



National
Oceanography
Centre

Ongoing Validation and Recent Improvements to CryoSat Ocean Products

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 - Global/Regional Mean Sea Level (+SWH + Wind Speed) Trends
 - Comparison with WW3
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 - SAR bias
 - Ascending/descending biases

ROUTINE REPORTS



- Daily and Monthly

CryoOcean-QCV - quality control/validation for CryoSat-2
NOP Daily Data Quality report for 30/08/2023

DOCUMENT INFORMATION

Document history	Issued	Reason for change	Author
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Company: ESA, NOC

NOP DAILY QUALITY ASSESSMENT FOR 30/08/2023

of on 31/08/23
of the first record: 30 08 2023 00:00:00.122
of the last record: 30 08 2023 11:45:20.819
orbits in present day: 70984 to 70989

MONTHLY QUALITY ASSESSMENT FOR December 2022
Report issued on 06/07/23

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Quality Control/Validation for CryoSat-2
Monthly Data Quality report for December 2022

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DATA



- Study is additional to routine monthly quality reports
- Geophysical Ocean Product (~30-day latency)
- 12 years of data: January 2011 – December 2022 inclusive
- Only LRM unless stated and data have passed QC

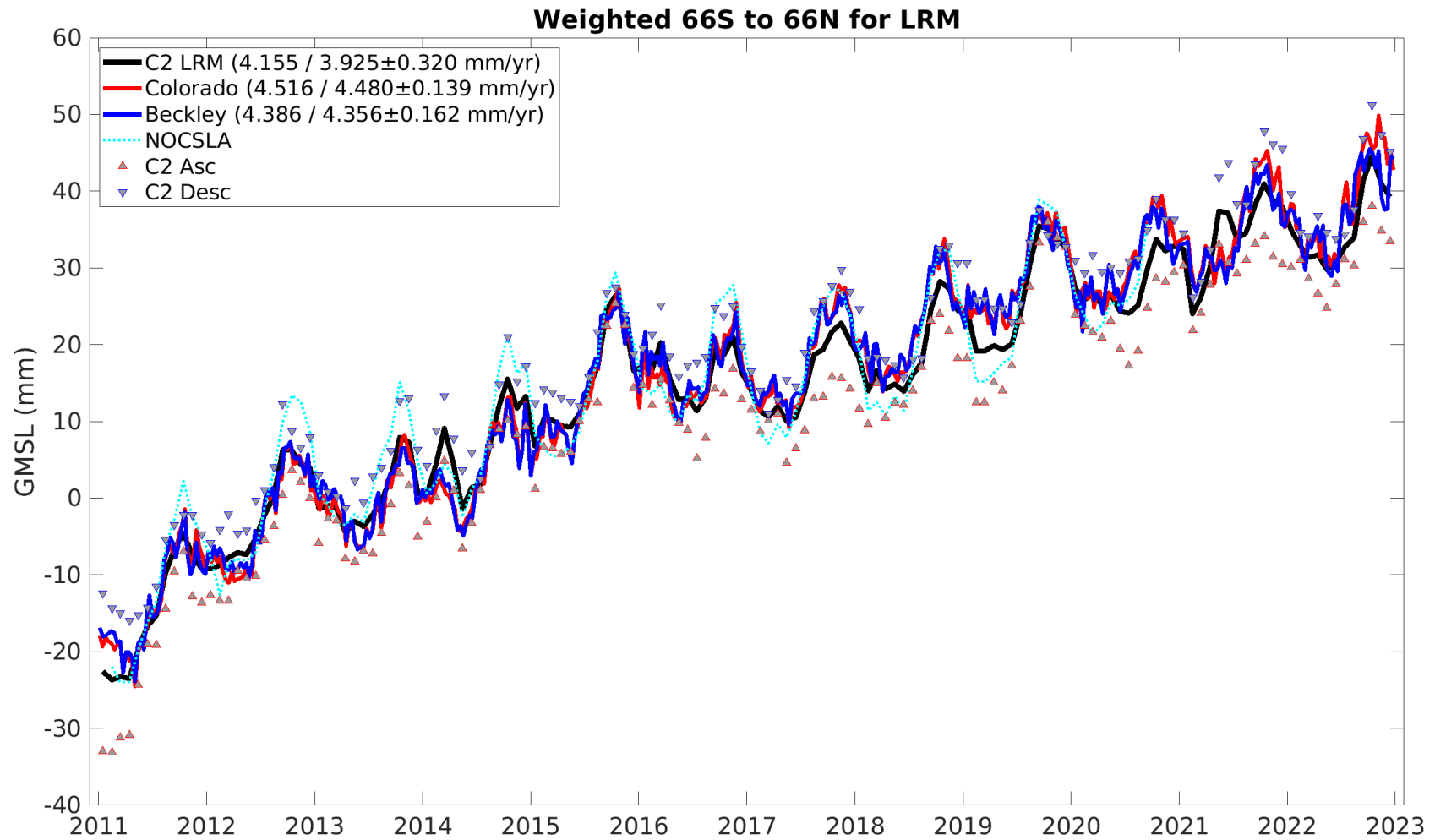
GLOBAL TRENDS



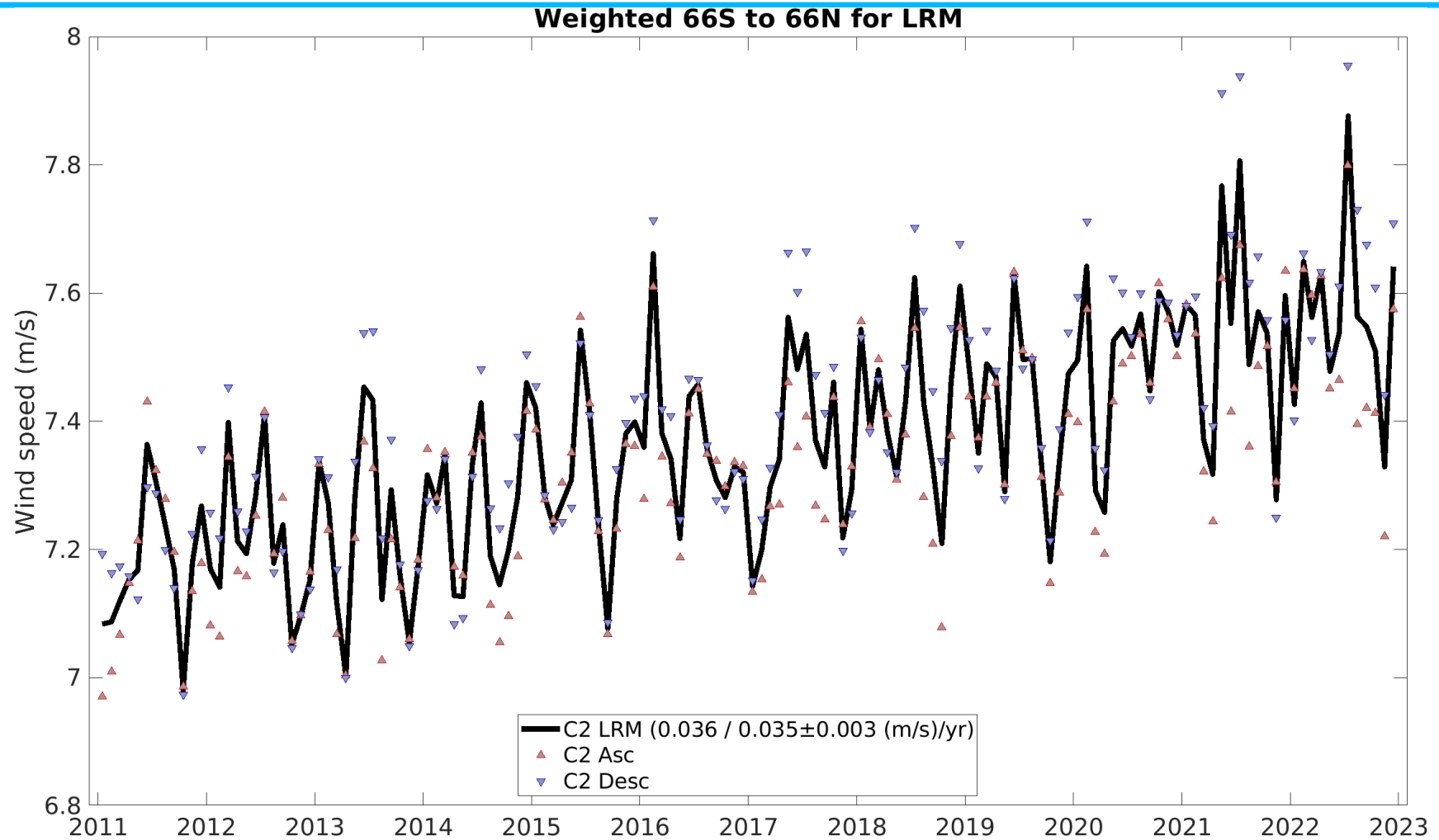
- Weighted mean to take account for latitude ($\pm 66^\circ\text{N}$)
- Annual and semi-annual signals removed
- Ordinary least squares and Bayesian approach to calculating trends
- Compared with other datasets
 - <https://sealevel.colorado.edu/>
 - Beckley et al. JGR 2017
 - NOCSLA (gridded L4, daily, $\frac{1}{4}^\circ$, CryoSat only)



