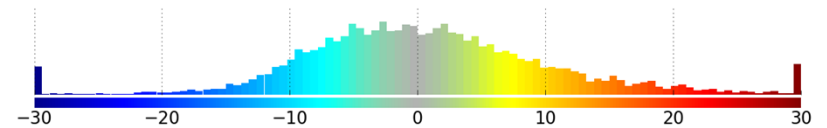
Mean centred around 13.40, std= 17.45

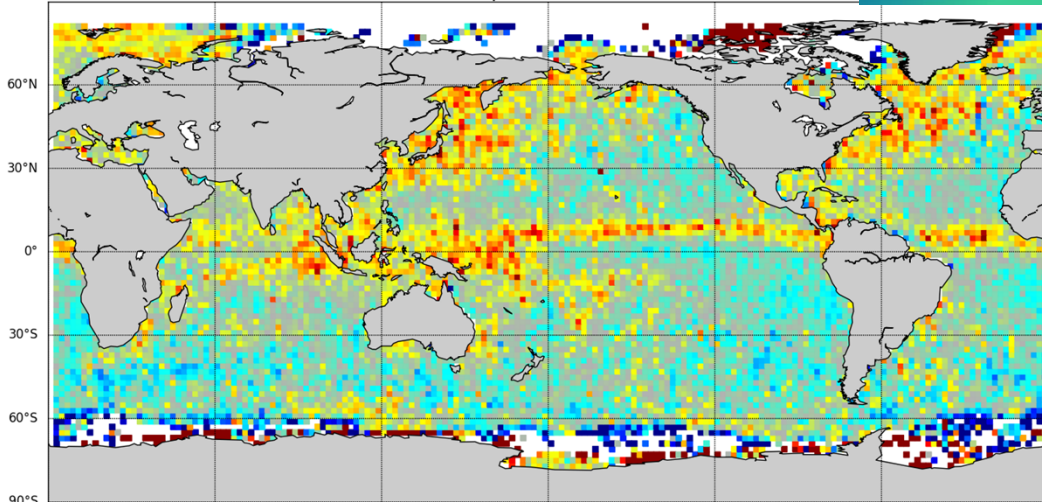Diff Swh alti/ERA5 (m) — J3

Mean centred around 0.76, std= 12.94

❑ SWH are slightly overestimated (~10 cm). Geographical patterns (significantly stronger than for J3) are correlated with SWH
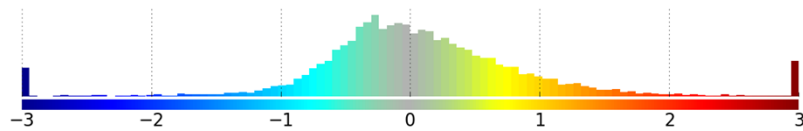
Data Quality over Ocean: Wind Speed

Hy-2b

J3
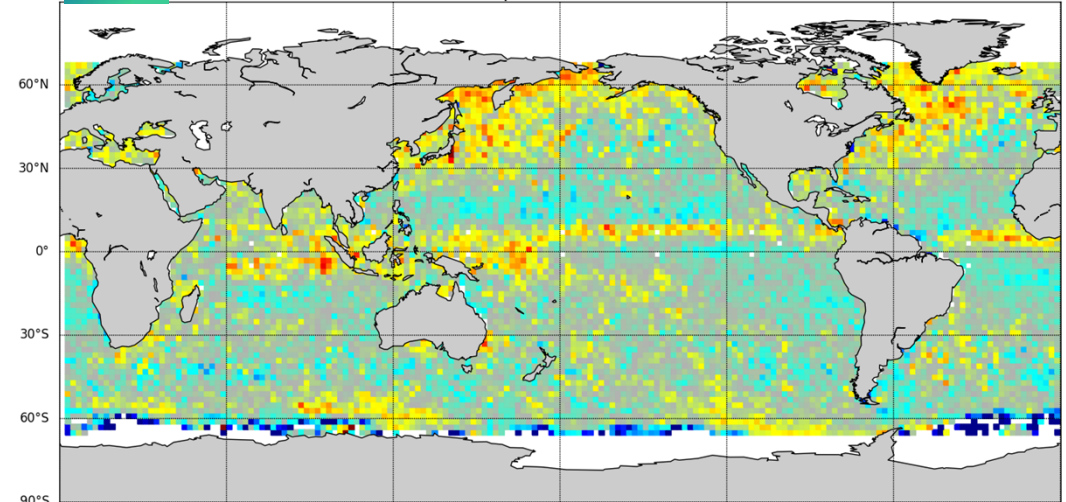
Diff Wind speed alti/Ecmwf (m/s)

