ISSI meeting – April 2020

Preliminary results of the comparison between GMI observations and ocean RTM simulations

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Dataset

- Collocation with satellite observations and geophysical data to run the different ocean radiative transfer models

AMSR2

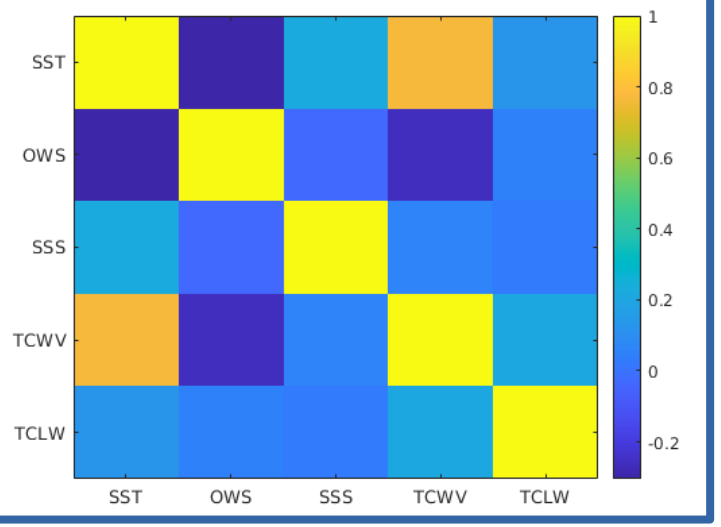
- AMSR2 brightness temperatures at top of atmosphere provided by JAXA
- 6.9 to 89GHz
- ECMWF reanalysis ERA-Interim data :
  - Ocean Wind Speed
  - Total Column Water Vapor
  - Total Column Liquid Water
  - Atmospheric profile (temperature, water vapor)
- Mercator ocean reanalysis provided by CMEMS :
  - Sea Surface Temperature
  - Sea Surface Salinity
  - Sea Ice Concentration
- Filtering of sea ice, coastal areas, and pixels with more than 0.01kg/m2 of liquid water content

GMI

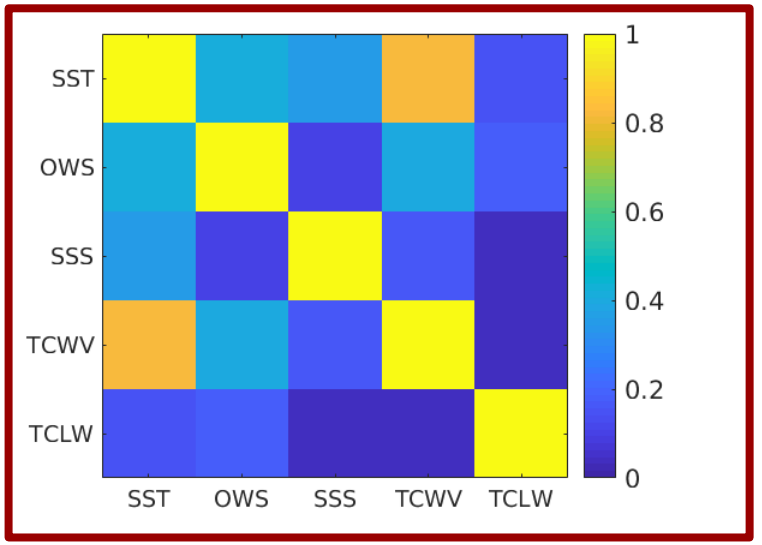
- GMI brightness temperatures (L1R-C) at top of atmosphere provided by NASA
- 10.65 to 166GHz
- ECMWF reanalysis ERA5 data :
  - Ocean Wind Speed
  - Sea Surface Temperature
  - Total Column Water Vapor
  - Total Column Liquid Water
  - Atmospheric profile (temperature, water vapor)
- Mercator ocean reanalysis provided by CMEMS :
  - Sea Surface Salinity
- Filtering of :
  - sea ice with our SIC algorithm,
  - coastal areas,
  - Cloudy pixels using neural network to detect cloud contamination from Favrichon et al.,2019

Distribution and correlations

GMI

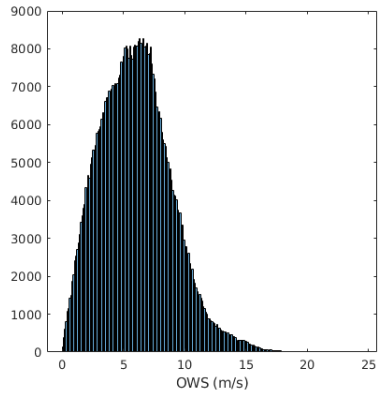


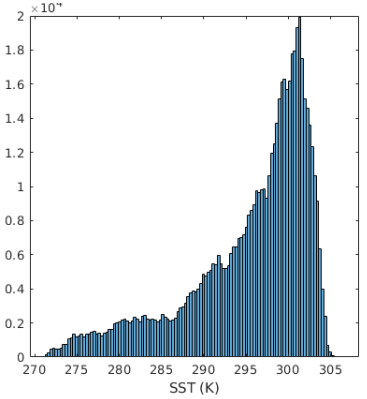
AMSR2

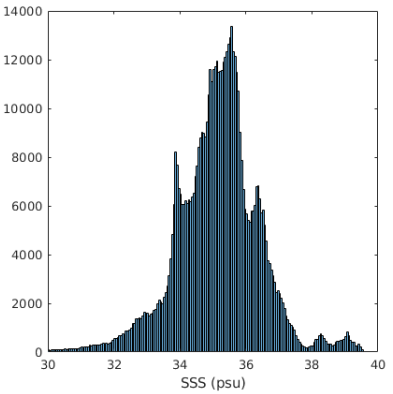


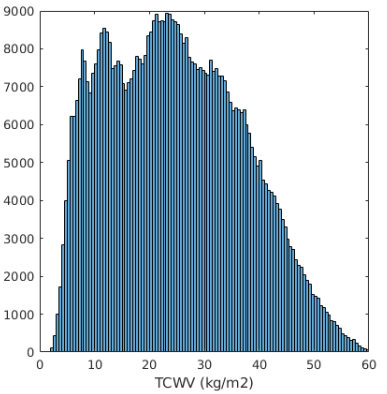
Distributions are different : difficulty to compare results with GMI and AMSR2