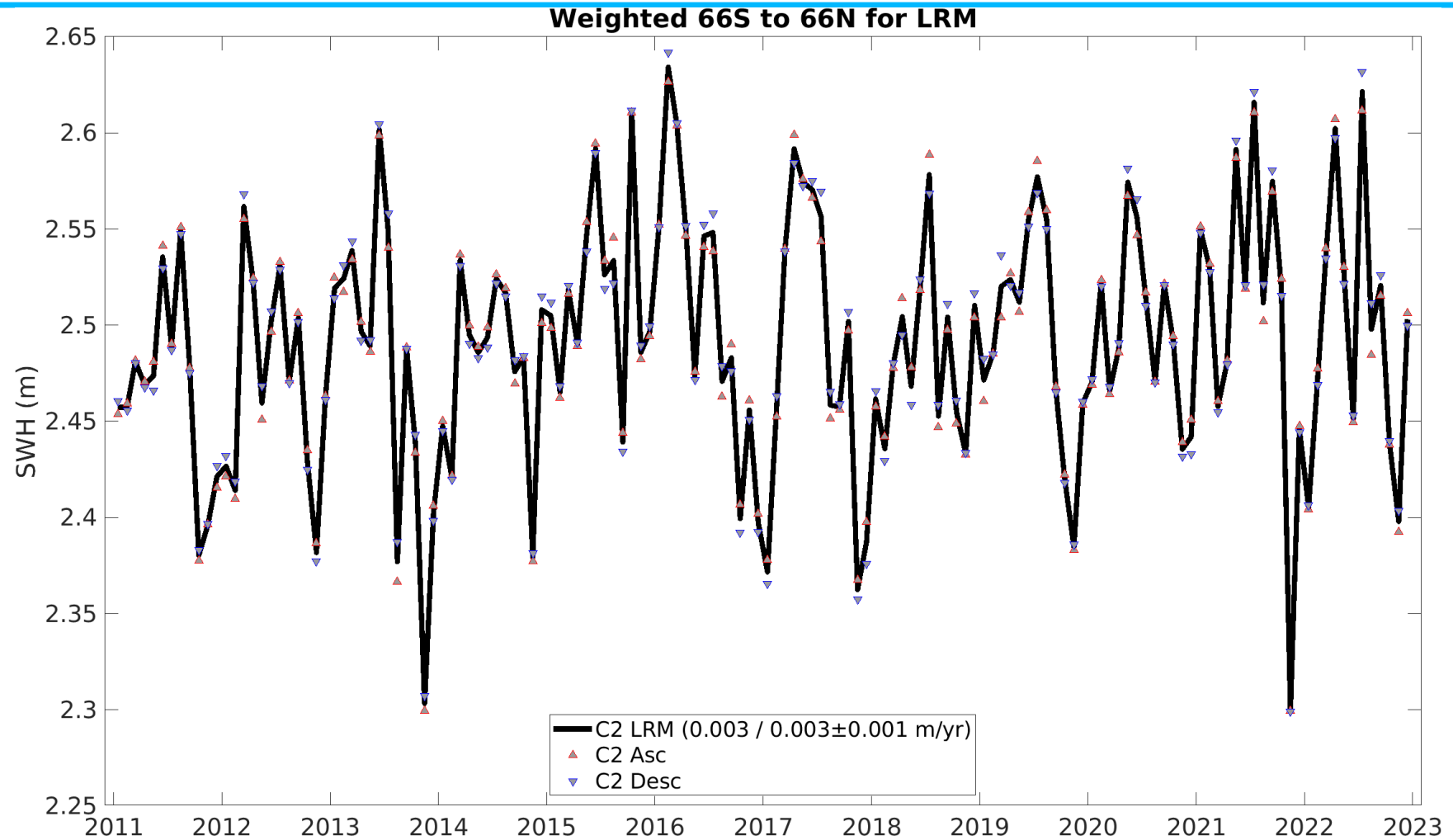
GLOBAL MEAN SEA LEVEL AND TREND



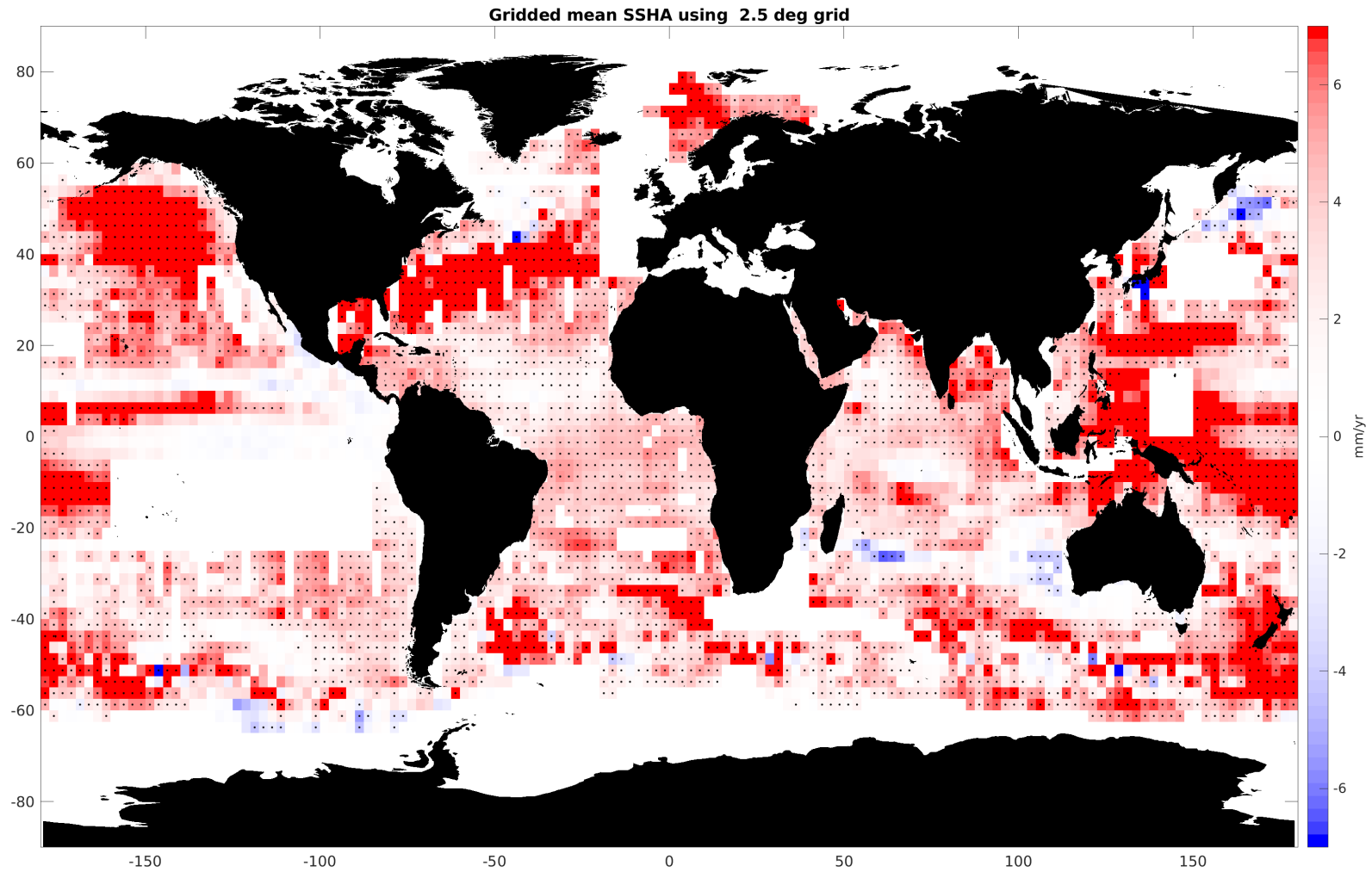
GLOBAL MEAN WIND SPEED AND TREND



GLOBAL MEAN SWH AND TREND

