

V3.4.1 L2 Residual SSS Retrieval Bias

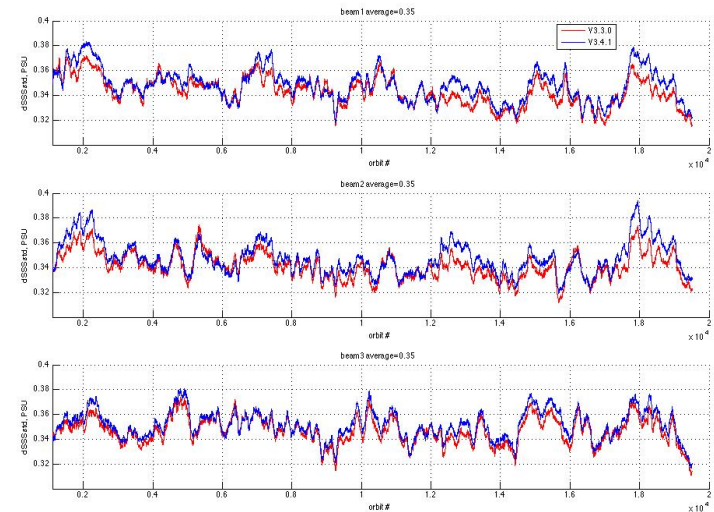
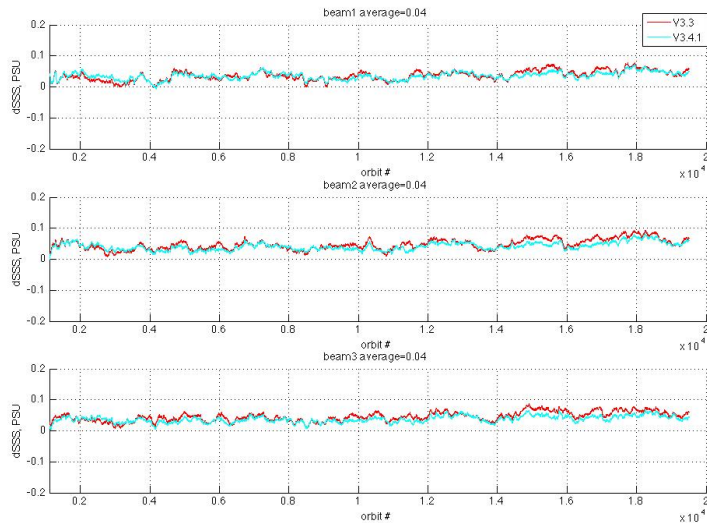
Liang Hong, Joel Gales

3/31/2015

Outline

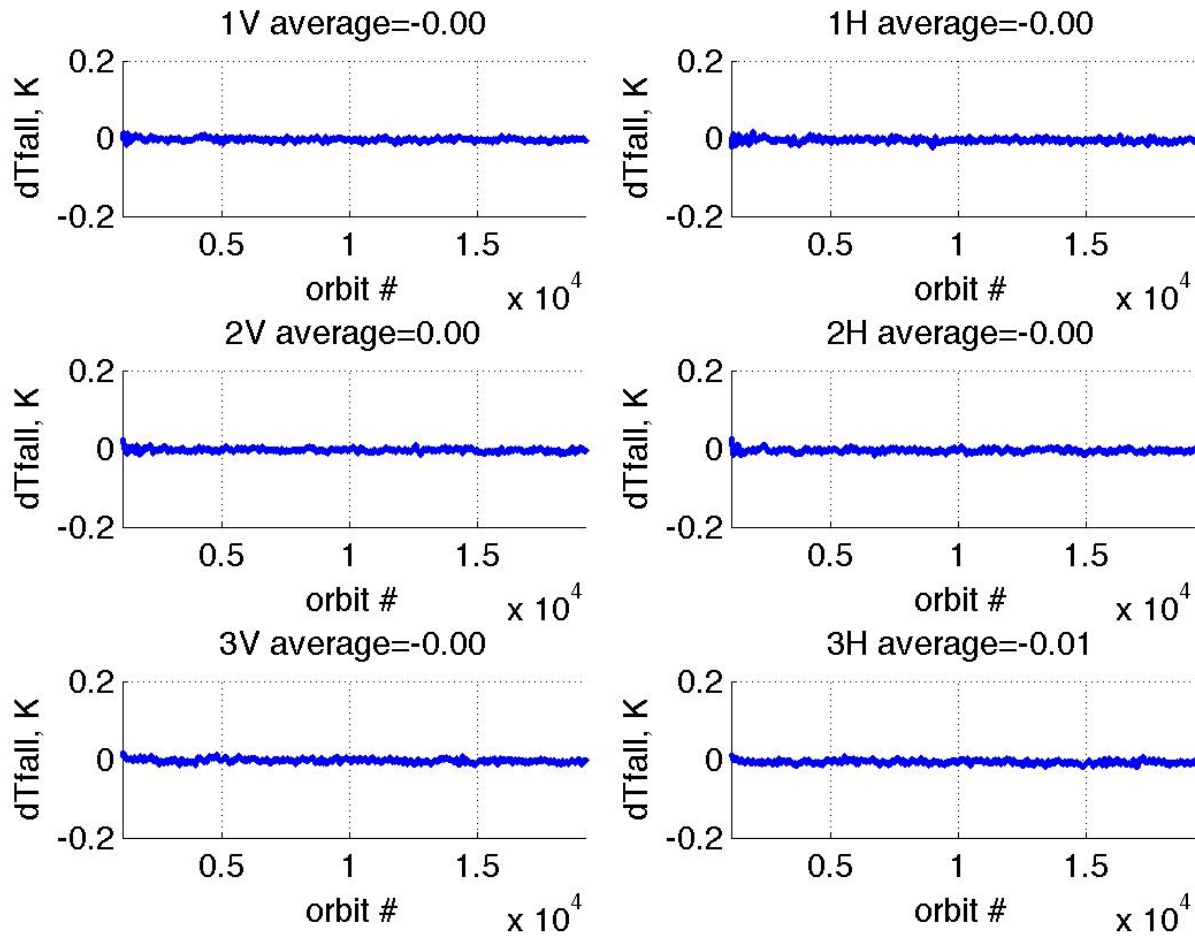
- Residual dSSS in V3.4.1 is still slightly positive (~ 0.04 PSU) for all beams, similar to all previous versions back to V2.8
 - Orbital average of residual SSS retrieval error (compared to HYCOM) for each beam using global data are checked as verification for radiometer gain and offset corrections
 - 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

