On the assessement of the assimilation of HY2B in the wave model MFWAM

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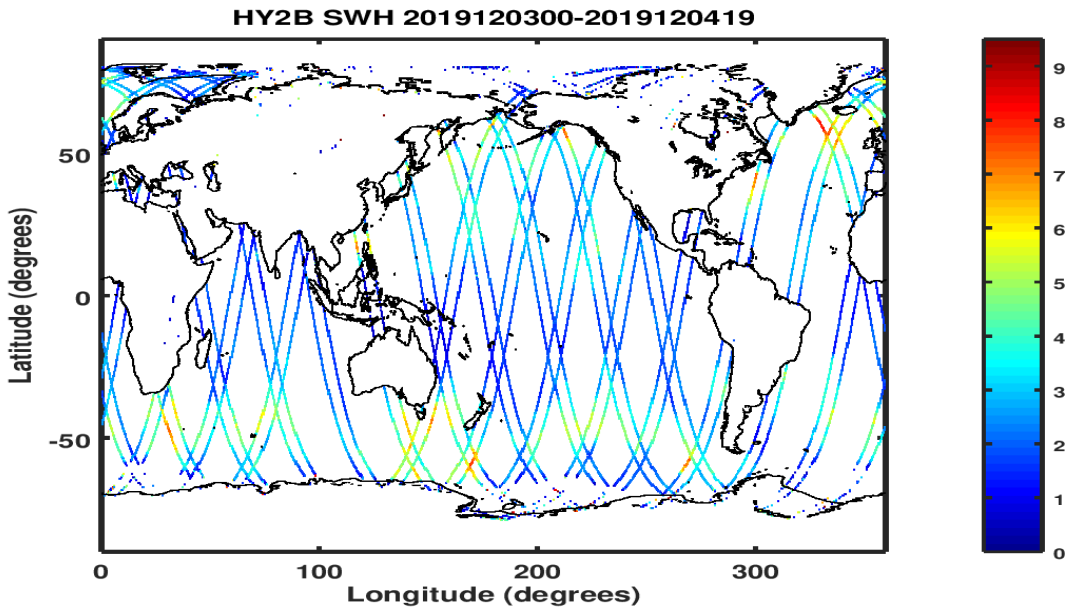
Motivation

- Evaluation of SWH from HY2B for operational applications
- Impact of the assimilation of SWH HY2B and Improvement of the data
- NRT applications or verification of operational Wave systems and wave studies



Example of HY2B SWH tracks On 3-4 December 2019

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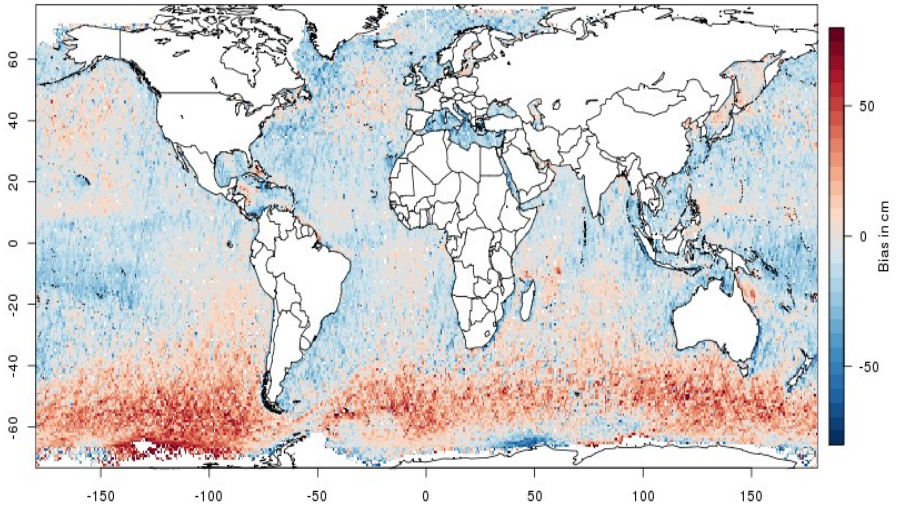
Assimilation experiments April-May 2019