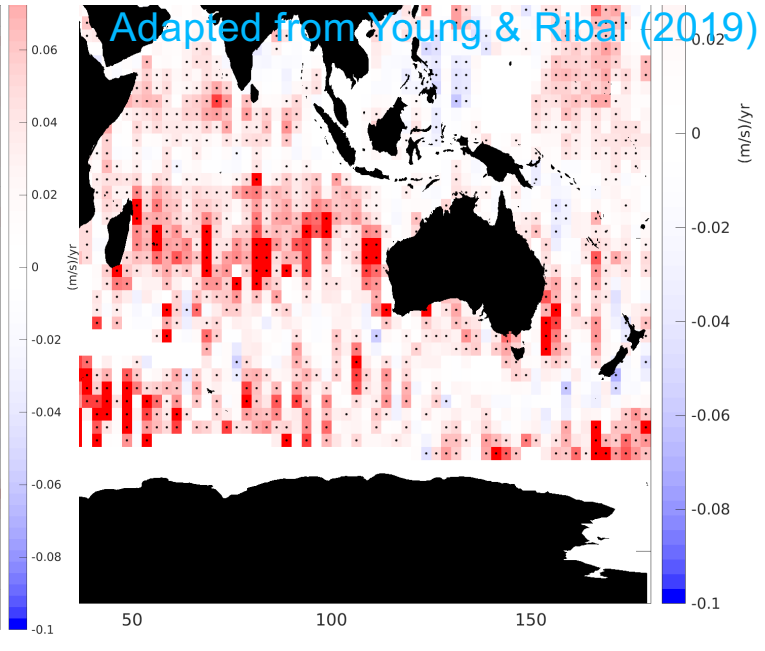
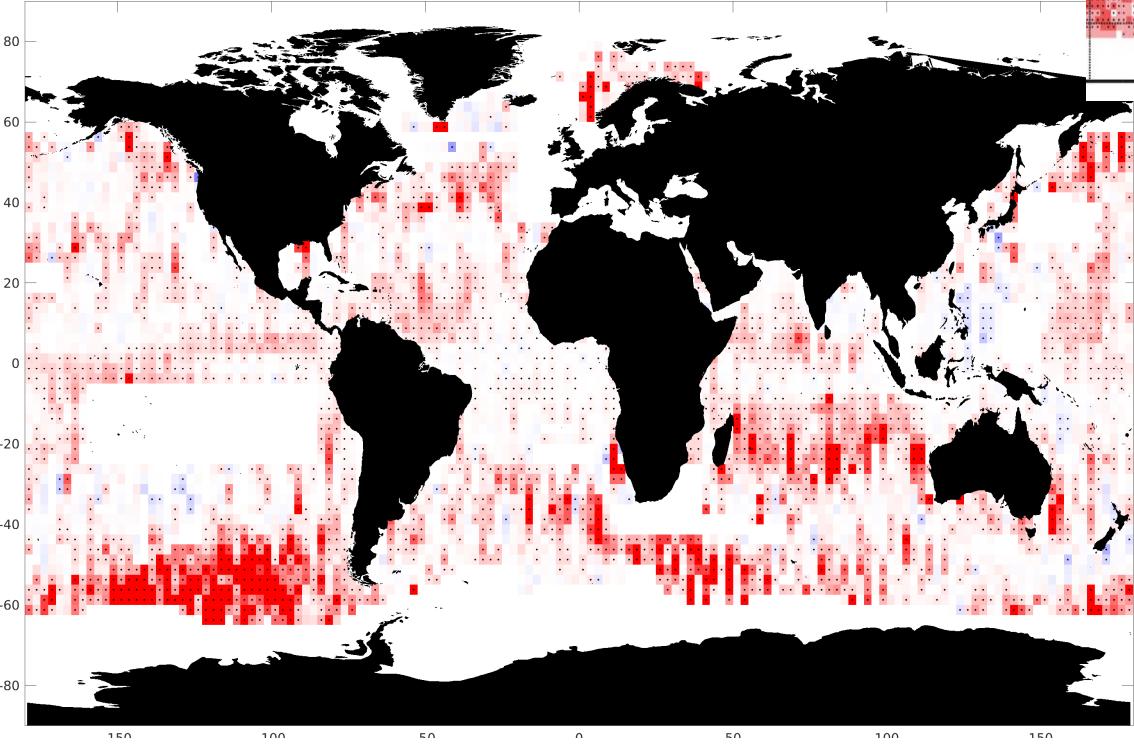
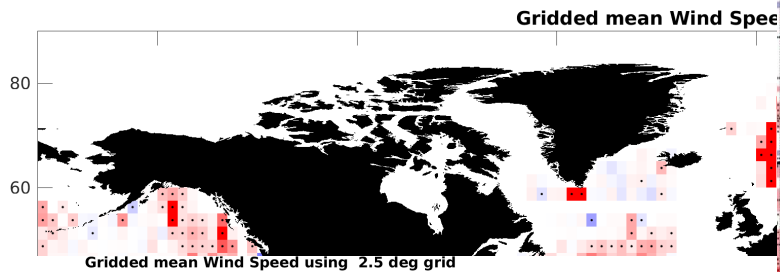
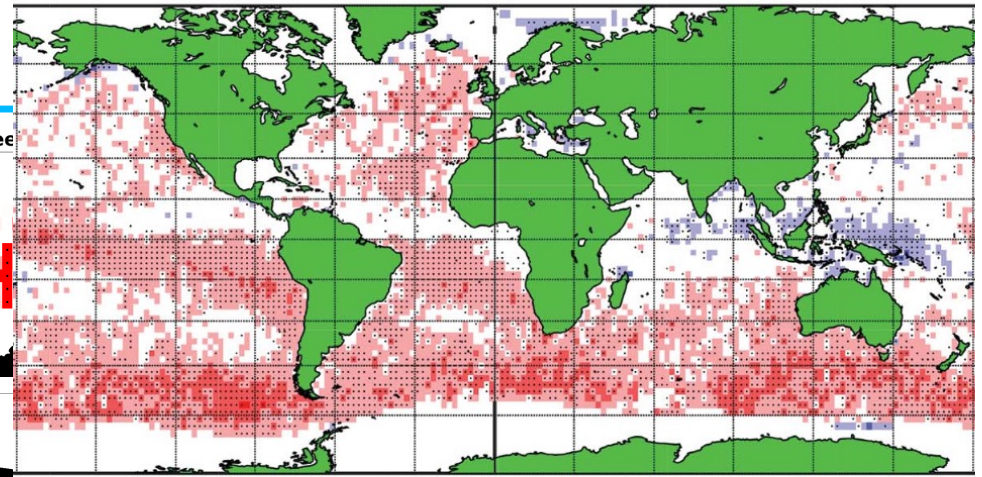
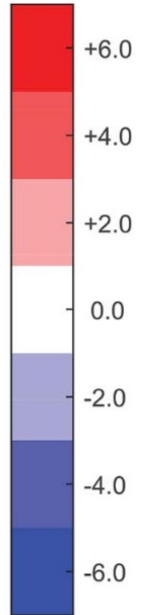