GMI

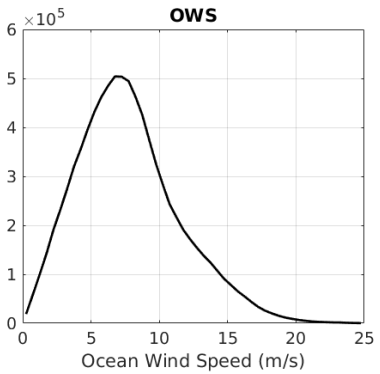


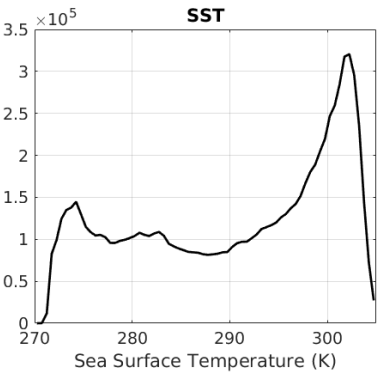


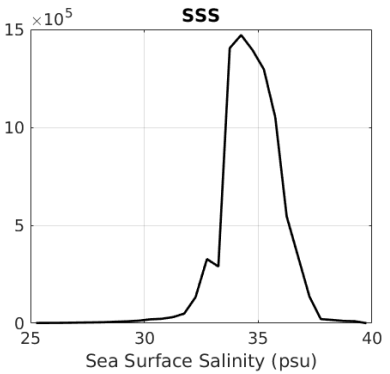


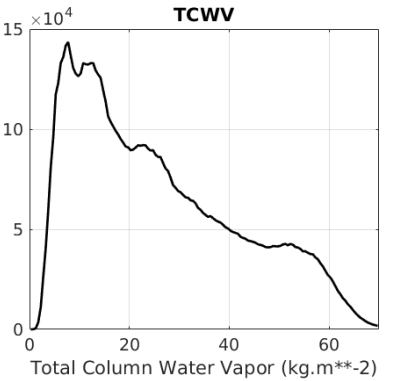


AMSR2



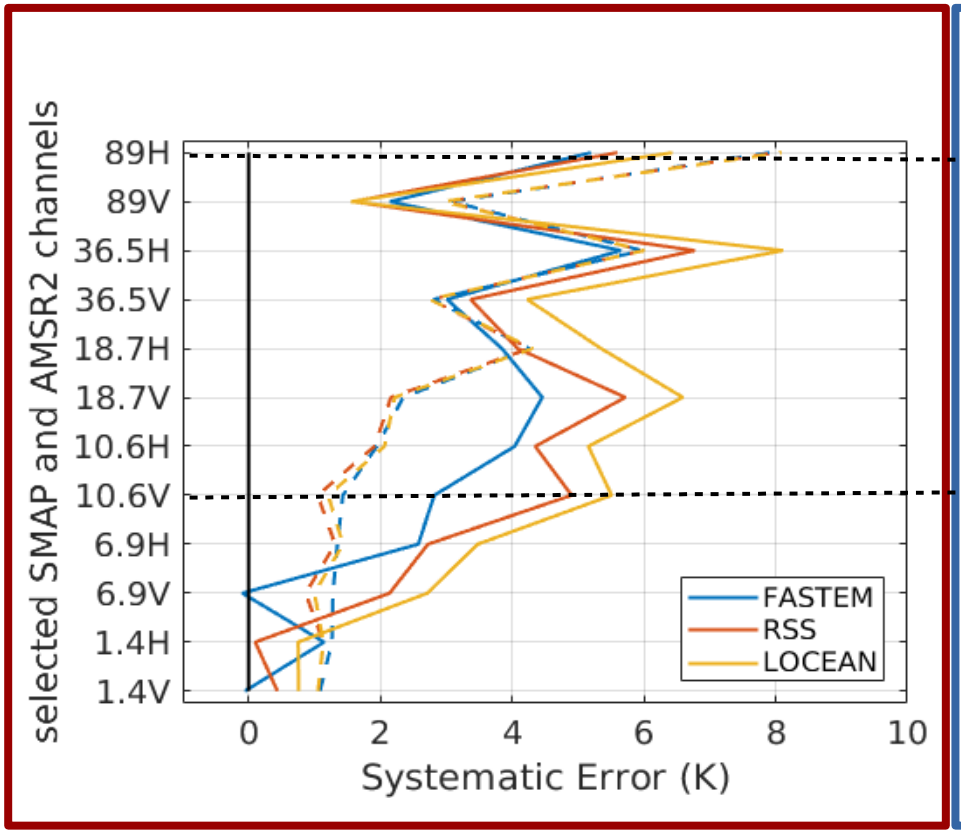




