

AQUARIUS SATELLITE SALINITY MEASUREMENTS ASSESSMENT

Gary Lagerloef, Hsun-Ying Kao

and many others of the Aquarius Science, Engineering and Cal/Val Team

Understanding
the Interaction
Between Ocean
Circulation, the
Water Cycle,
and Climate by
Measuring
Ocean Salinity



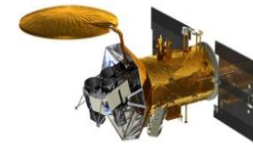
Aquarius/SAC-D



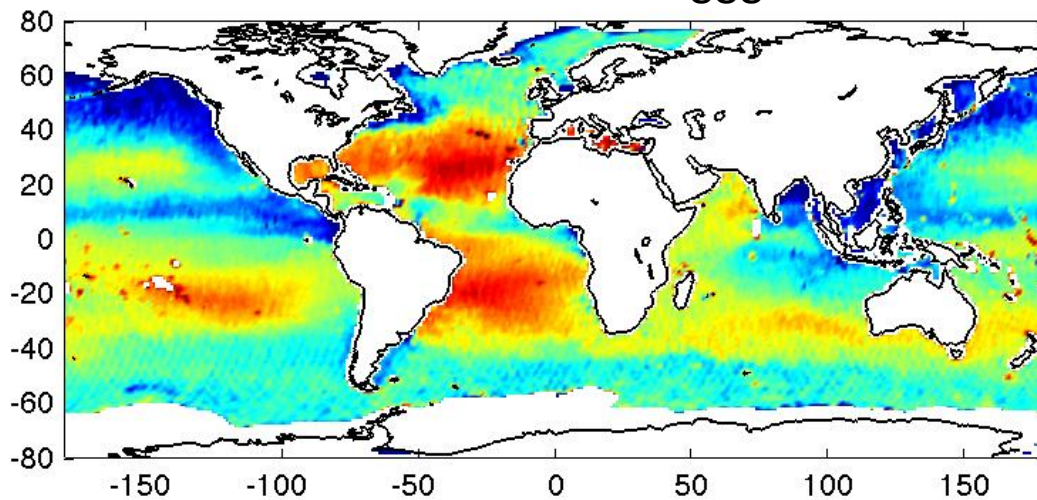
7th Aquarius/SAC-D Science Meeting