REGIONAL TRENDS - SSHA



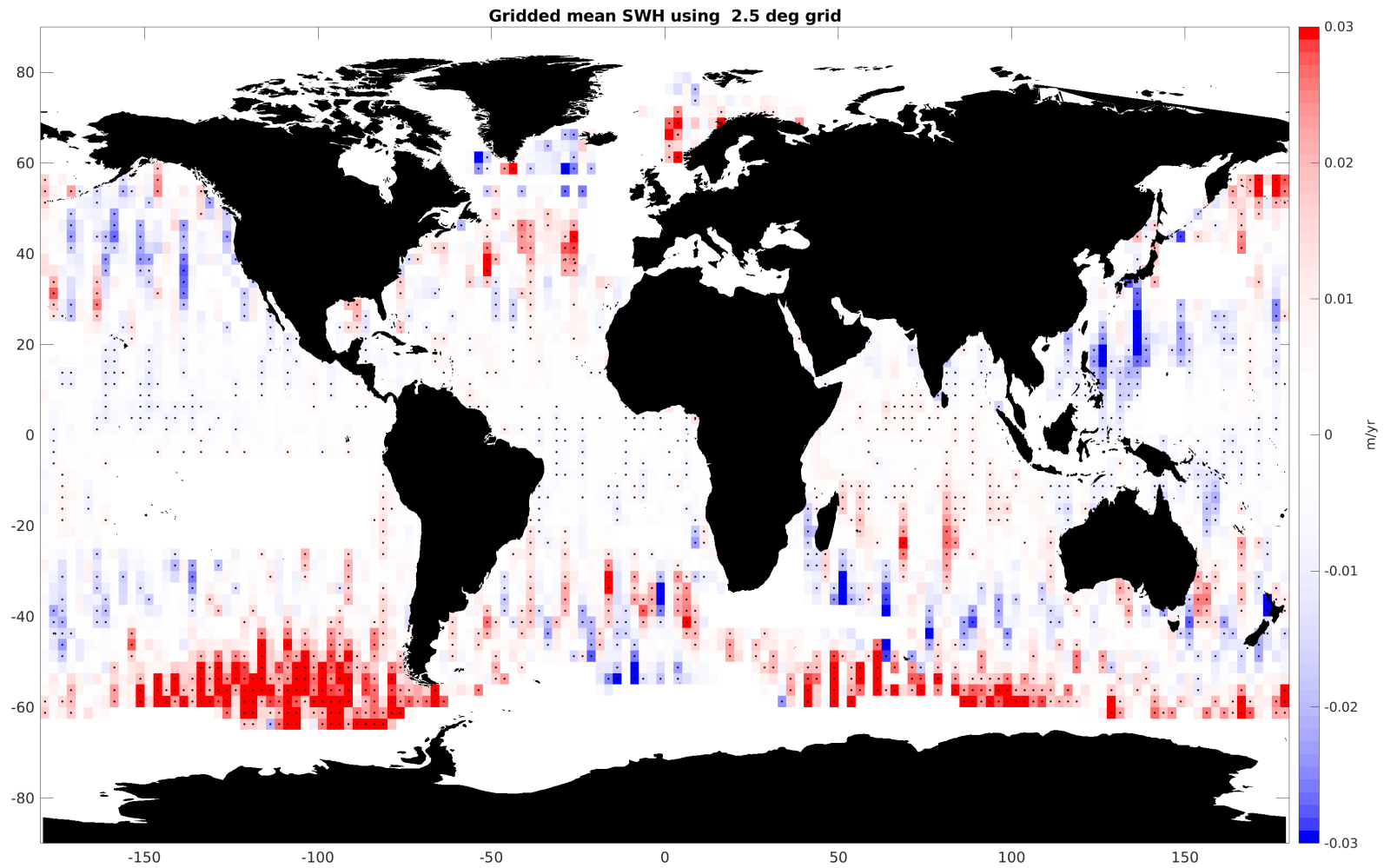
REGIONAL TRENDS – WIND SPEED

Altimeter U_{10} mean trend (1985 - 2018) [cm/s/yr]