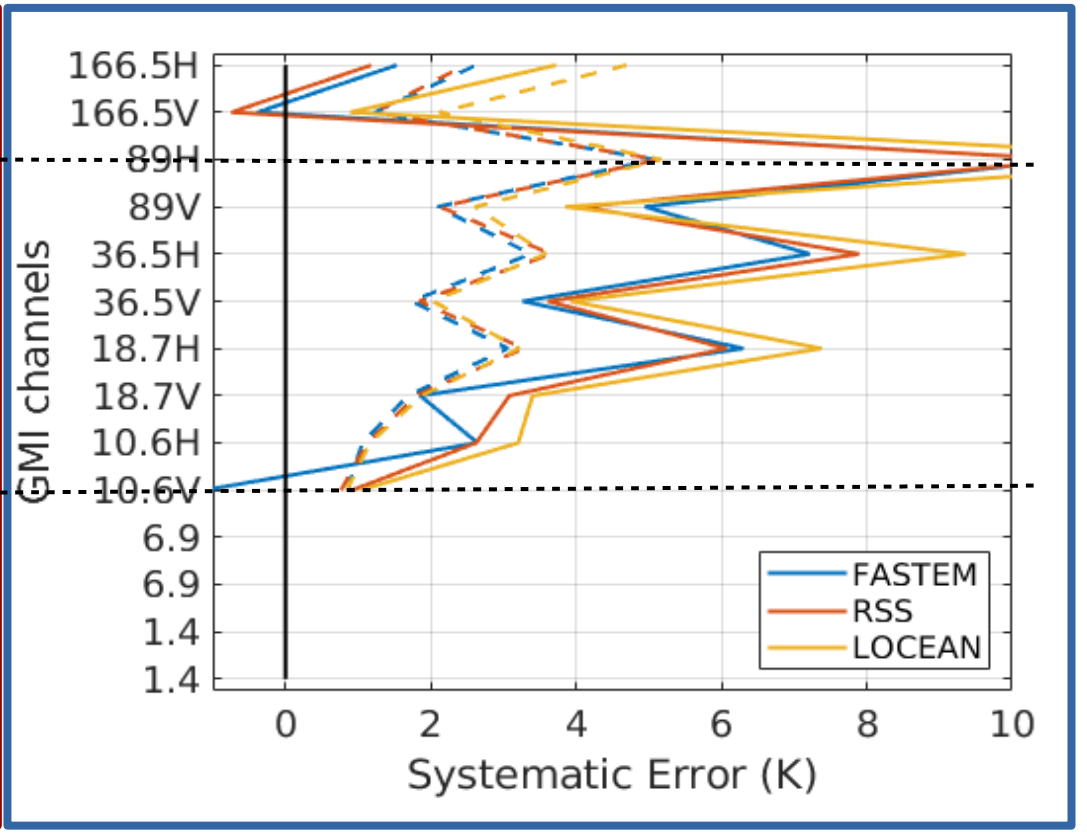


Biases comparison

AMSR2



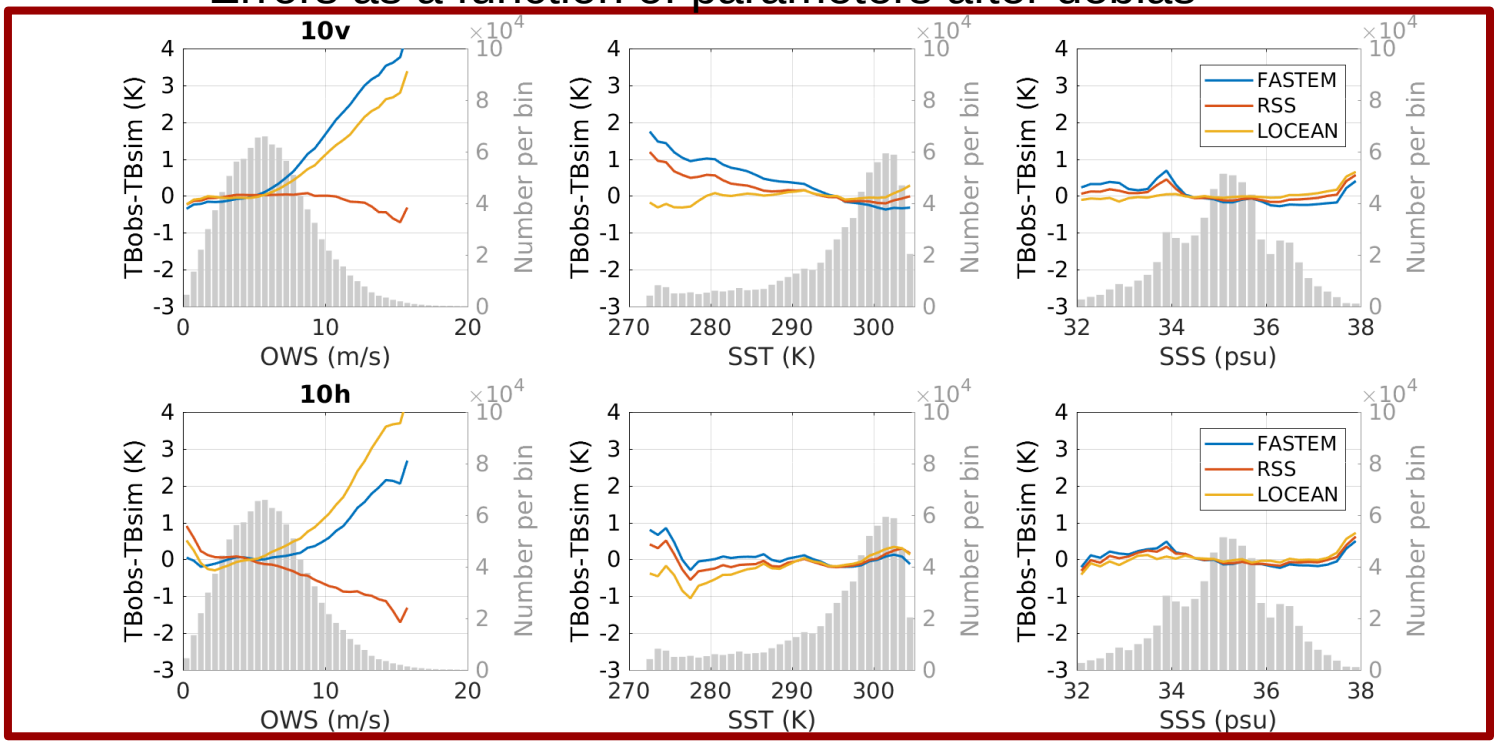
GMI



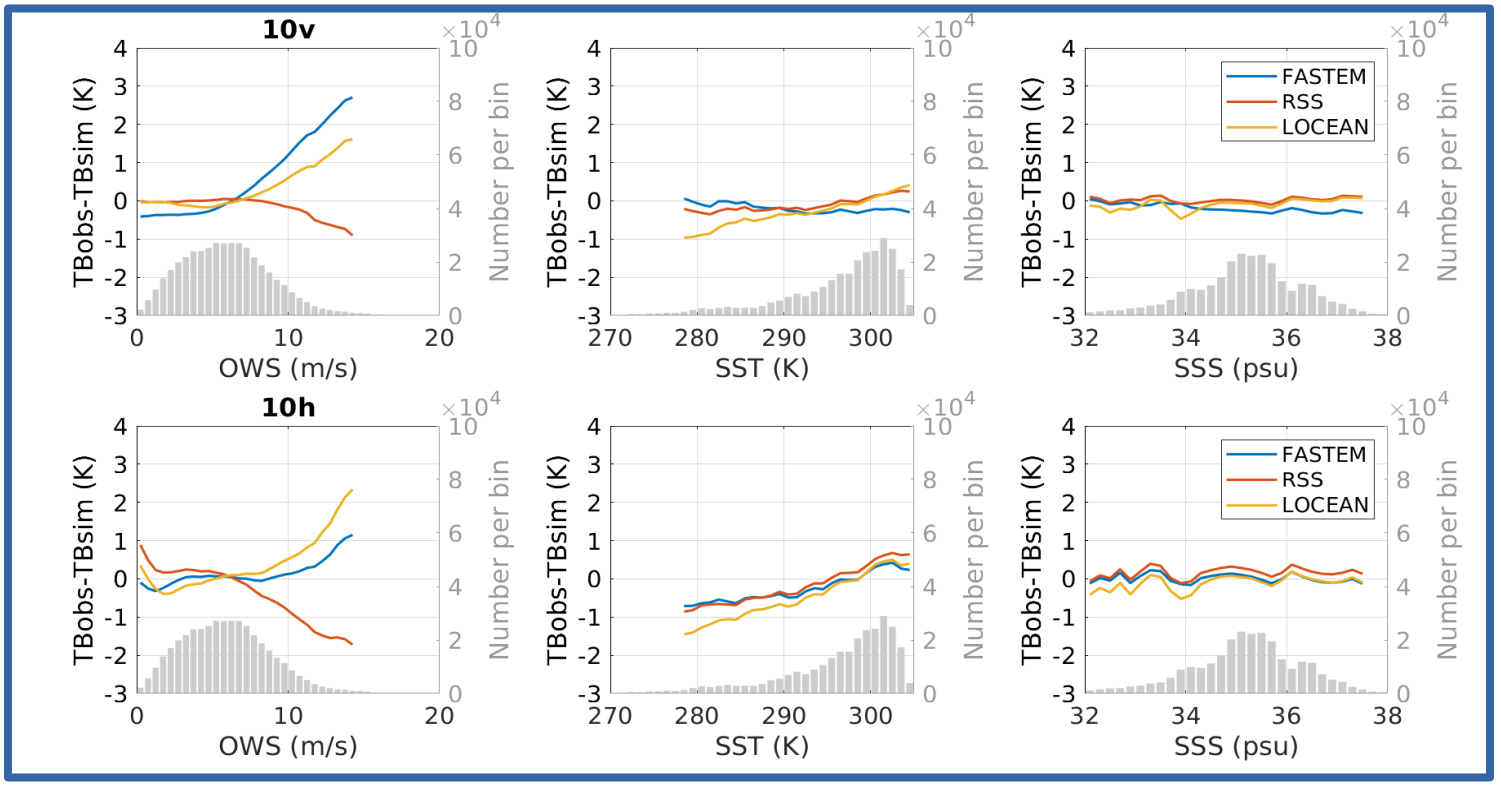
Biases between simulations and observations are smaller with GMI at 10.65 GHz
Biases are larger with GMI at 89 GHz
For frequencies between 10 and 89 GHz biases are similar for AMSR2 and GMI (slightly larger in horizontal polarization with GMI).
The stds are smaller for GMI (clouds have been filtering with a neural network)