11-13 April 2012

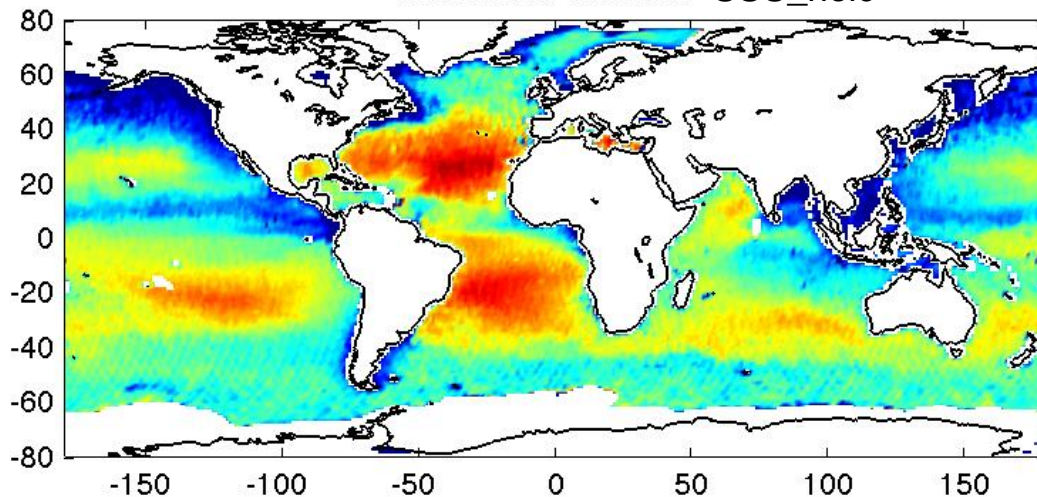
Buenos Aires, Argentina



with land correction SSS



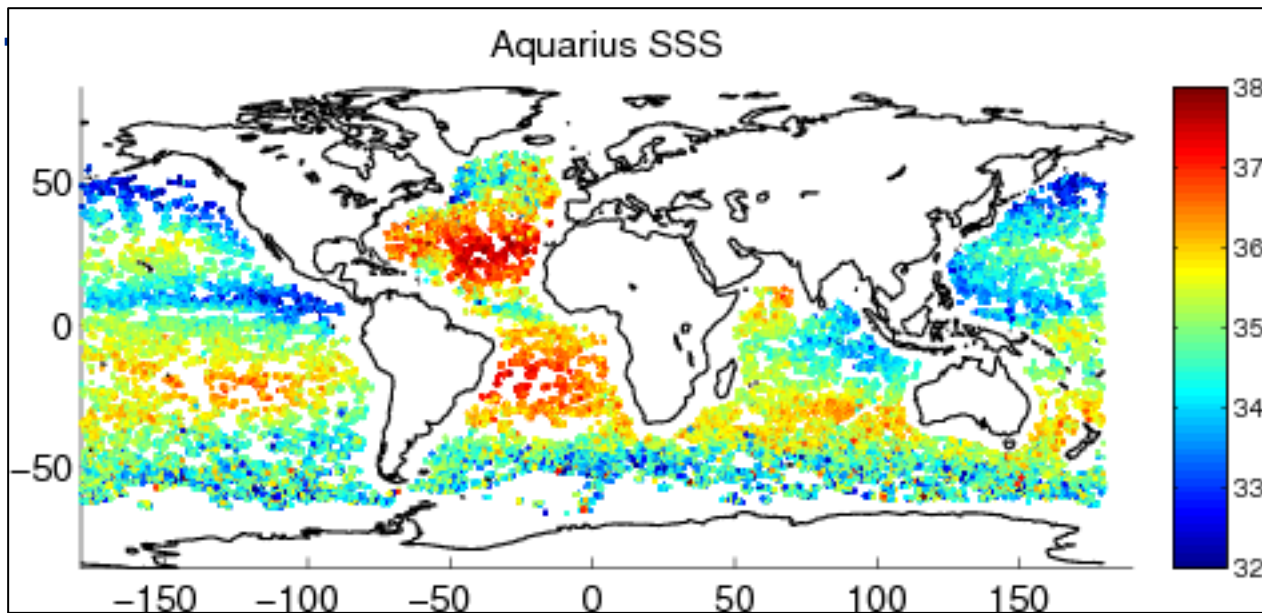
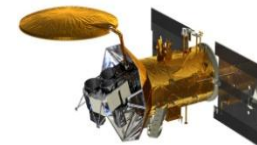
without land correction SSS_nolc



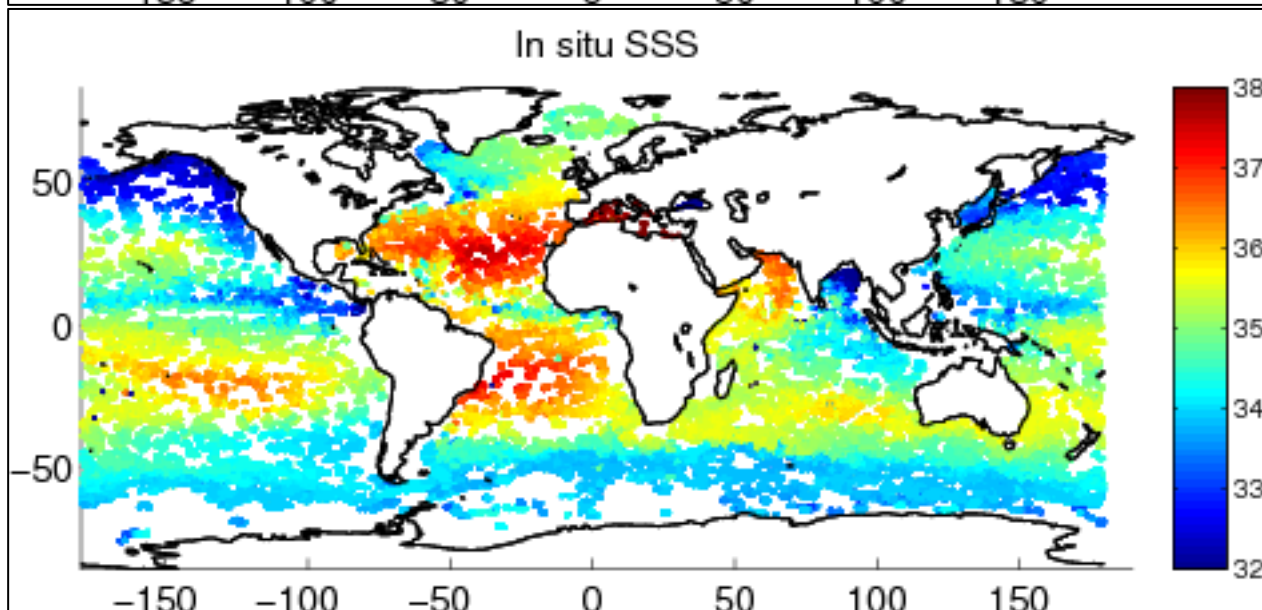
In new Version 1.3 (and V1.2.2 & V1.2.3) the land correction is applied to the retrieved SSS. A separate parameter SSS_nolc is also provided.

