The Impact of Auxiliary SST on SSS

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31 Mar 2015
Auxiliary SST as it relates to SSS retrievals

• Does uncertainty from the auxiliary SST lead to systematic errors in the Aquarius SSS retrieval?

• SST products:
  • Reynolds Daily OISST AVHRR-only
    • NOAA Optimum Interpolation 1/4 Degree Daily Sea Surface Temperature Analysis, Version 2, Final Product.
    • Reynolds et al, J Climate, 2007, 5473-5496; Banzon and Reynolds, J Climate, 2013, 2557-2562
  • RSS WindSat V7.0.1 SST retrieval
    • Daily 11-day running average at ½-degree resolution (to fill in gaps)
  • Canadian Meteorological Center (CMC) SST product
    • Global GHRSSST L4 data product via PO.DAAC
    • Inputs: AVHRR, ERS, Envisat, TMI, AMSRE, WindSat, in situ (ICOADS)
    • Interpolated on a global 0.2-degree grid
  • UKMet OSTIA (Operational Sea Surface Temperature and Sea Ice Analysis)
    • Global GHRSSST L4 data product via PO.DAAC
    • Inputs: AVHRR, SEVIRI, GOES, IASI, TMI, in situ
    • Optimal interpolation, on a global 0.054-degree grid
    • Only available since 2013.115
WindSat daily, 11-day running average SST
(Half-degree resolution)
Bias & STDev
(Monthly 1-deg avg SST differences)
RMS: Monthly 1-deg Avg SST Differences

WindSat – Reynolds: 0.30K
CMC – Reynolds: 0.25K
SSS Sensitivity to SST, as a function of SST

![Graph showing the sensitivity of SSS to SST as a function of SST.]
SSS Sensitivity to SST

\[ dSSS = dSST \times \left[ \frac{dSSS}{dSST} \right] \]

SST Reynolds – WindSat / dSSS

\[ SSS_{\text{SSS}} = -0.0019984 \times (\text{SSS})^2 + 1.1257 \times (\text{SSS}) - 161.4934 \]
Joint PDF

dSSS derived from Reynolds – WindSat

Aquarius - HYCOM

ρ = 0.13162
RMS of Triple Collocation
(Aquarius, ARGO, HYCOM), 3-deg monthly averages

Blue → Reynolds SST
Red → WindSat SST
Green → CMC SST
Conclusions

• Auxiliary SST does NOT cause any of the zonal SST-dependent biases

• WindSat SST and CMC appear to be slightly better than Reynolds SST
  • Not always true

• Uncertainty due to auxiliary SST may cause systematic errors
  • Which may add to or compensate for other systematic errors