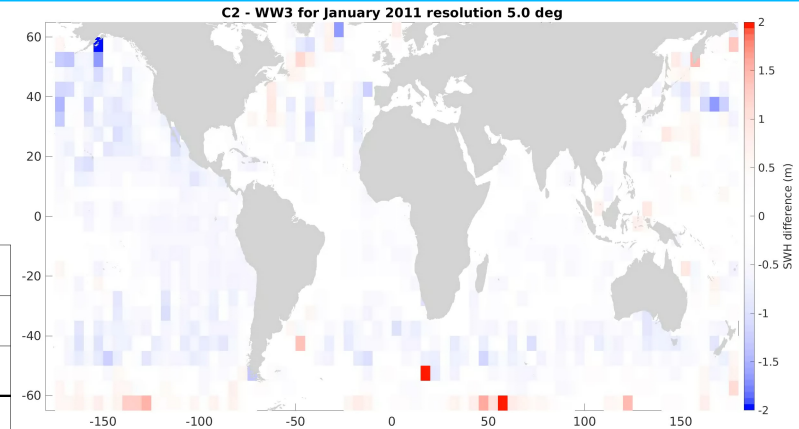
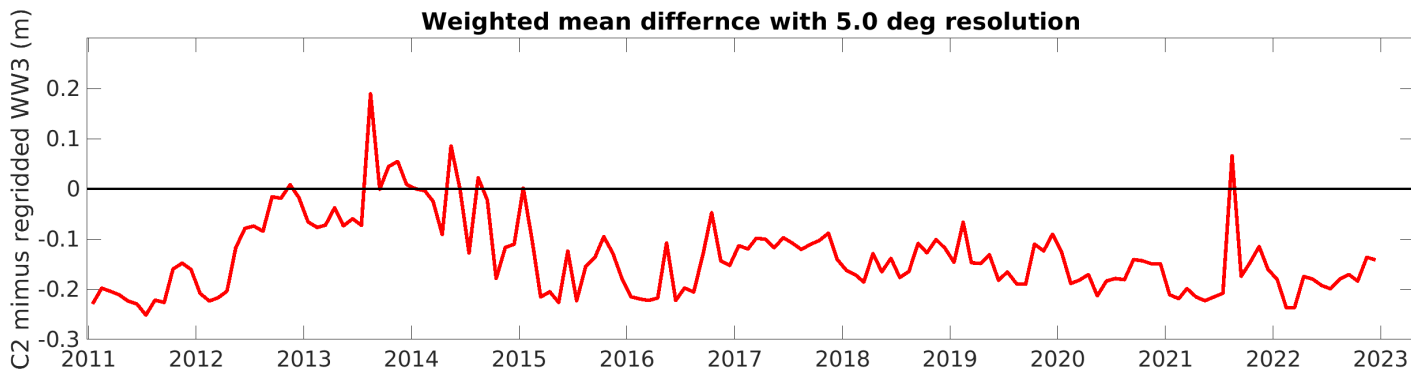


Adapted from Young & Ribai (2019)