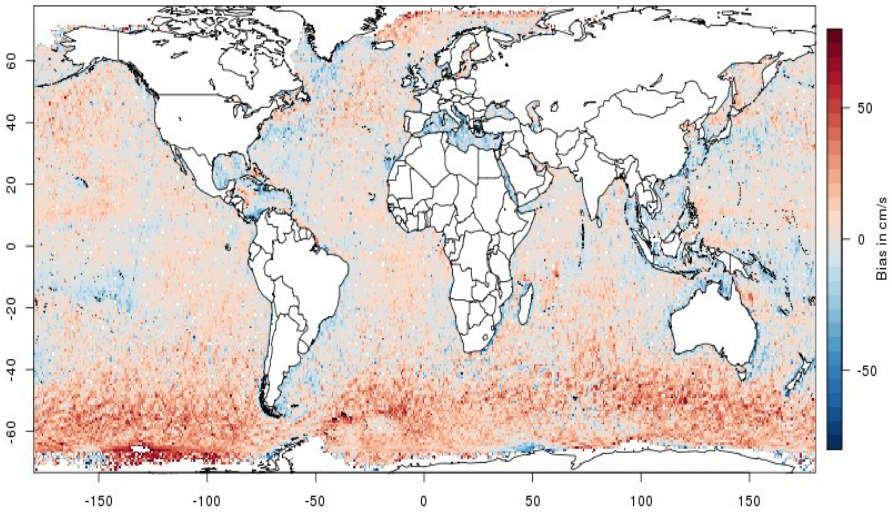
- **Model MFWAM configuration : global 0.5°, with 6-hourly atmospheric forcing from IFS**
- **Level 2 wave products provided by NSOAS (April-May 2019)**
- **Quality control on SWH, Sig0 and surface type**
- **Assimilation run with time window of 6 hours, and control run without assimilation**
- **Validation with SWH from Jason-2, Saral and S3**

Control run



Bias maps of SWH (max range 60 cm)

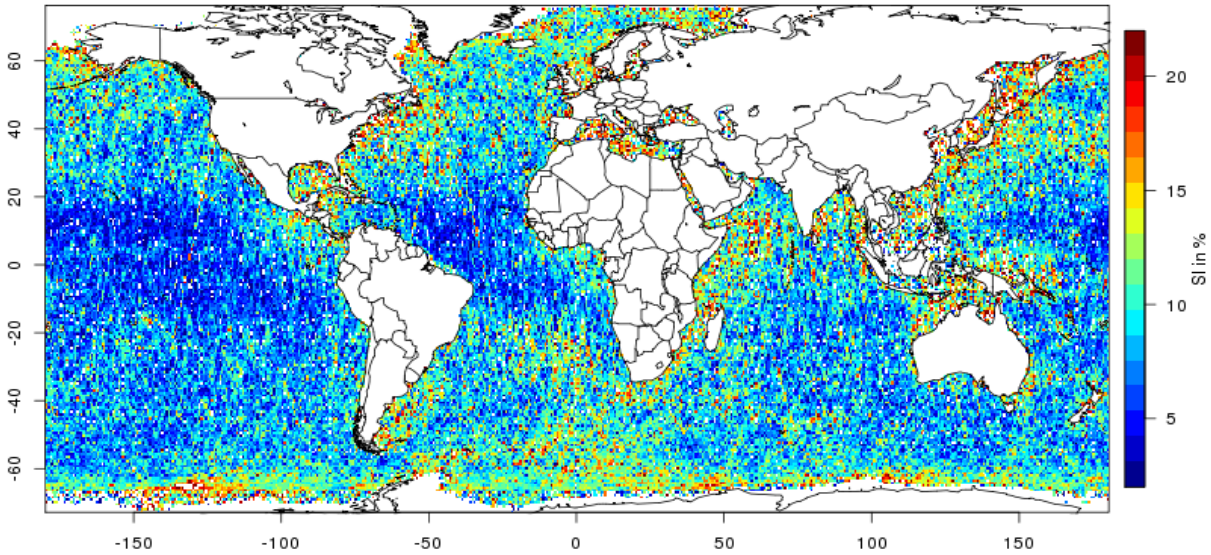
With assimilation of HY2B



Overall the assimilation of HY2b Induces a positive bias which means that SWH are overestimated