Errors as a function of parameters after debias

AMSR2



GMI



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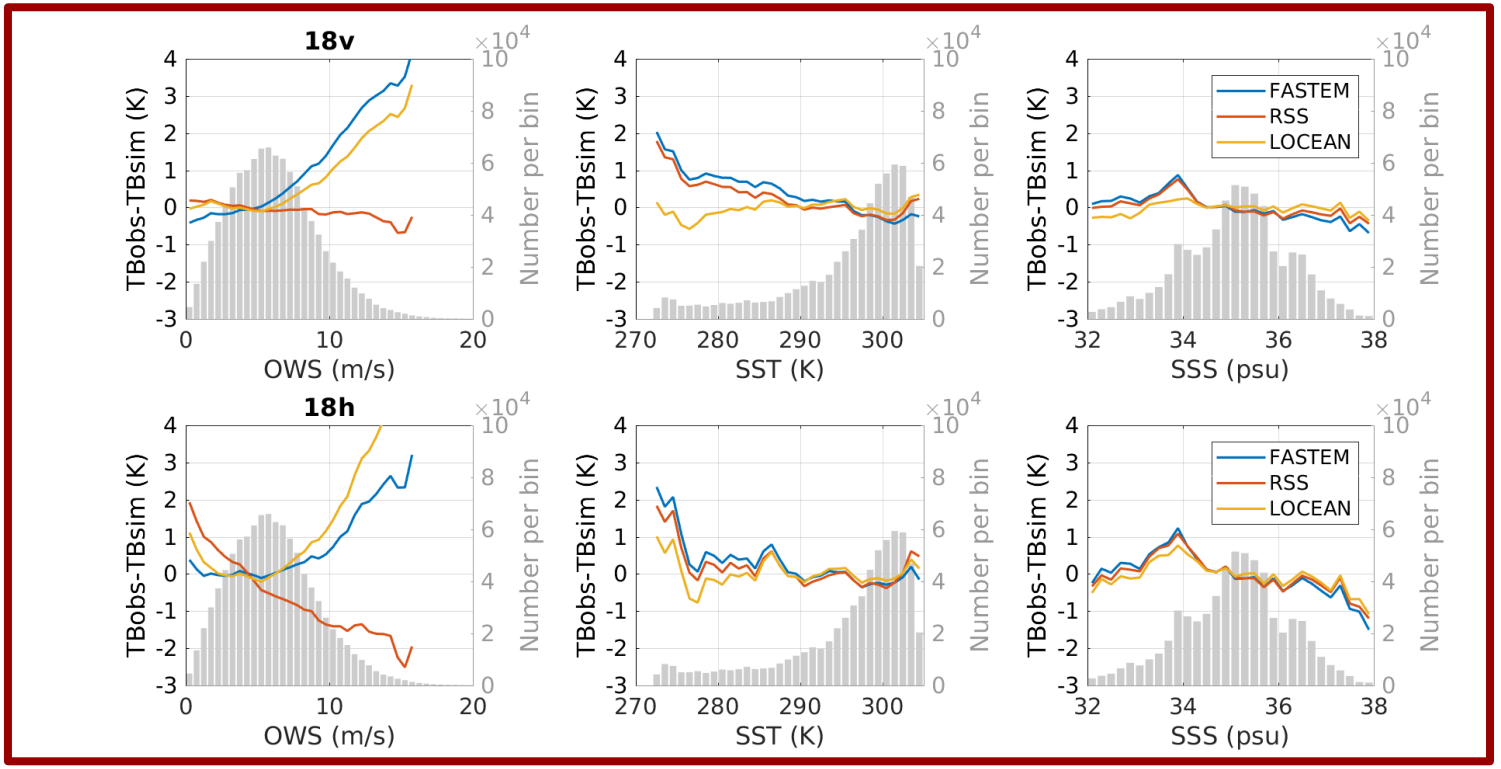
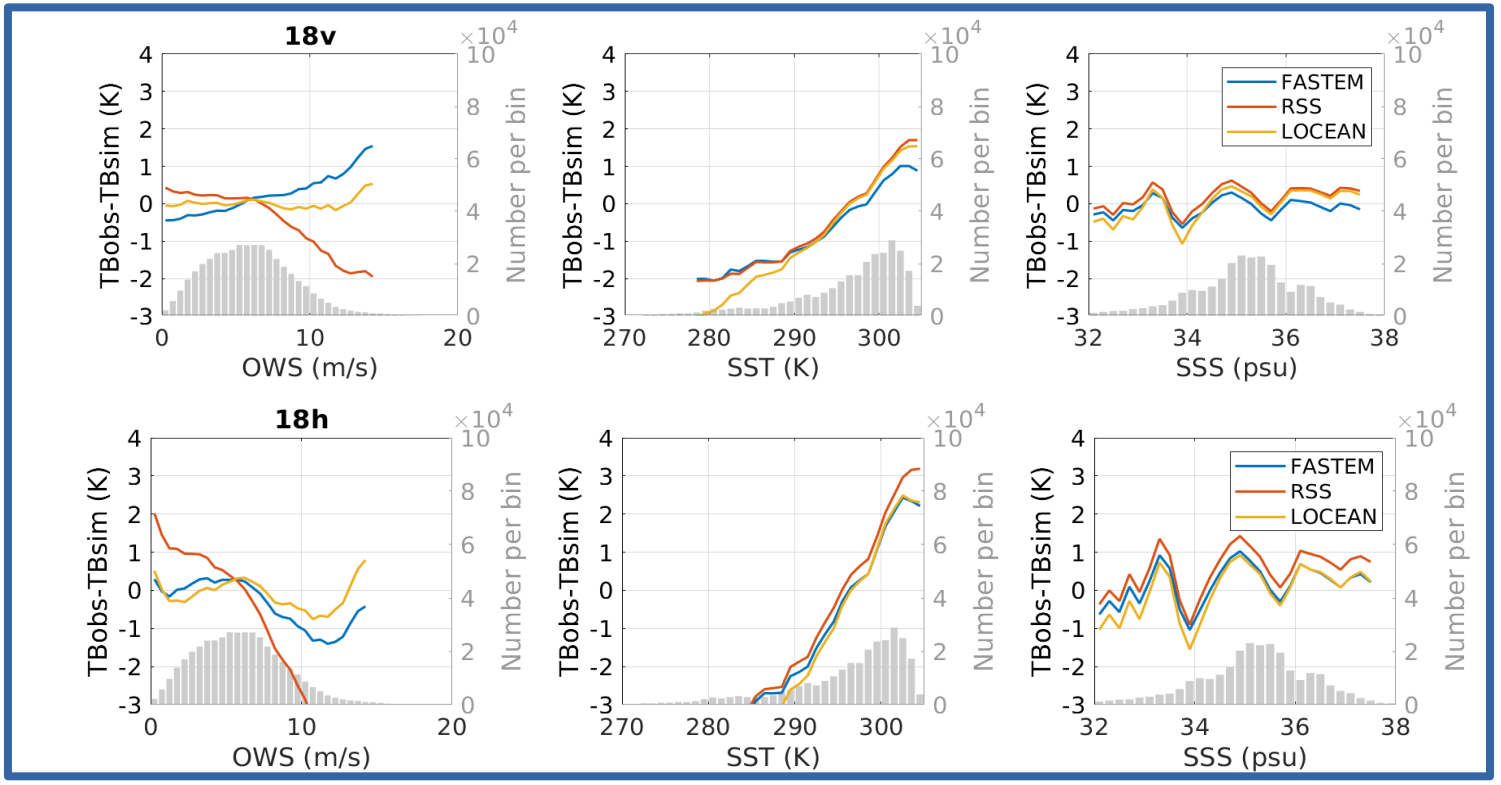