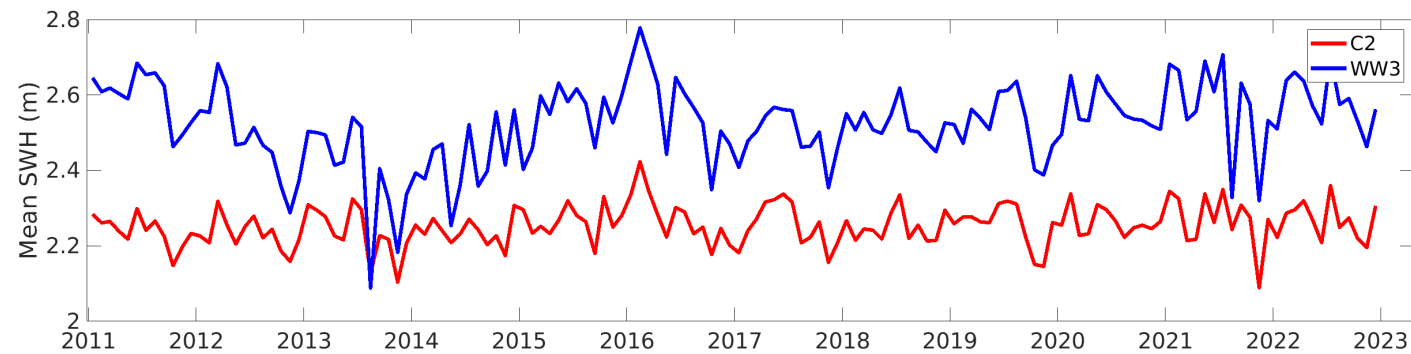
REGIONAL TRENDS - SWH



CRYOSAT SWH COMPARISON WITH WW3



Slight bias with CryoSat ~10 cm lower globally



SEA LEVEL COMPARISON WITH PSMSL TIDE GAUGES

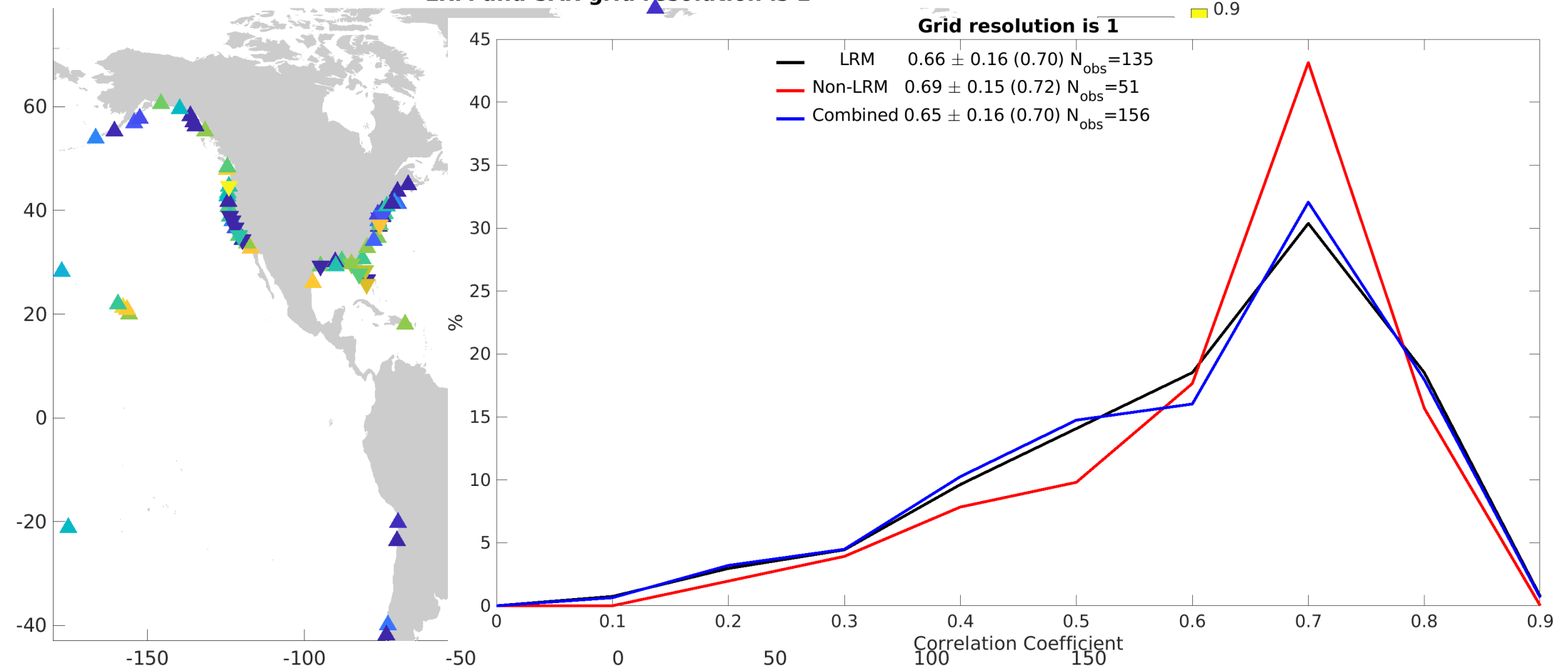


- Permanent Service for Mean Sea Level – see Poster CVL2023_012
- Revised Local Reference (RLR) for same period