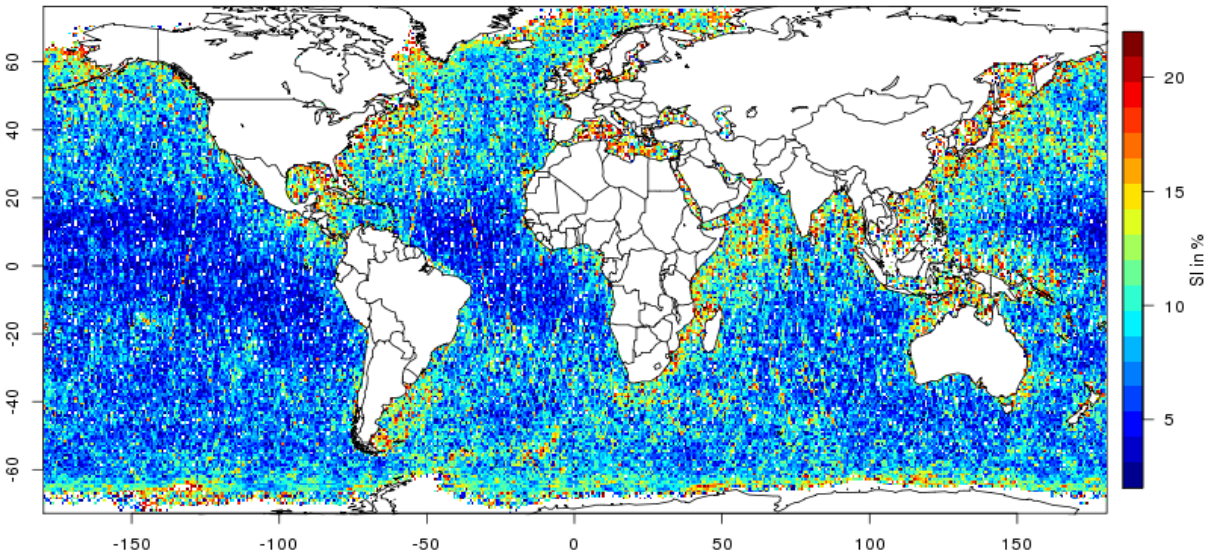
Scatter index maps of SWH from the model MFWAM

Without assimilation of HY2B



Good performance of the assimilation Of HY2B. The scatter index of SWH is significantly improved

With assimilation of HY2B



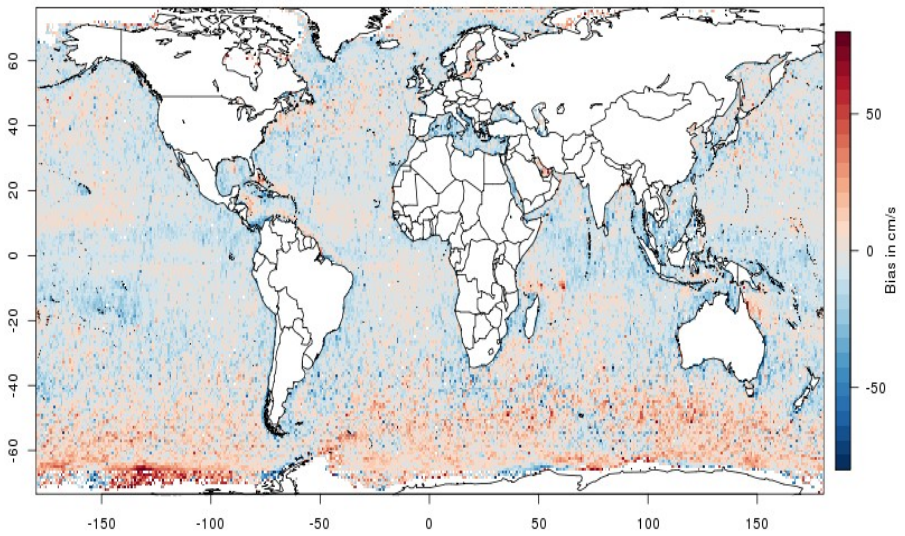
Comparison with Jason-3 Saral/Altika and S3A April & May 2019

SWH correction with Deep Neural Network : colocation with buoys data (Wang et al. 2020, Remote Sensing)

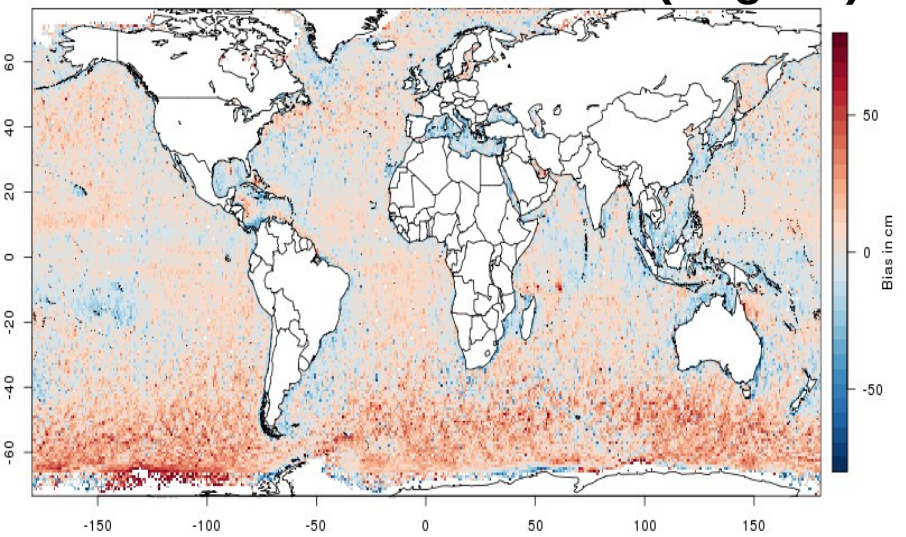
- Deep Learning (DL) model has been implemented (see Wang et al. 2020)
- Assimilation run with corrected SWH has been performed. Validation with Ja3,Saral and S3