SSS – HYCOM orbital avg.



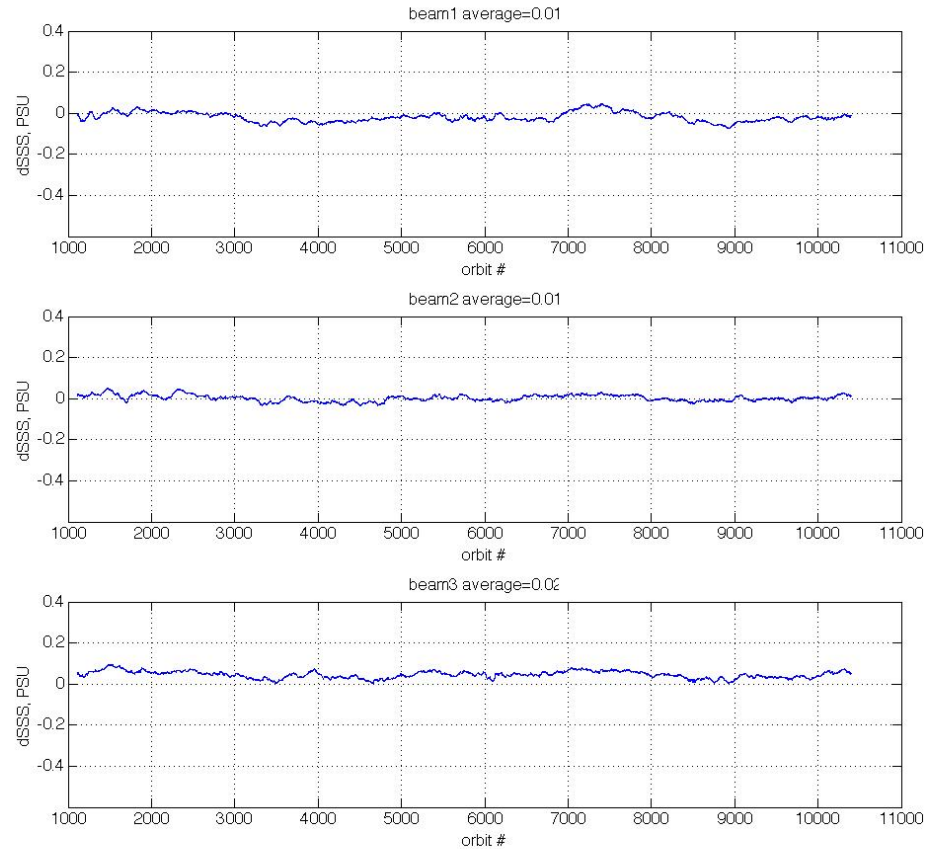
- V3.4.1 both standard deviation and bias are nearly unchanged from V3.3 (V3.0 + SWH correction)
- The dSSS biases are lightly more consistent among 3 beams in V3.4.1