Diff Wind speed alti/Ecmwf (m/s)
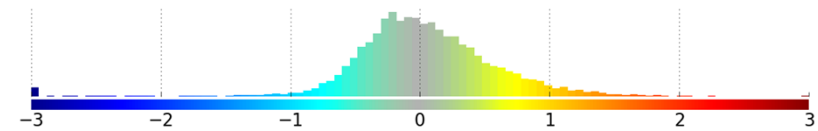
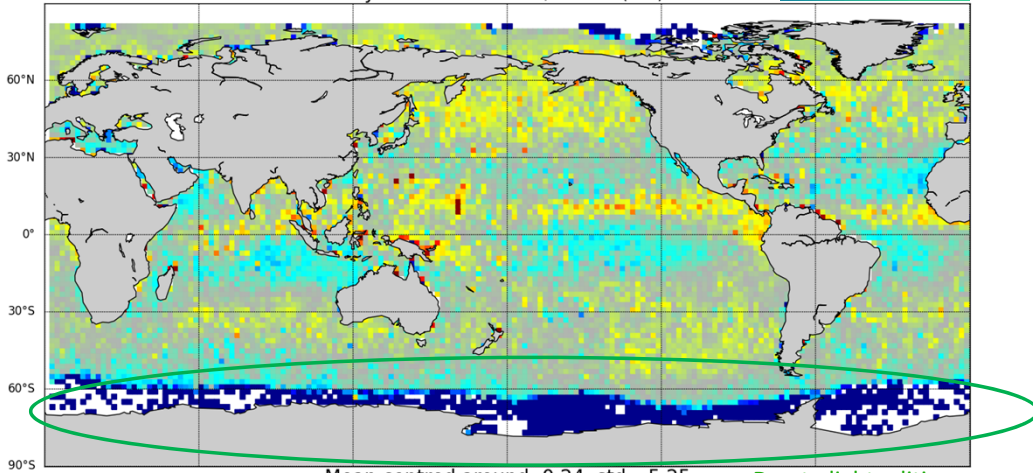Mean centred around -0.74, std= 2.06

Mean centred around -0.36, std= 0.72

❑ The wind speed estimation is slightly underestimated (-0.7 m/s) compared to ECMWF model

❑ Geographical patterns (slightly stronger than for Jason-3) are correlated with atmospheric attenuation

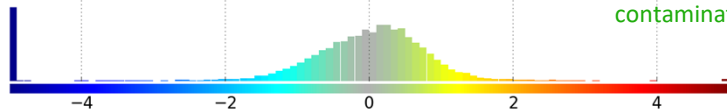# Data Quality over Ocean: MWR Wet Troposphere correction
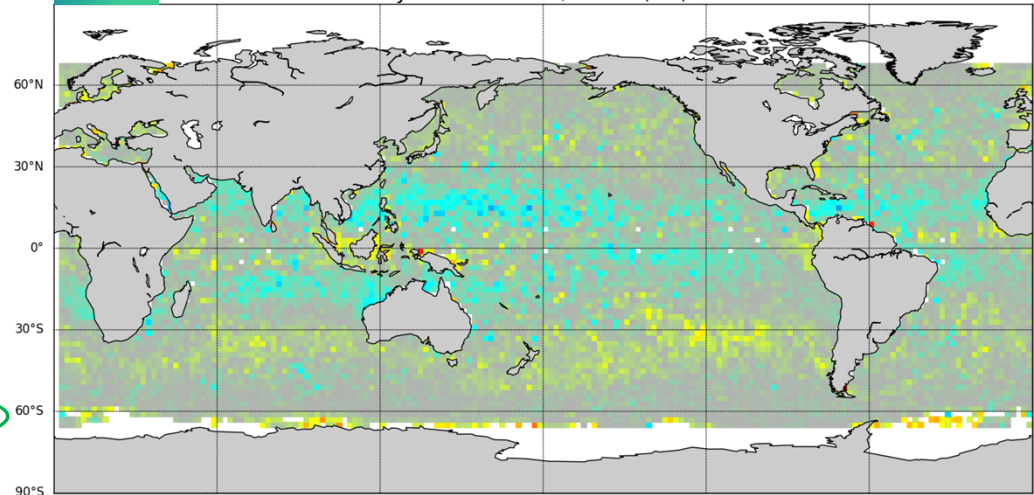

Hy-2b

J3

Hy-2B Diff WTC mwr/Ecmwf (cm)

J3 Diff WTC mwr/Ecmwf (cm)

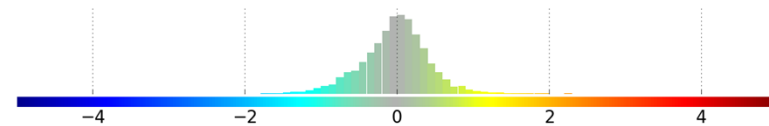Mean centred around -0.24, std= 5.25

Due to light editing applied to remove ice contamination

Mean centred around 0.70, std= 0.49

❑ The WTC derived from Hy-2B MWR is consistent with respect to path delay derived from ECMWF model. The geographical patterns are almost consistent with Jason-3 result but slightly stronger