18v
18h
TBobs-TBsim (K)
Number per bin
×10^4
OWS (m/s)
SST (K)
SSS (psu)
FASTEM
RSS
LOCEAN

GMI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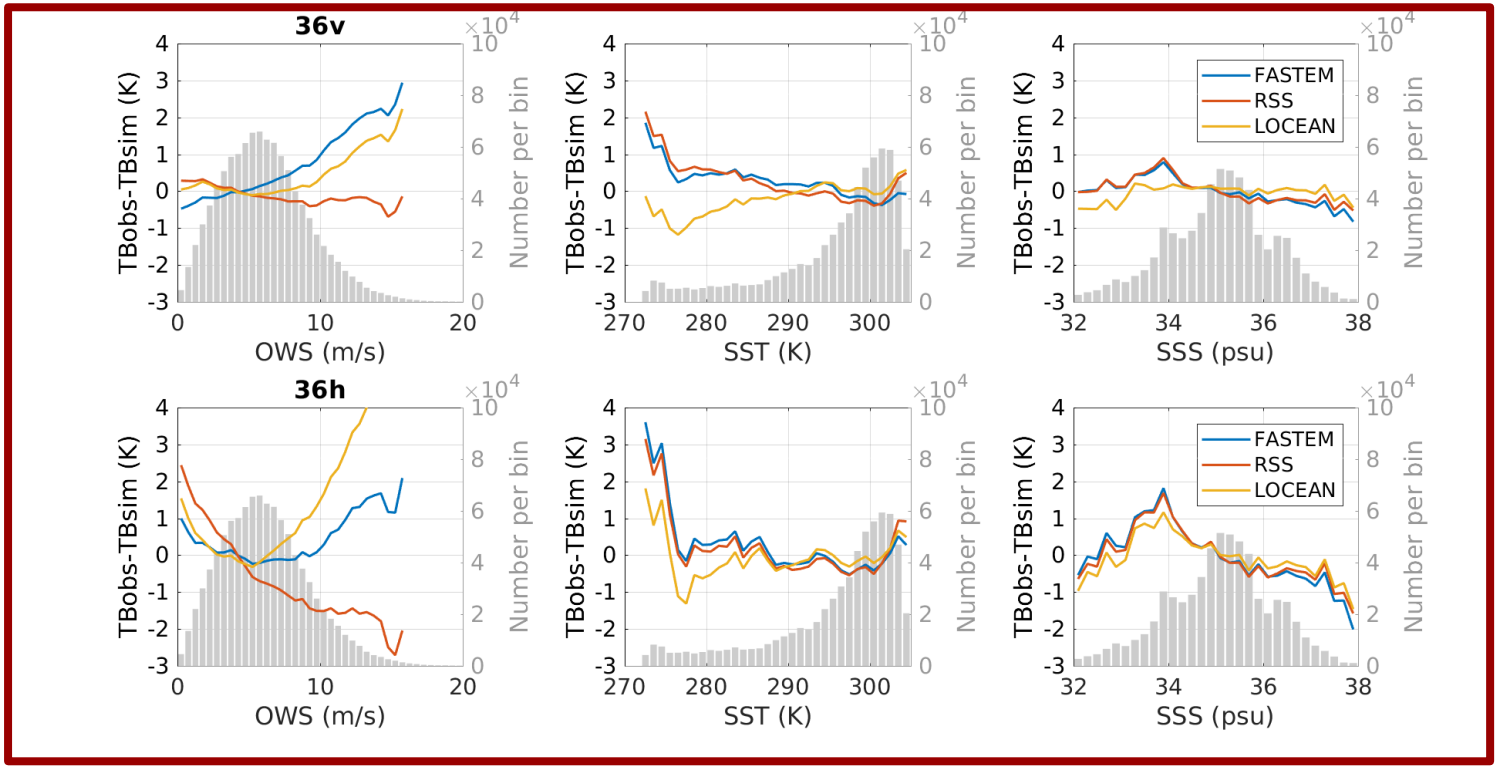
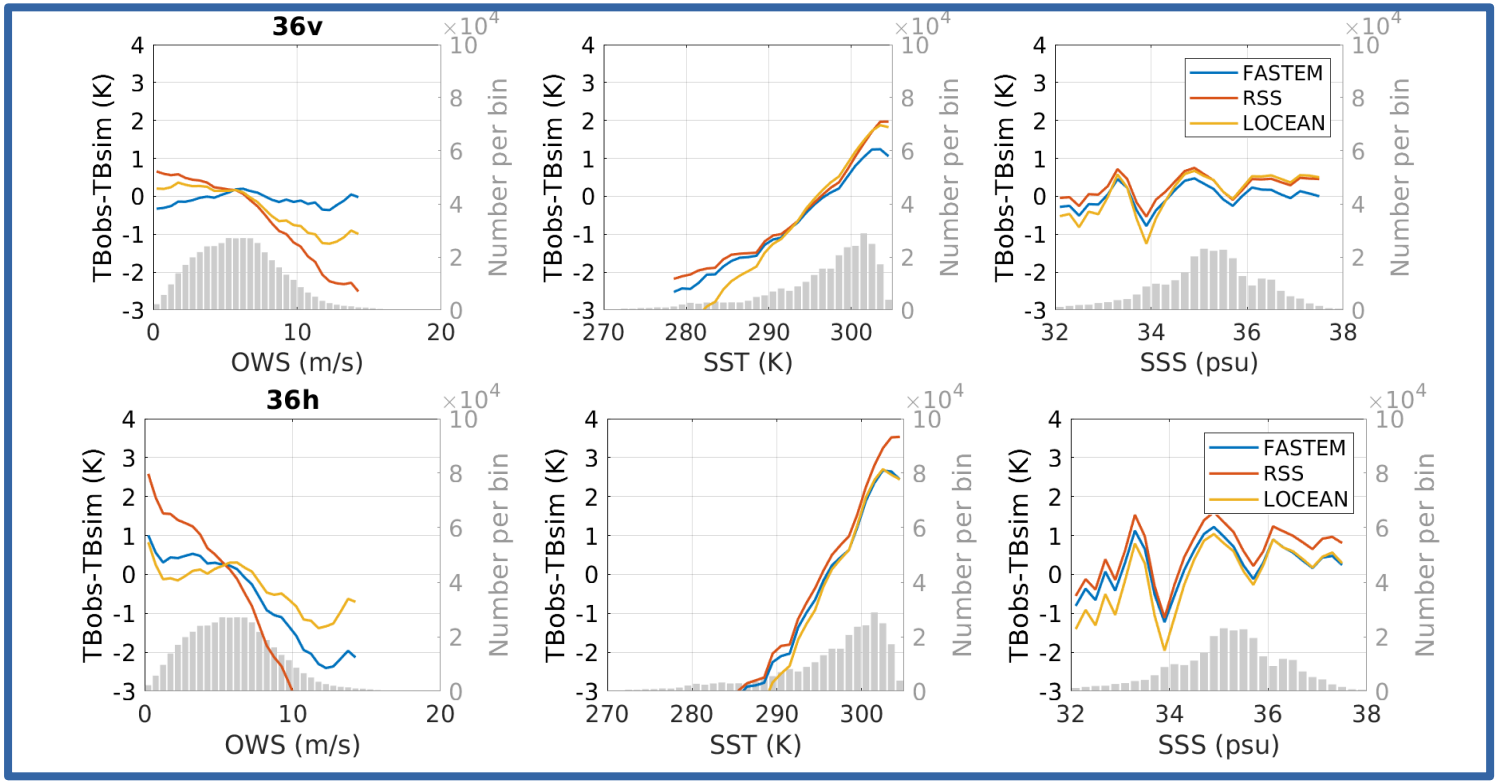