In previous versions, the land correction had to be applied by the user.

The land correction is too large around islands and will be improved with a higher resolution land mask in the next version (F. Wentz presentation yesterday)

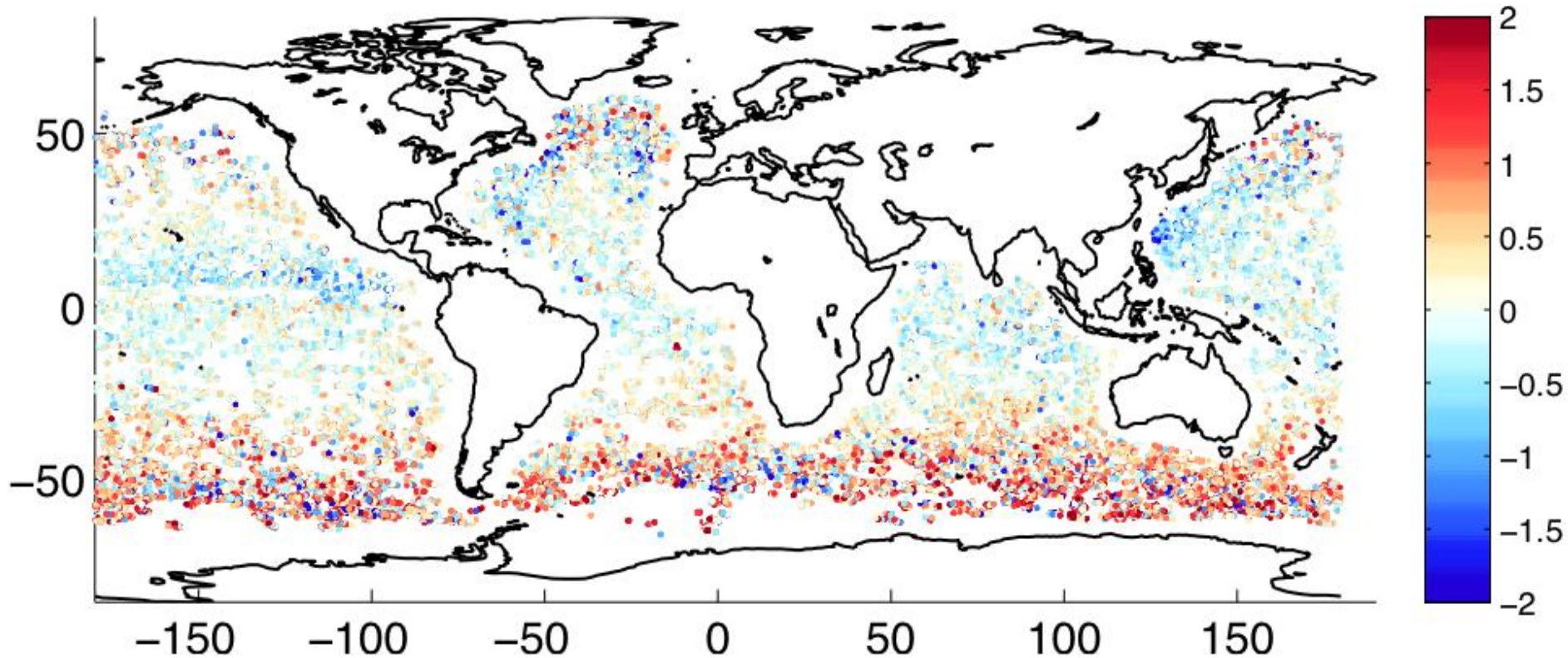
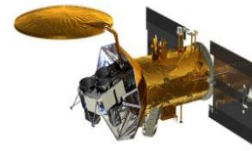