Data Quality over Ocean: Hy-2B in DUACS:

Eddies comparison between the 3 and 4-missions-configuration
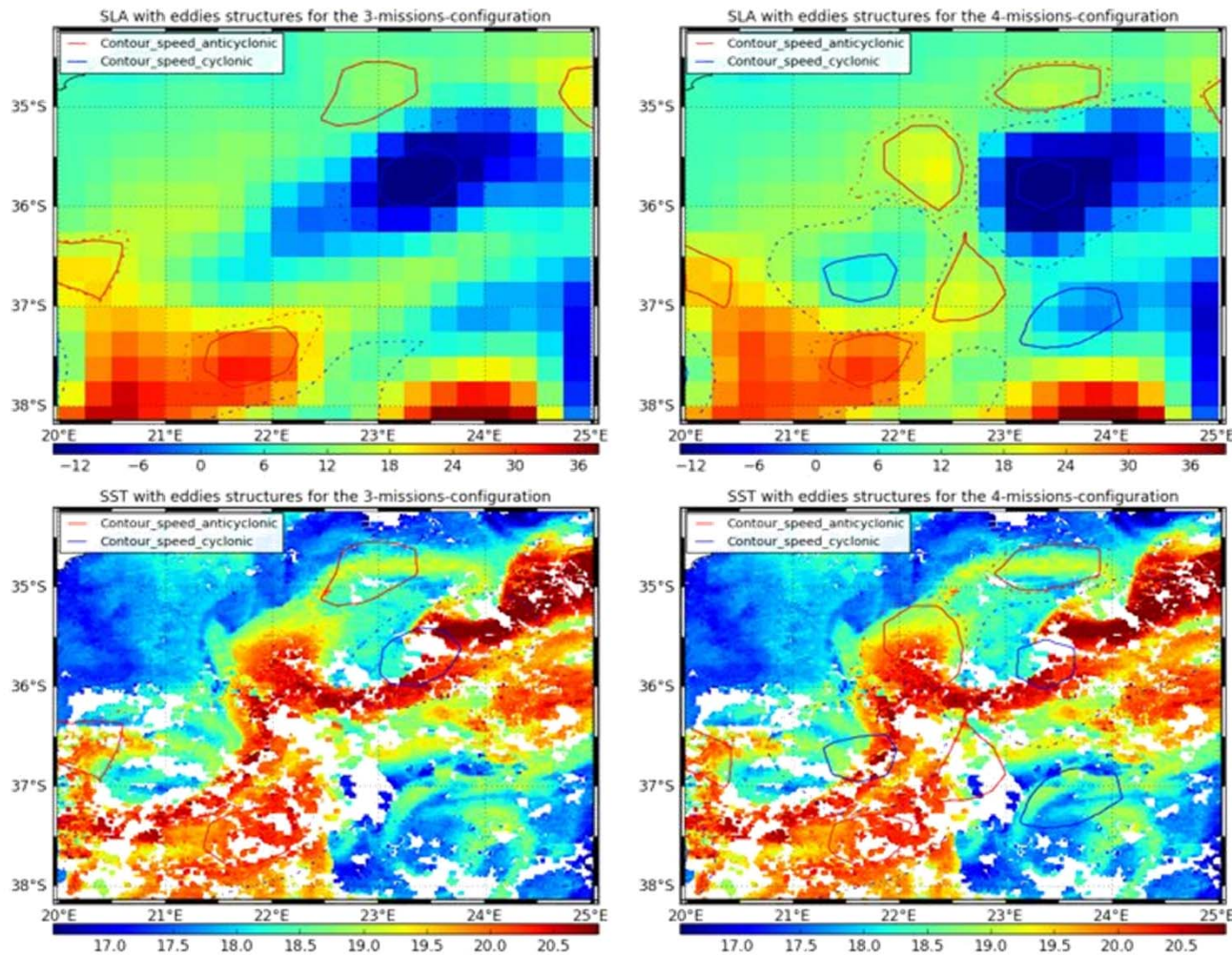
Courtesy: Guillaume Taburet (CLS)

❑ The Hy-2B integration in DUACS system is under testing :

➔ First results very promising

❑ See G. Taburet poster for more information

Conclusions

- ❑ Hy-2B altimeter and the ground processing (L1 & L2 processing) perform very well as we observed increased performances at high frequencies and good agreement with other altimeters at long wavelengths

- ❑ Testing Hy-2B integration in DUACS show promising results (see G. Taburet poster)

Perspectives

- ❑ Assess the quality and performances of the MWR and altimeter C-band frequency

- ❑ Integration in CMEMS NRT system planned for mid 2020.