36v
36h
TBobs-TBsim (K)
Number per bin
×10^4
OWS (m/s)
SST (K)
SSS (psu)
FASTEM
RSS
LOCEAN

GMI


36v
36h
TBobs-TBsim (K)
Number per bin
×10^4
OWS (m/s)
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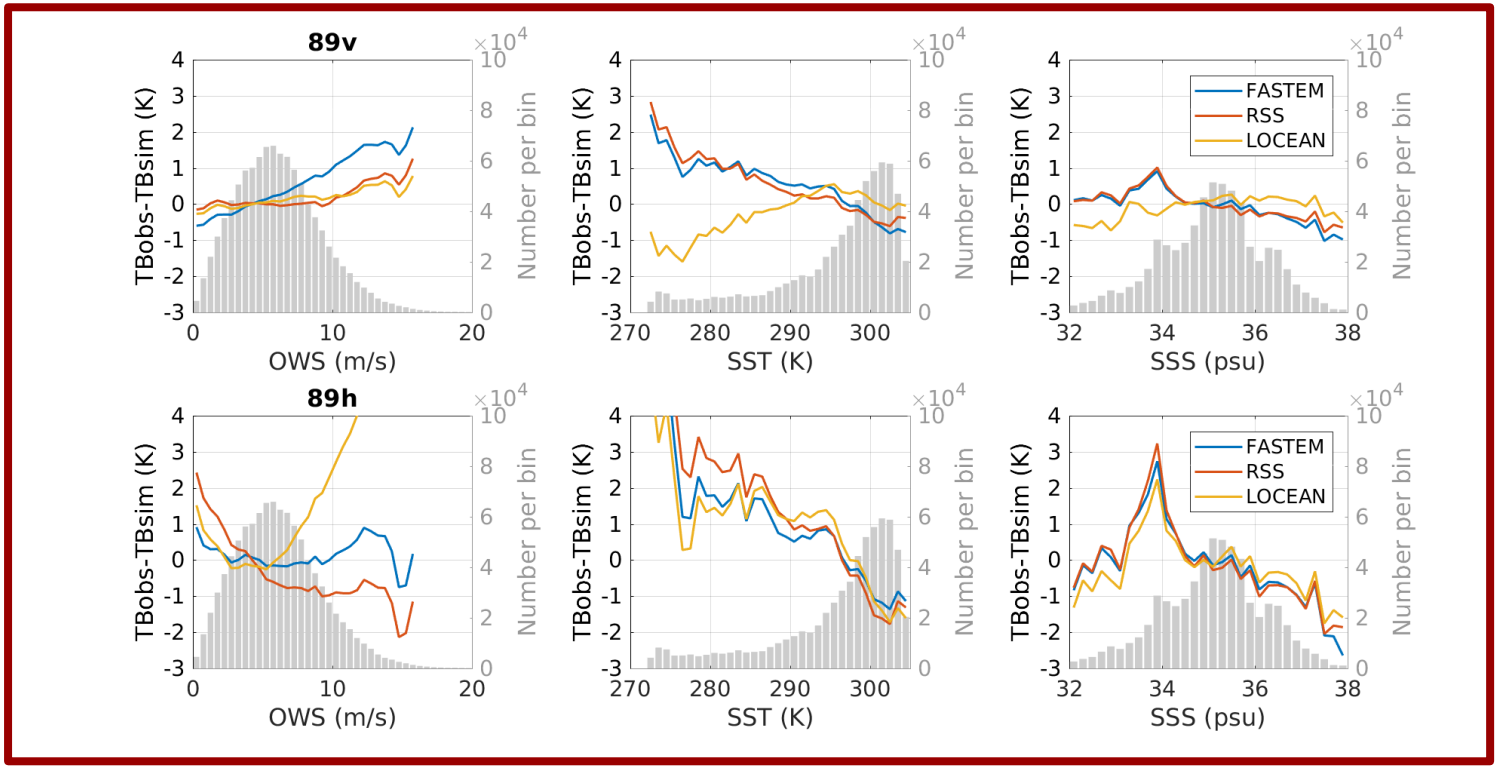
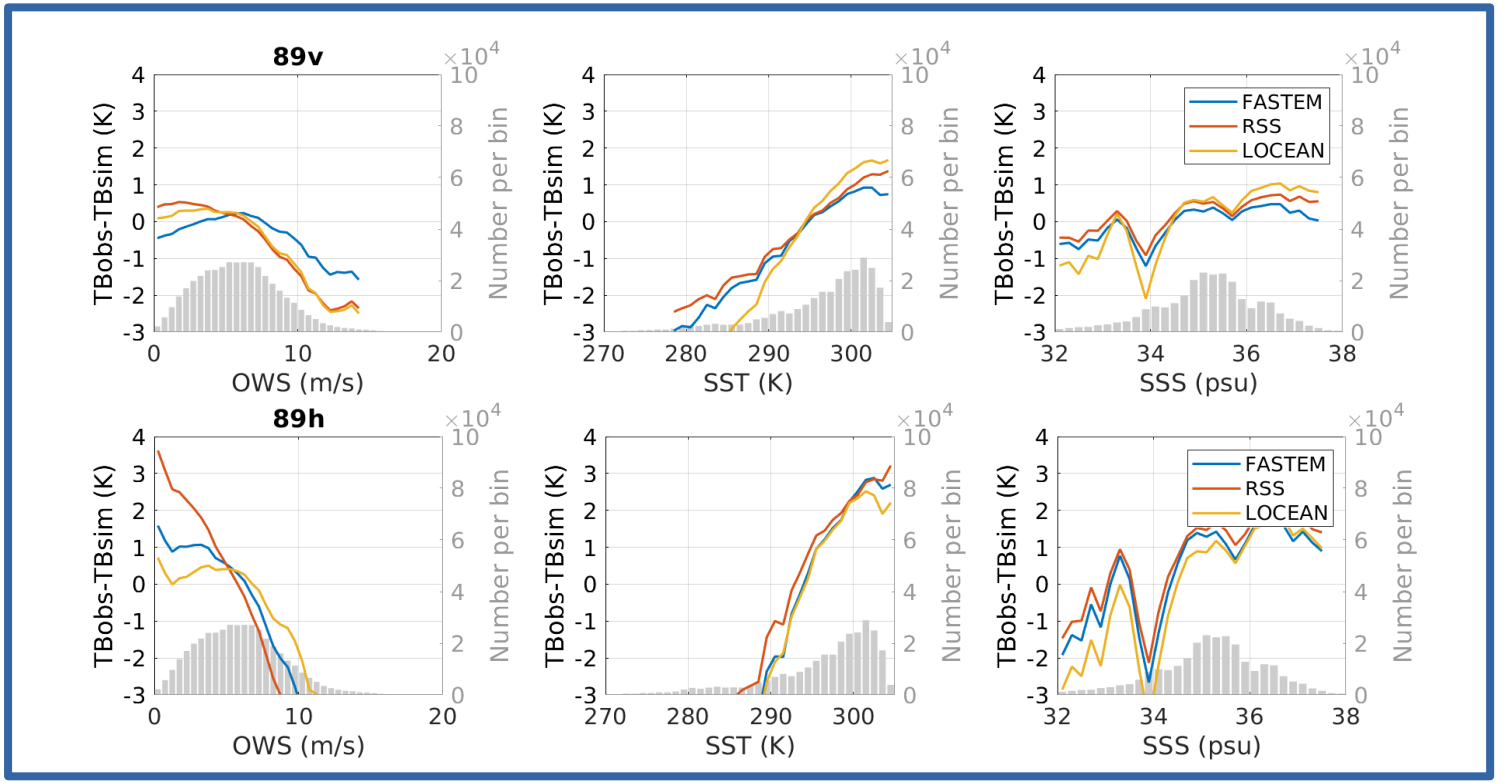

89v
89h
TBobs-TBsim (K)
Number per bin
×10^4
OWS (m/s)
SST (K)
SSS (psu)
FASTEM
RSS
LOCEAN

GMI


89v
89h
TBobs-TBsim (K)
Number per bin
×10^4
OWS (m/s)
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FASTEM
RSS
LOCEAN

Perspectives

- Finalize GMI comparisons.
- Look at the dependence of the difference Tbobs-Tbsim as a function of the wave model outputs?
  - Which parameters are interesting to look at?
- Reproduce a similar study using sounders observations (to study angular dependence of the RTMs) :
  - Which sounder do you recommend? (AMSU, MHS, ATMS?)
- If available, compare active part of the community RTM with radar observations