V3.4.1 dTa



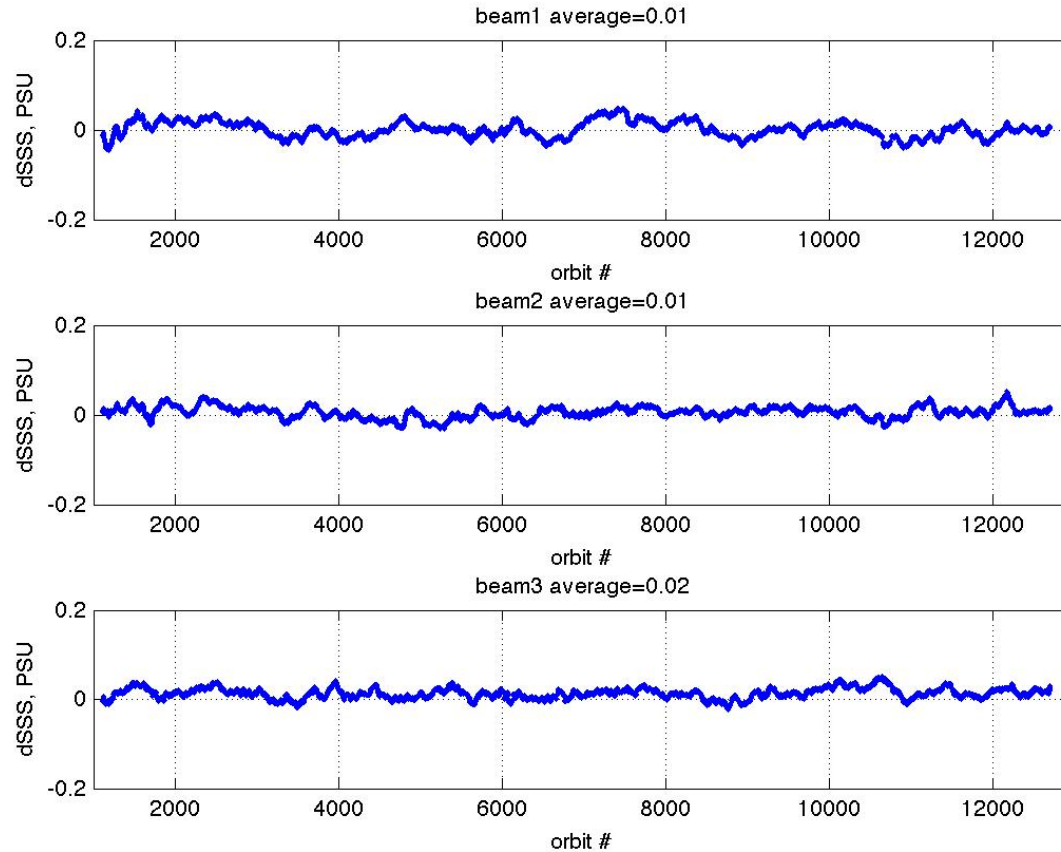
$dT_a = T_f - T_{a_exp}$ is flattened to 0 for all channels

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

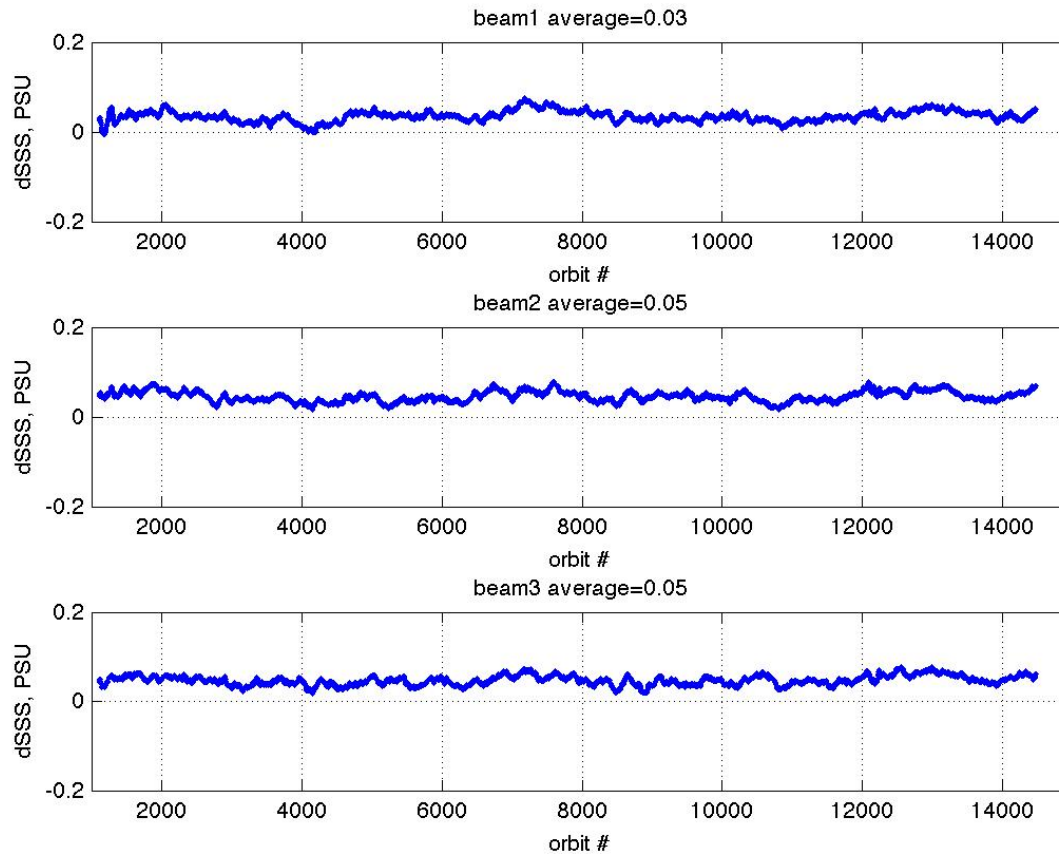


V2.4.1 used the prelaunch RFI thresholds in place of the revised thresholds that were implemented for V2.0

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

-- ([http://oceancolor.gsfc.nasa.gov/WIKI/AQ\(2f\)GS\(2f\)SW\(2f\)UpdatesPostLaunch.html](http://oceancolor.gsfc.nasa.gov/WIKI/AQ(2f)GS(2f)SW(2f)UpdatesPostLaunch.html))

V2.8.1 dSSS



Orbital avg
dSSS
changed to
slight
positive
values

V2.6.1 used the updated flag definitions provided by D. Levine.