- Filter PSMSL flags and limited gaps
- 249 remaining tide gauges averaged into [0.5° 1° 2.5° 5° 10°] boxes same as CryoSat (split by LRM/non-LRM)

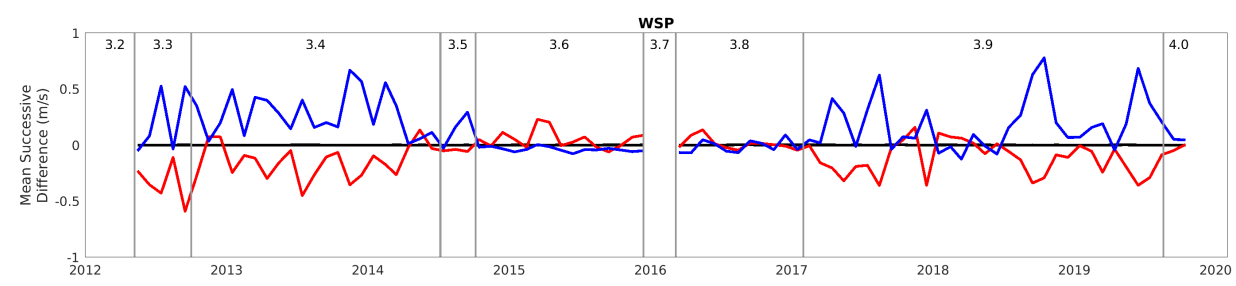
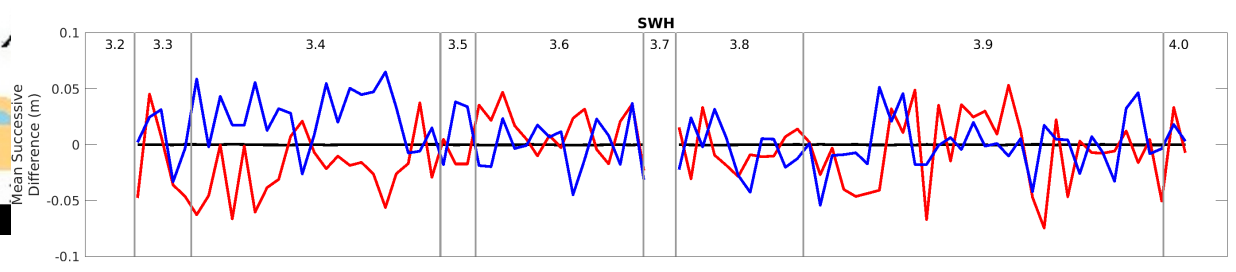
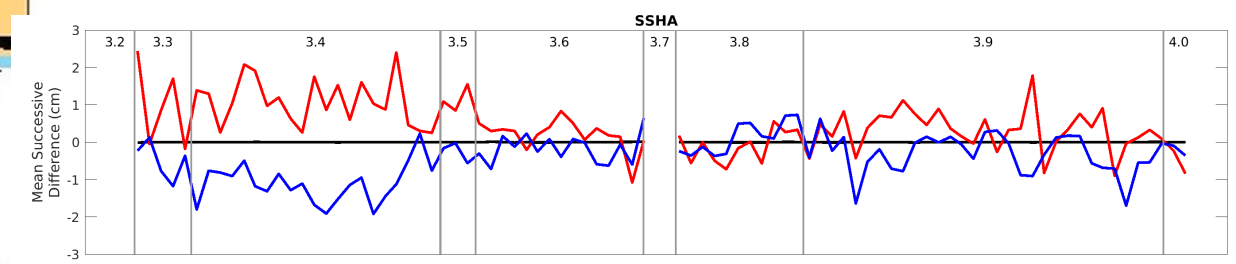
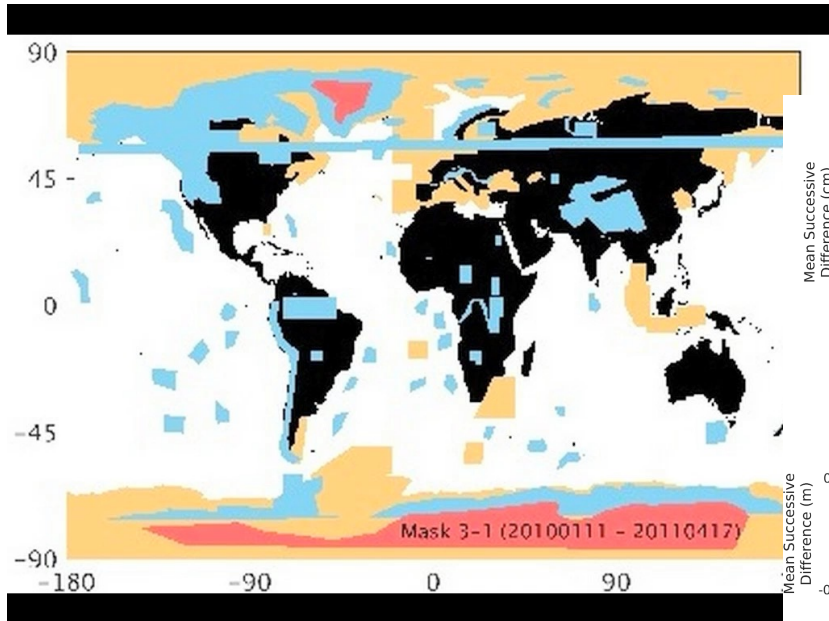