Bias maps of SWH (cm)

Assimilation of DL-SWH



Assimilation of SWH (original)



Good reduction of the bias in particular in the Southern ocean

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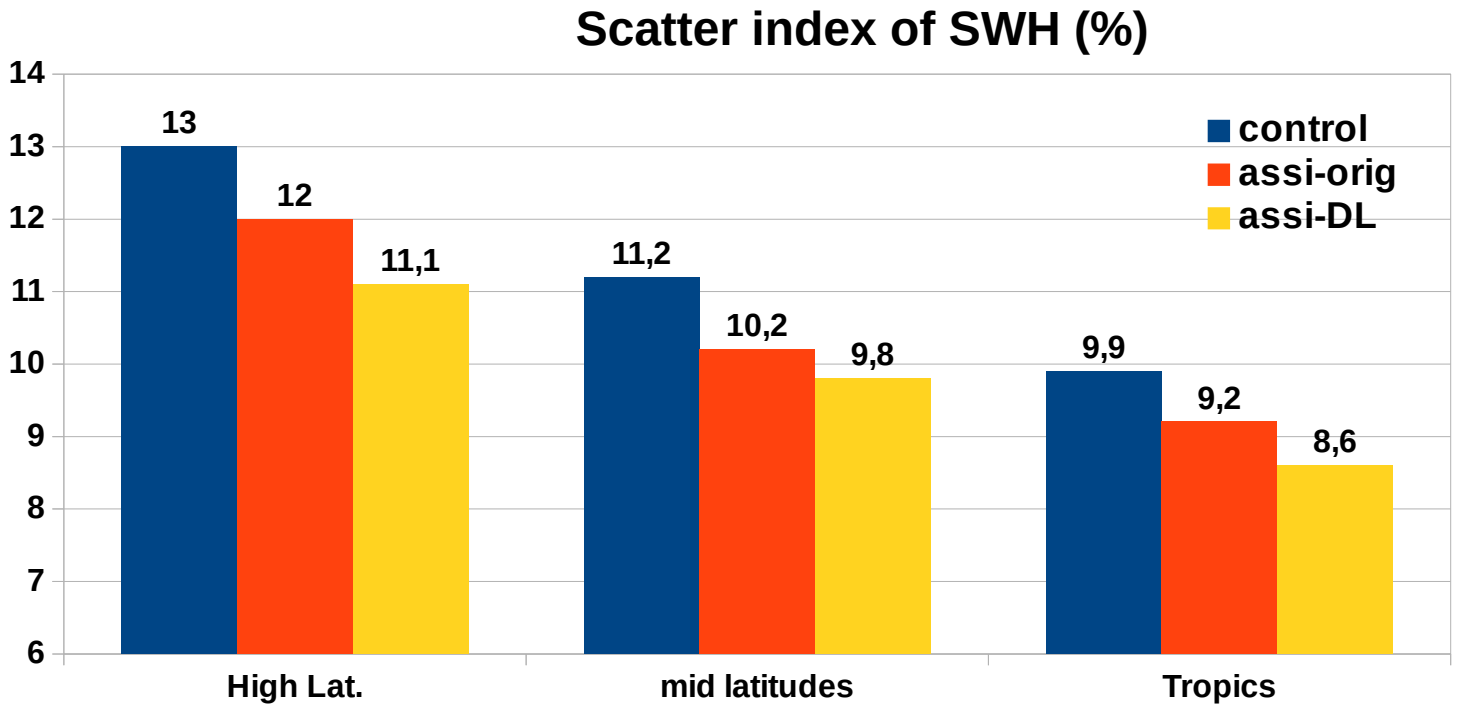
Impact of corrected SWH by DL



SWH corrected by DL improved the scatter Of SWH in all ocean regions

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Conclusions

- The assimilation of SWH HY2B induces a positive impact and improved Significantly the scatter of SWH in all ocean regions.
- A strong positive SWH bias has been shown in the validation process
- The use of Deep Learning model to correct SWH (see Wang et al. 2020) Removes completely the strong SWH bias after the assimilation, and also induces a better scatter in high and mid latitudes and the tropics.
- HY2B should be used in the operational suite, if the data are received in NRT, which is not yet satisfied.

Reference :
Wang J. K., et al. : Validation and calibration of Significant Wave Heights and wind Speed retrievals from HY2B altimeter based on deep learning, Remote Sens. 2020, 12, 2858 ; doi :103390/rs12172858

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