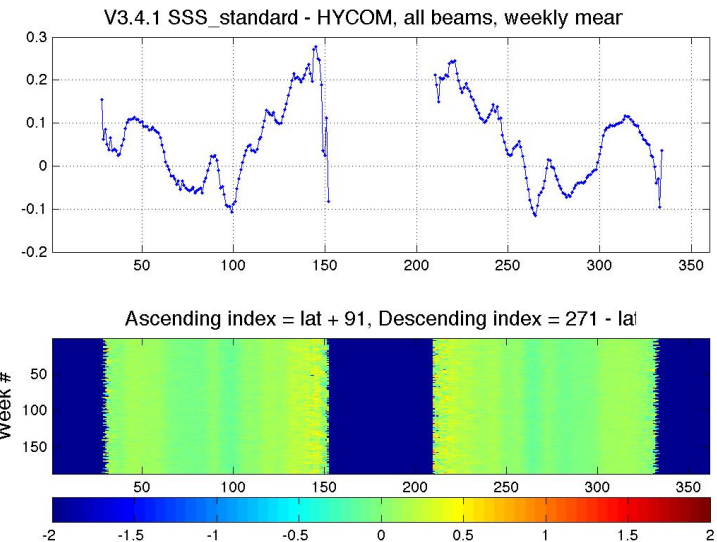
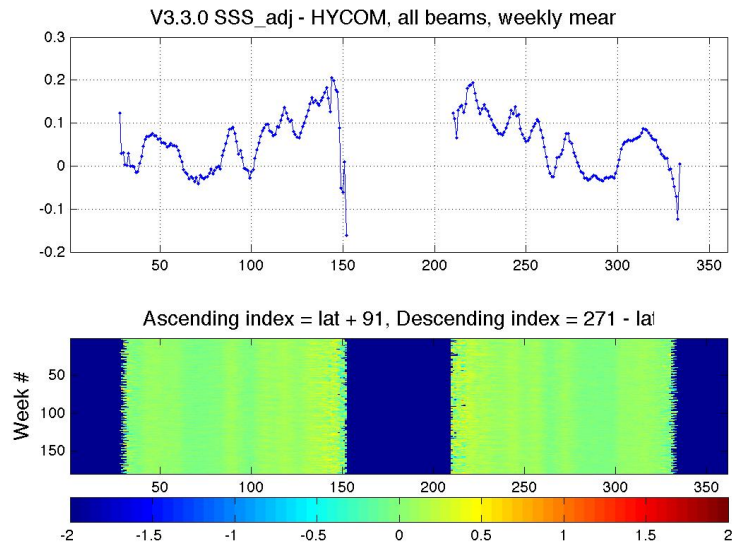
V2.7.1 incorporated some corrections to the **quality flags**, the use of the flags in the calibration determination, and an **updated SSS climatology** file from RSS. A problem was identified in the updated SSS climatology file used for the V2.7.1 processing. The values were set to 0 for areas with 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)

SSS – HYCOM Latitudinal Dependence

V3.3 SST_adj

V3.4.1



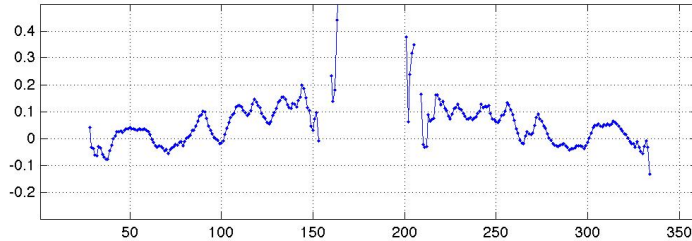
- V3.3 SSS_adj: -0.05 to 0.2 PSU bias along lat. Asc + Dsc
- V3.4.1 SSS: -0.1 to 0.25 PSU bias along lat. Asc + Dsc
 - Negative dSSS's in tropics and positive dSSS's at higher lat.
 - Symmetric patterns in Asc/Dsc

Beam 1

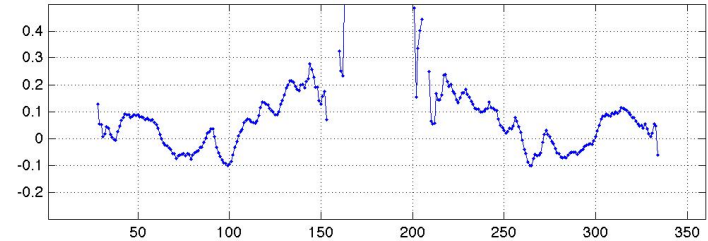
V3.3 SST_adj

V3.4.1

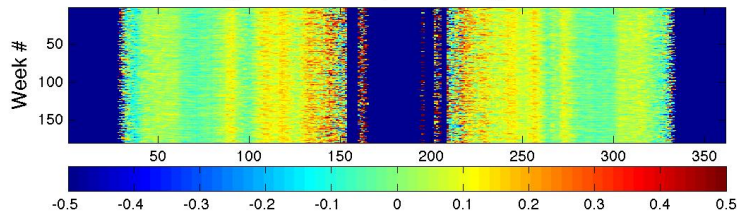
V3.3.0 SSS_adj - HYCOM, beam1, weekly mean



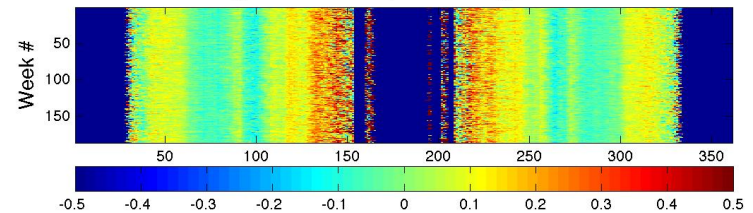
V3.4.1 SSS_standard - HYCOM, beam1, weekly mean