Aquarius salinity at
buoy location &
time



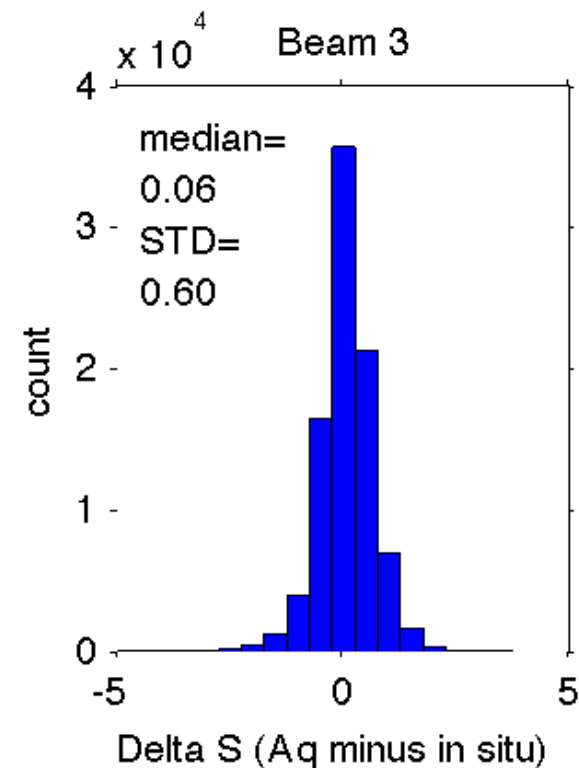
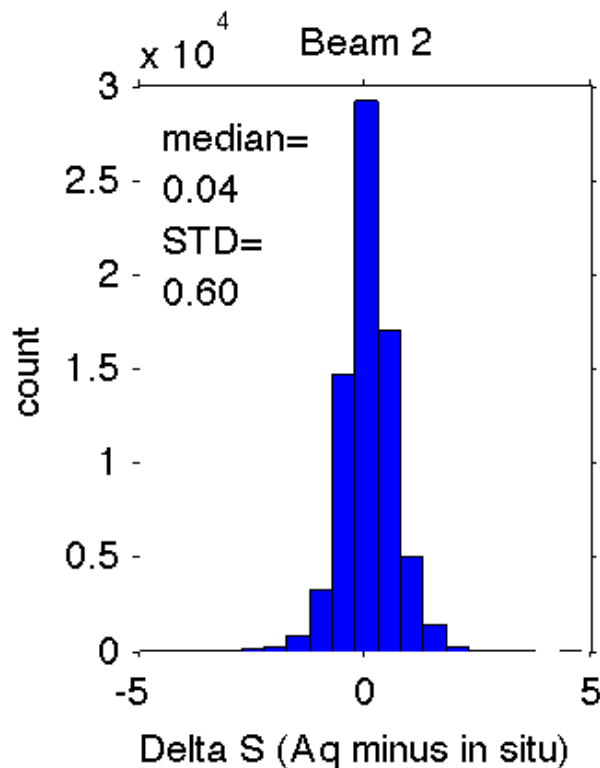
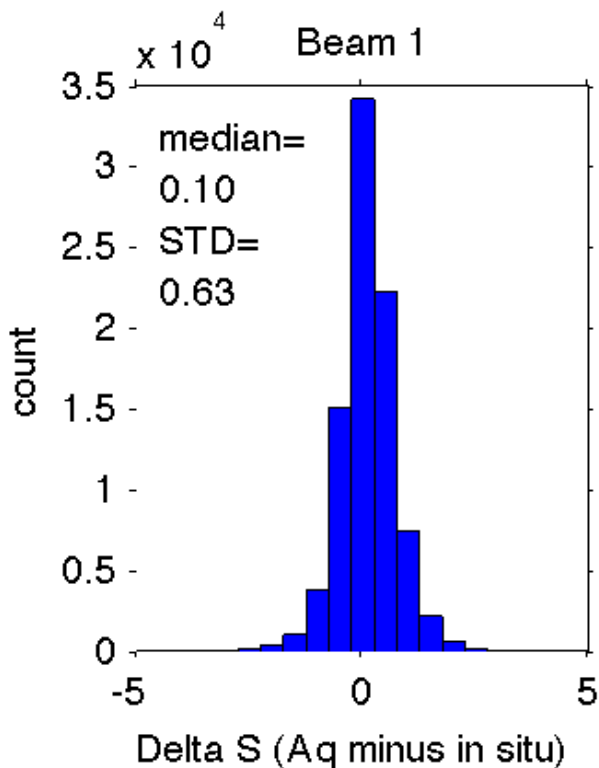
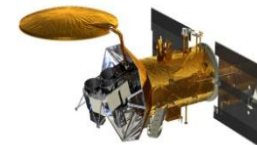
Buoy salinity