SEA LEVEL COMPARISON WITH PSMSL TIDE GAUGES

LRM and SAR grid resolution is 1



SAR BIAS



— No change
— to SAR
— from SAR

Ascending-descending biases

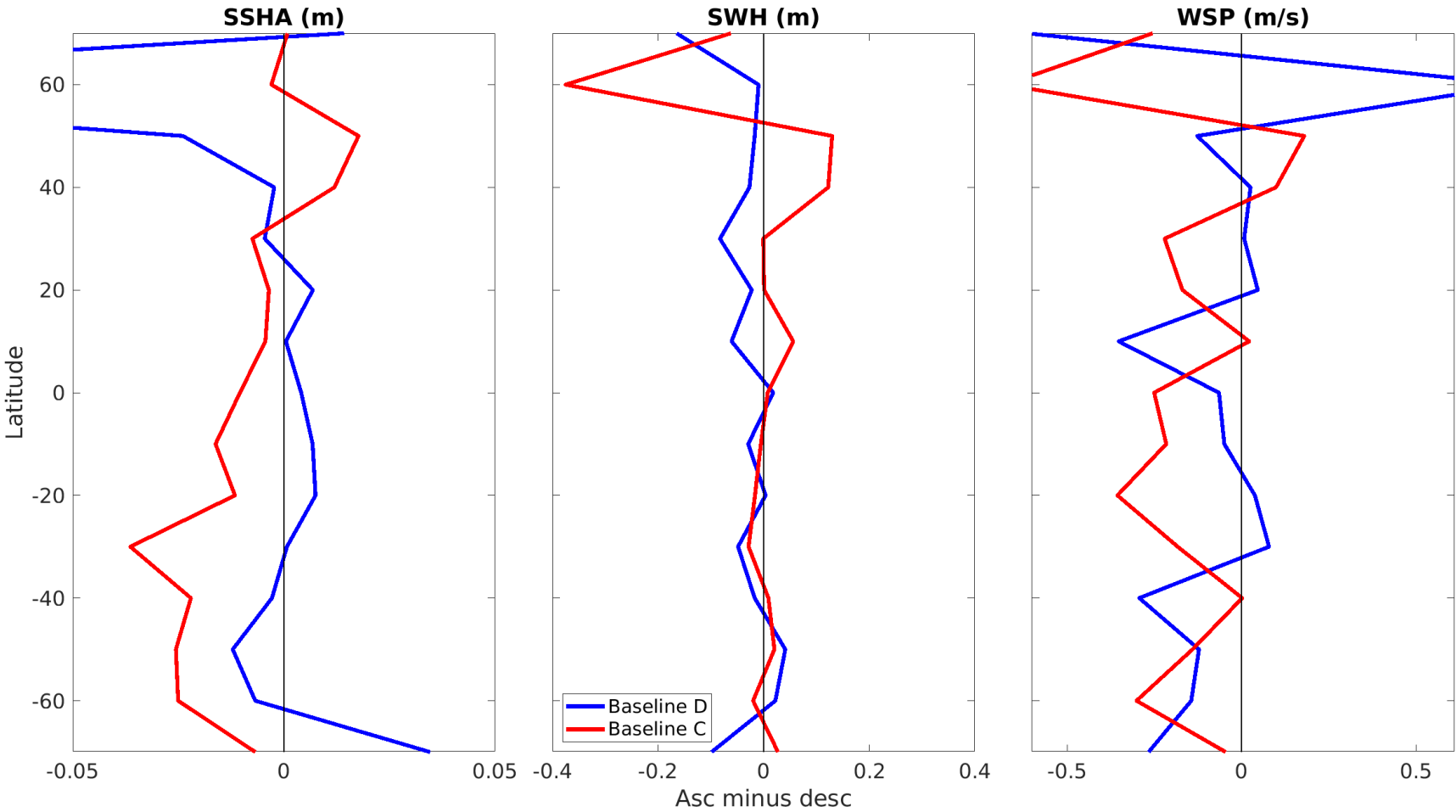


- Monthly averages of all data in $10^{\circ} \times 10^{\circ}$ boxes (similar, if noisier, results at lower spatial resolutions)
- Mean ascending minus descending in each box
- For operational Baseline C and preliminary Baseline D

Ascending-descending biases



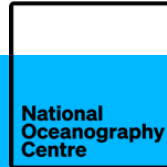
Latitude bin widths are 10 degrees



CONCLUSIONS



- CryoSat-2 continues to provide high quality ocean data –SSHA, SWH and wind speed
- Unique orbit provides complementary coverage to other altimetry missions
- Long timeseries (now >13 years)
- Baseline D will represent further improvements



Thank you

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