Ascending index = lat + 91, Descending index = 271 - lat



Ascending index = lat + 91, Descending index = 271 - lat



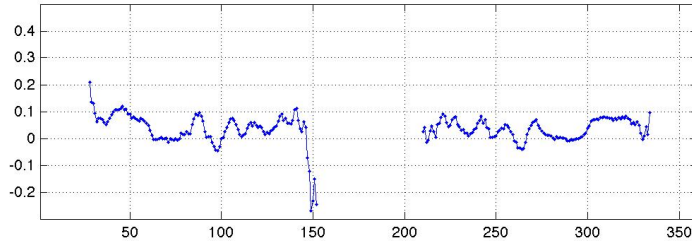
- V3.3 : -0.1 to 0.2 PSU bias along lat. Asc + Dsc
- V3.4.1: -0.1 to 0.25 PSU bias along lat. Asc + Dsc
- Both latitudinal dependence consistent over time
- V3.4.1 : tropical SSS retrieval lower value than V3.3

Beam 2

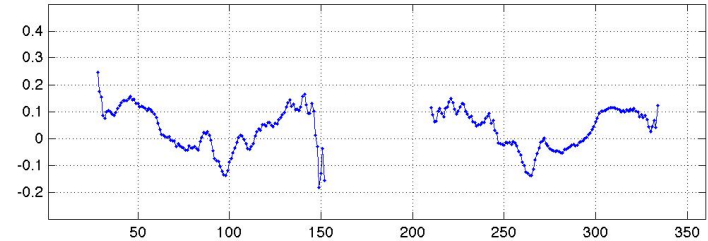
V3.3 SST_adj

V3.4.1

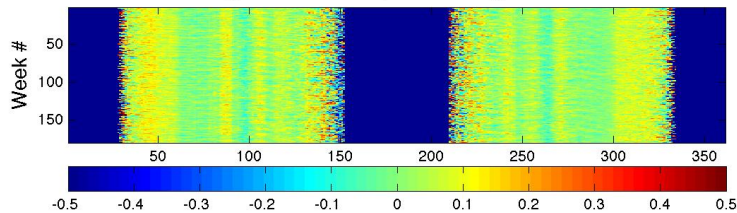
V3.3.0 SSS_adj - HYCOM, beam2, weekly mean



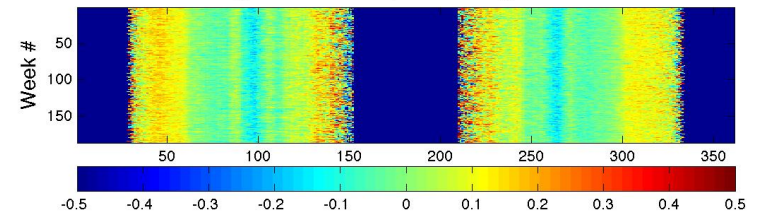
V3.4.1 SSS_standard - HYCOM, beam2, weekly mean



Ascending index = lat + 91, Descending index = 271 - |lat|



Ascending index = lat + 91, Descending index = 271 - |lat|



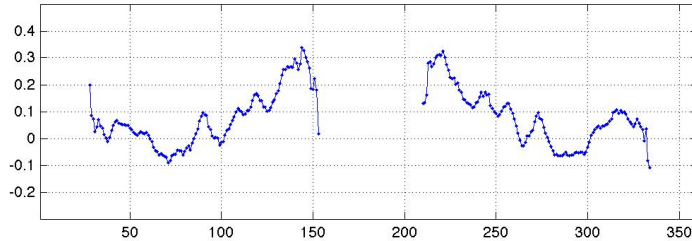
- V3.3: -0.05 to 0.1 PSU bias along lat. Asc + Dsc;
- V3.4.1: -0.15 to 0.15 PSU bias along lat. Asc + Dsc;
- Both V3.3 & V3.4: latitudinal dependence consistent over time
- V3.4.1 SSS: tropical SSS retrieval lower value than V3.3

Beam 3

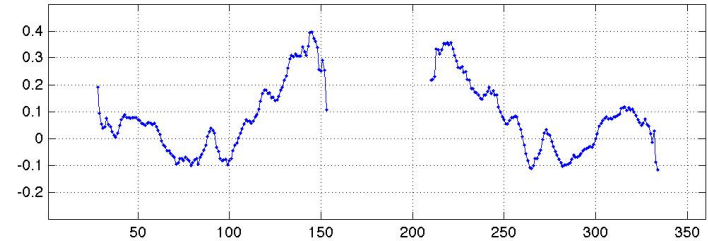
V3.3 SST_adj

V3.4.1

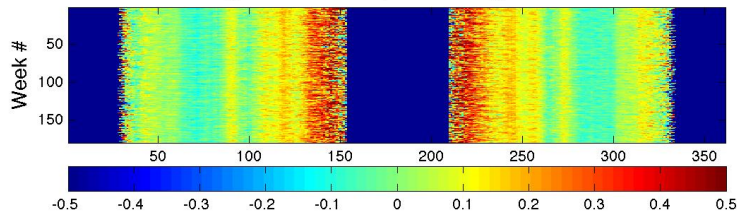
V3.3.0 SSS_adj - HYCOM, beam3, weekly mean



