V3.4.1 L2 Residual SSS Retrieval Bias

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Residual dSSS in V3.4.1 is still slightly positive (~0.04 PSU) for all beams, similar to all previous versions back to V2.8

- Orbital average of residual SSS retrieval error (compared to HYCOM) for each beam using global data are checked as verification for radiometer gain and offset corrections
- Ta gain and offset corrections are implemented such that $dTa = Tf - Ta_{exp}$ is about 0 for all beams
  - i.e. substitute $Tf$ with $Ta_{exp}$ in Aquarius SSS retrieval model won’t get exact same HYCOM salinity.
- dSSS changed slightly between V2.5 and V2.8

- Latitudinal distribution of dSSS in V3.4.1 is changed from V3.0
- V3.4.1 both standard deviation and bias are nearly unchanged from V3.3 (V3.0 + SWH correction)
- The dSSS biases are lightly more consistent among 3 beams in V3.4.1
V3.4.1 dTa

dTa = Tf – Ta_exp is flattened to 0 for all channels
V2.2.1 dSSS

- Data filtered using same criteria as for calibration correction
- V2.2.1 has exponential drift correction and flattening offset (wiggle) correction applied
V2.5.1 dSSS

V2.4.1 used the prelaunch RFI thresholds in place of the revised thresholds that were implemented for V2.0.

V2.5.1 used the updated galaxy correction developed by RSS.

-- (http://oceancolor.gsfc.nasa.gov/WIKI/AQ2fGS2fSW2fUpdatesPostLaunch.html)
V2.6.1 used the updated flag definitions provided by D. Levine.
V2.7.1 incorporated some corrections to the **quality flags**, the use of the flags in the calibration determination, and an **updated SSS climatology** file from RSS. A problem was identified in the updated SSS climatology file used for the V2.7.1 processing. The values were set to 0 for areas with ice concentrations, causing anomalous behavior in the wind determination and roughness correction at extreme latitudes.
V2.8.1 included the corrected SSS climatology file and some final corrections to the quality flags. (V3.0 equivalent)
- V3.3 SSS _adj: -0.05 to 0.2 PSU bias along lat. Asc + Dsc
- V3.4.1 SSS: -0.1 to 0.25 PSU bias along lat. Asc + Dsc
  - Negative dSSS’s in tropics and positive dSSS’s at higher lat.
  - Symmetric patterns in Asc/Dsc
Beam 1

- V3.3 : -0.1 to 0.2 PSU bias along lat. Asc + Dsc
- V3.4.1: -0.1 to 0.25 PSU bias along lat. Asc + Dsc
- Both latitudinal dependence consistent over time
- V3.4.1 : tropical SSS retrieval lower value than V3.3
- V3.3: -0.05 to 0.1 PSU bias along lat. Asc + Dsc;
- V3.4.1: -0.15 to 0.15 PSU bias along lat. Asc + Dsc;
- Both V3.3 & V3.4: latitudinal dependence consistent over time
- V3.4.1 SSS: tropical SSS retrieval lower value than V3.3
- V3.3 : -0.1 to 0.35 PSU bias along lat. Asc + Dsc;
- V3.4.1 : -0.1 to 0.4 PSU bias along lat. Asc + Dsc;
- Both latitudinal dependence consistent over time
- V3.4.1 SSS: tropical SSS retrieval lower value than V3.3
V3.4.1 L2 Calibration Correction Summary

• SSS residual bias in V3.4.1
  – Rain not filtered in analysis
  – In V3.4.1, for both ascending and descending paths and all 3 beams, SSS values in tropical area are lower than V3.3
  – Global average of V3.4.1 beam differences of SSS bias are slightly smaller than V3.3
  – Slight positive SSS biases exist in all beams on global average basis (V2.8-V3.4)

• How do we evaluate SSS retrievals globally
  – Rain filter? SST filter?...
backup
SSS – HYCOM orbital avg.

Minor drop in orbital error mean after SSS adjustment

Orbital error std greatly reduced after SSS adjustment
SSS – HYCOM Latitudinal Dependence

Standard SSS

- Standard SSS: -0.2 to 0.3 PSU bias along lat. Asc + Dsc
  - Negative dSSS’s in tropics and positive dSSS’s at higher lat.
  - Symmetric patterns in Asc/Dsc

Adjusted SSS

- Bias adj. SSS: -0.05 to 0.2 PSU bias along lat. Asc + Dsc
Beam 1

Standard SSS

- Standard SSS: -0.2 to 0.2 PSU bias along lat. Asc + Dsc

Adjusted SSS

- Bias adj. SSS: -0.05 to 0.1 PSU bias along lat. Asc + Dsc
Beam 2

Standard SSS

- Standard SSS: -0.25 to 0.3 PSU bias along lat. Asc + Dsc

Adjusted SSS

- Bias adj. SSS: -0.05 to 0.15 PSU bias along lat. Asc + Dsc
Beam 3

Standard SSS

- Standard SSS: -0.2 to 0.45 PSU bias along lat. Asc + Dsc

Adjusted SSS

- Bias adj. SSS: -0.1 to 0.35 PSU bias along lat. Asc + Dsc
Cal/Val data filter

- 3) LAND (no yellow or red)
- 4) ICE (no yellow or red)
- 5) WIND (no yellow or red winds, no HH or HHH wind non-convergence, scatterometer RFI)
- 12) NAV (no bad attitude or off-earth)
- 13) SA_OVERFLOW (overflow bit set in NRT telemetry)
- 14) ROUGH (no roughness table out-of-bounds, missing SWH value)
- 16) POINTING (no non-science mode or pointing anomalies)
- 17) TBCONS (no emissivity = NaN)
- 18) COLDWATER (no SST < 5C)
- 19) TFTADIFF (tf-ta: no yellow or red)
- 21) REFL_1STOKES (no yellow or red moon or galaxy contamination)
- 23) RFI_REGION (no bad RFI geographic regions)