10/1/2011
through
2/29/2012



V 1.2.3

10/1/2011 through 2/29/2012

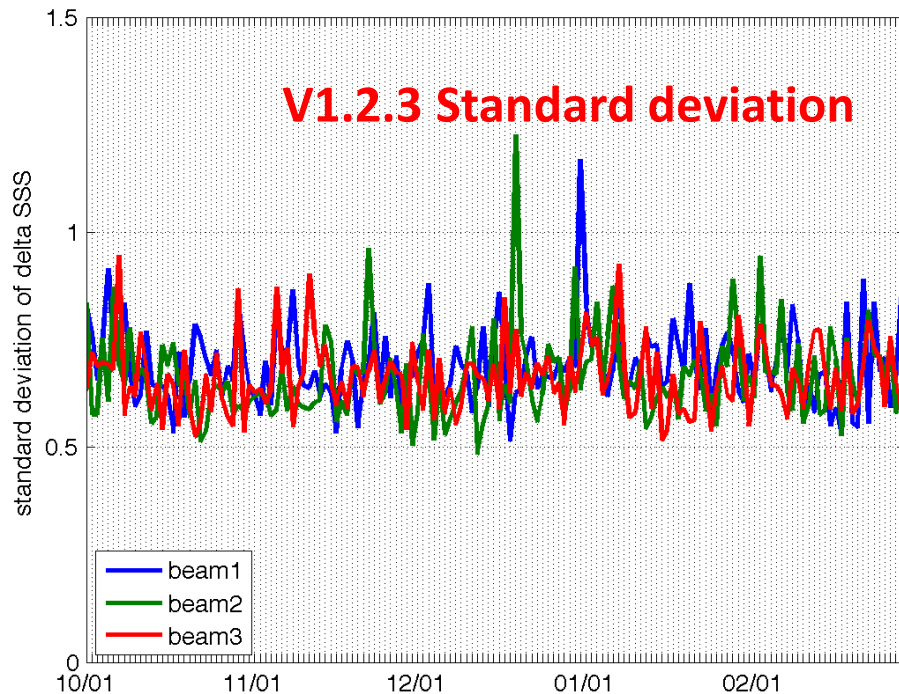
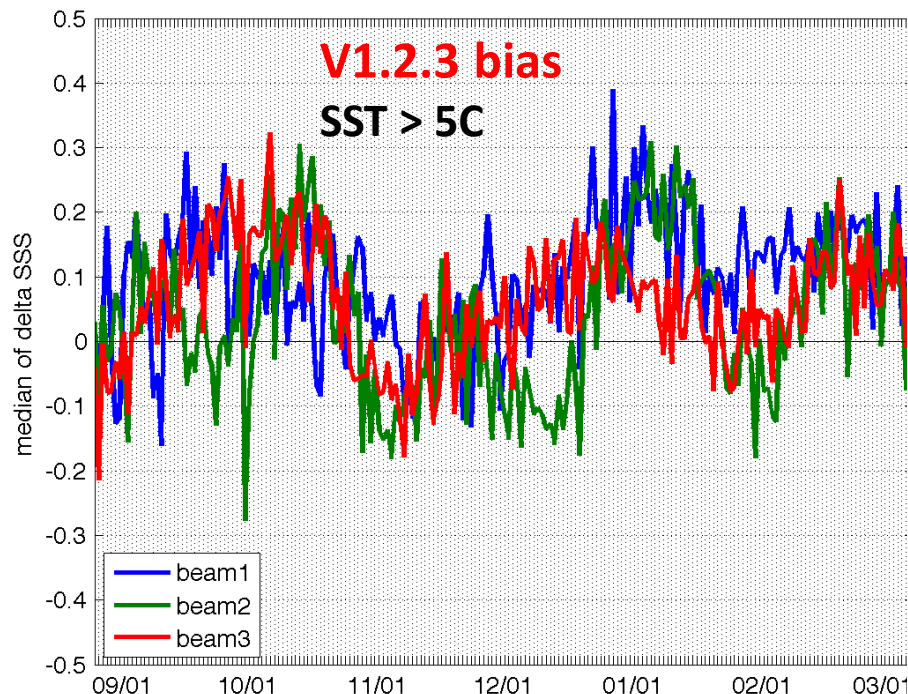