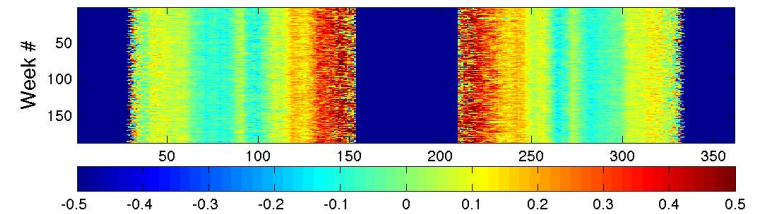
V3.4.1 SSS_standard - HYCOM, beam3, weekly mean



Ascending index = lat + 91, Descending index = 271 - lat



Ascending index = lat + 91, Descending index = 271 - lat



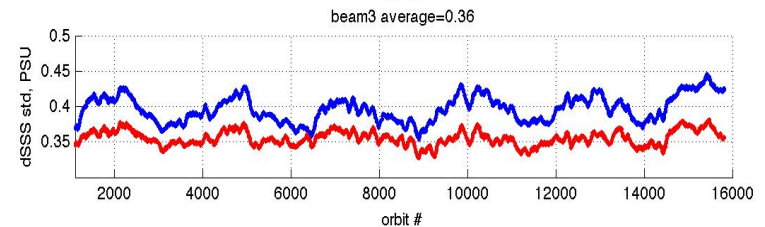
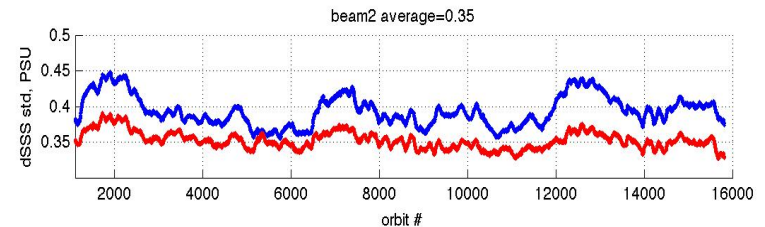
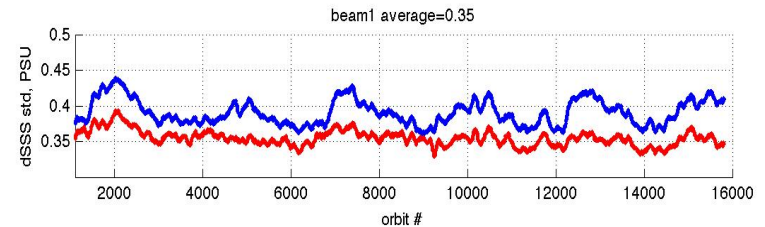
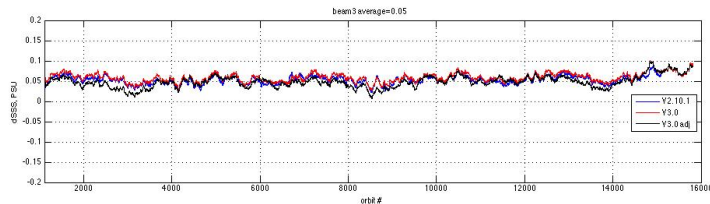
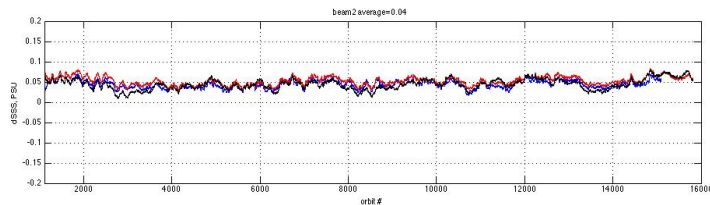
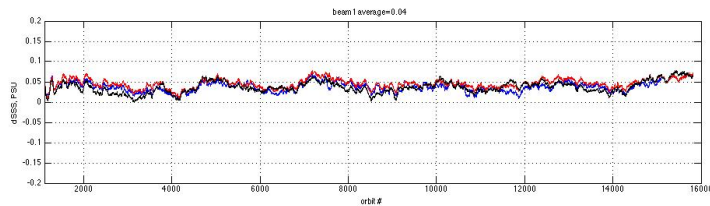
- V3.3 : -0.1 to 0.35 PSU bias along lat. Asc + Dsc;
- V3.4.1 : -0.1 to 0.4 PSU bias along lat. Asc + Dsc;
- Both latitudinal dependence consistent over time
- V3.4.1 SSS: tropical SSS retrieval lower value than V3.3

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.

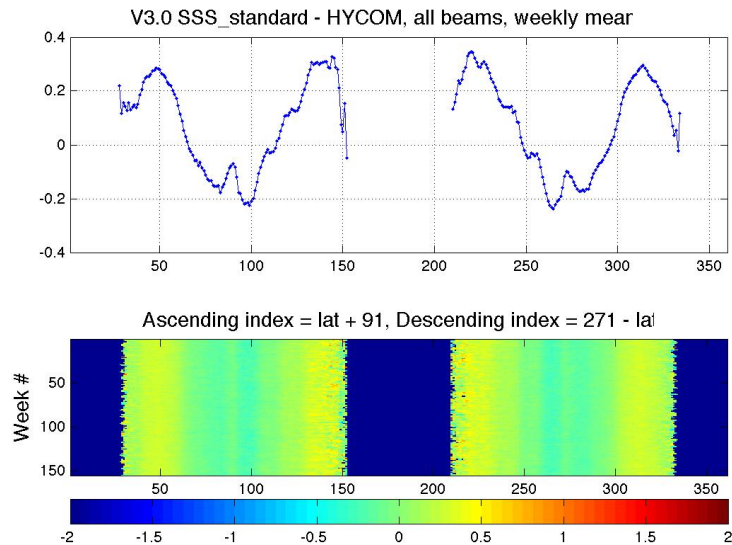


Minor drop in orbital error mean after SSS adjustment

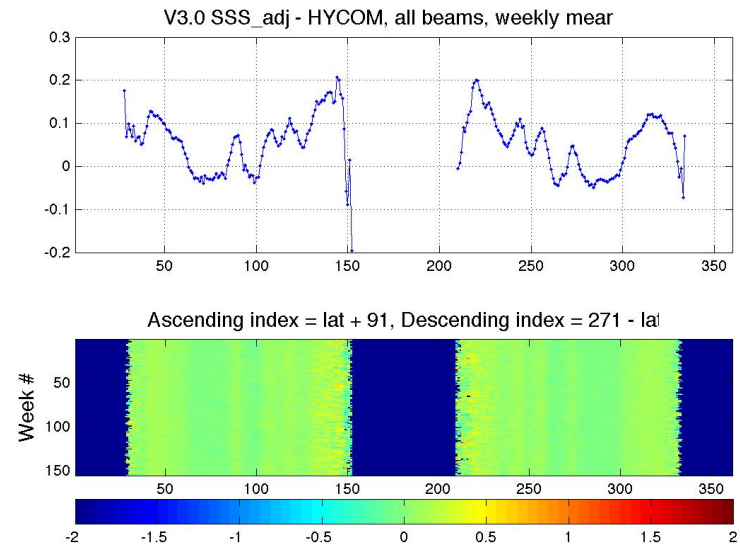
Orbital error std greatly reduced after SSS adjustment

SSS – HYCOM Latitudinal Dependence

Standard SSS



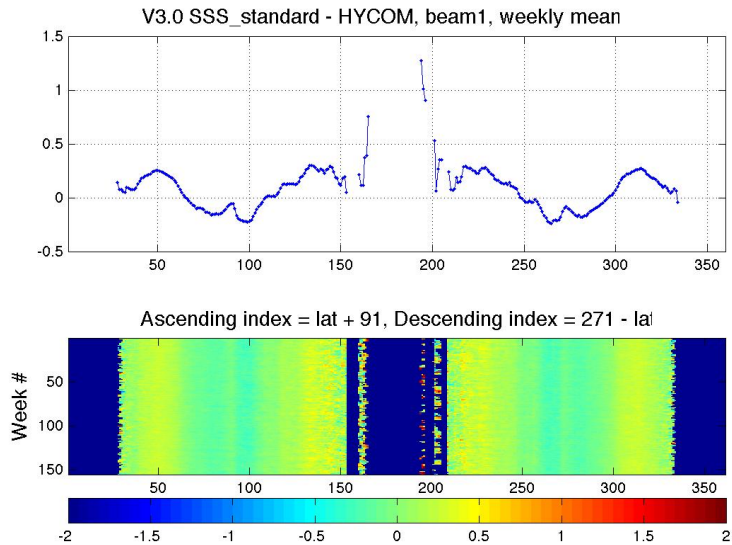
Adjusted SSS



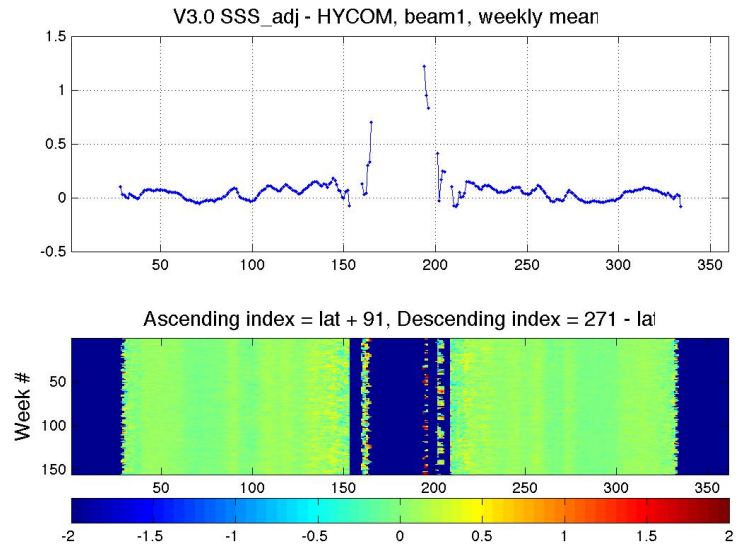
- Standard SSS: -0.2 to 0.3 PSU bias along lat. Asc + Dsc
 - Negative dSSS's in tropics and positive dSSS's at higher lat.
 - Symmetric patterns in Asc/Dsc
- Bias adj. SSS: -0.05 to 0.2 PSU bias along lat. Asc + Dsc

Beam 1

Standard SSS



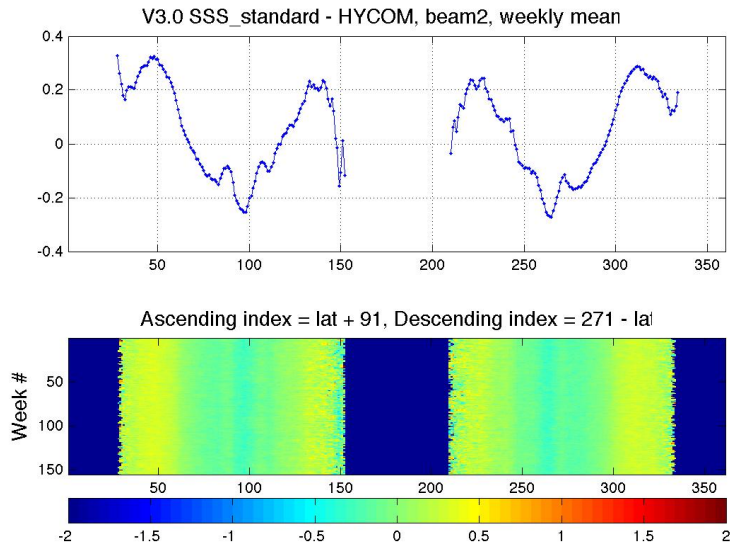
Adjusted SSS



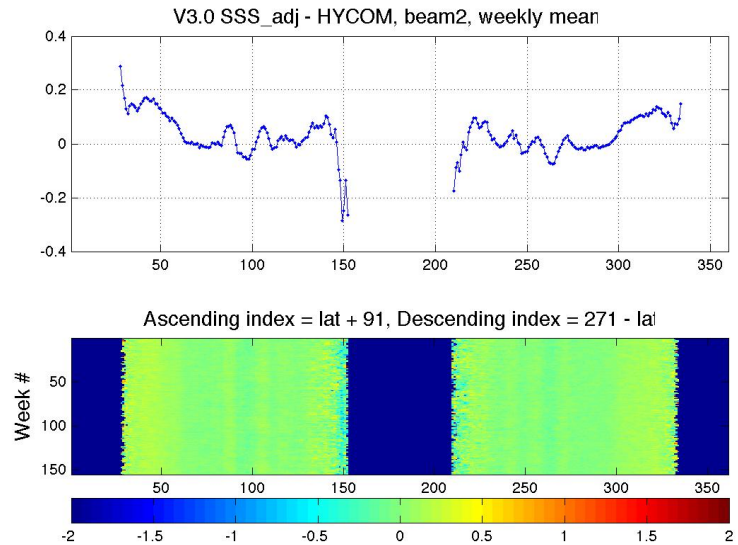
- Standard SSS: -0.2 to 0.2 PSU bias along lat. Asc + Dsc
- Bias adj. SSS: -0.05 to 0.1 PSU bias along lat. Asc + Dsc

Beam 2

Standard SSS



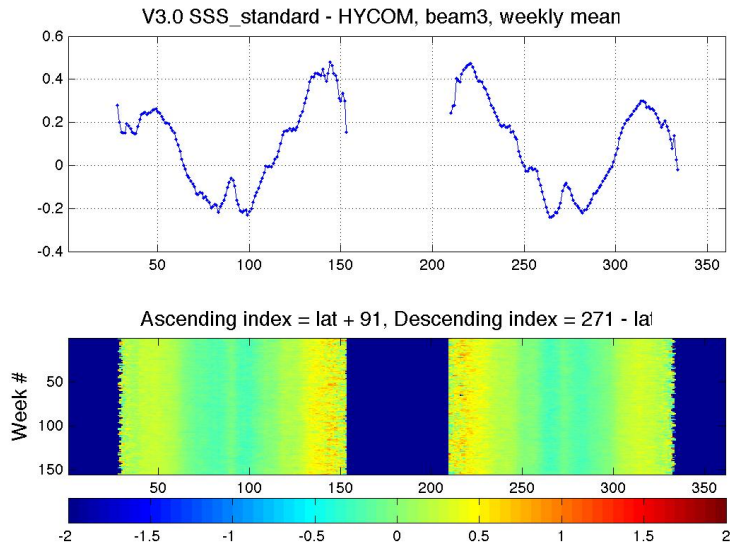
Adjusted SSS



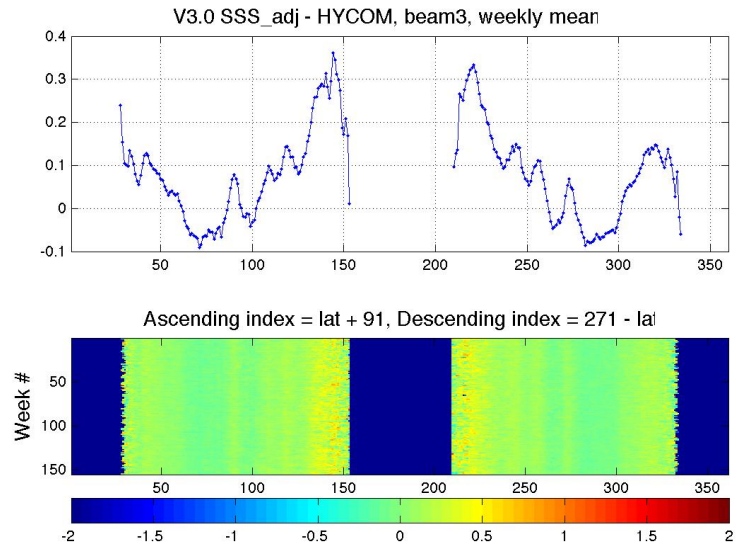
- Standard SSS: -0.25 to 0.3 PSU bias along lat. Asc + Dsc
- Bias adj. SSS: -0.05 to 0.15 PSU bias along lat. Asc + Dsc

Beam 3

Standard SSS



Adjusted SSS



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