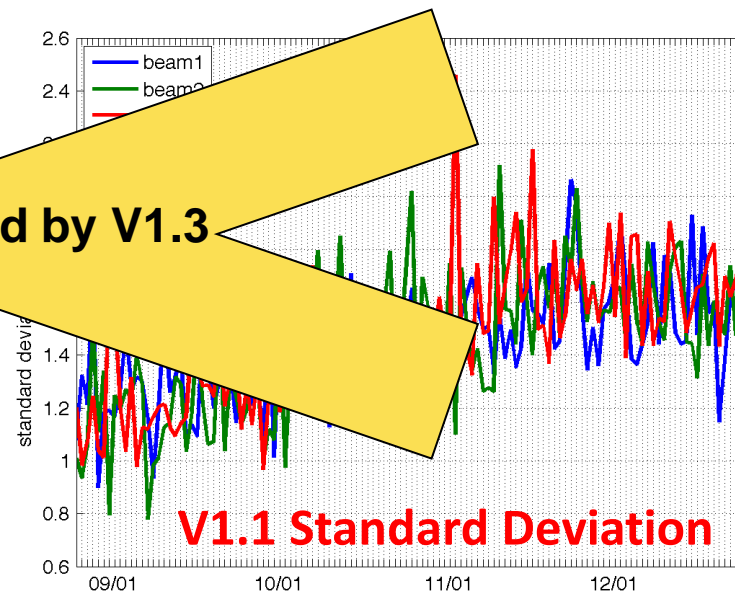
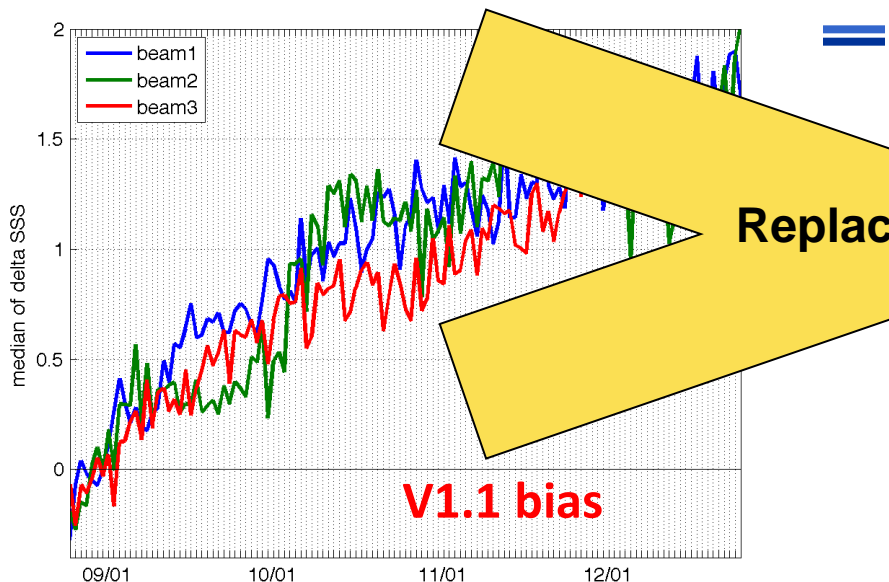
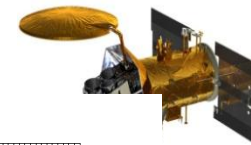


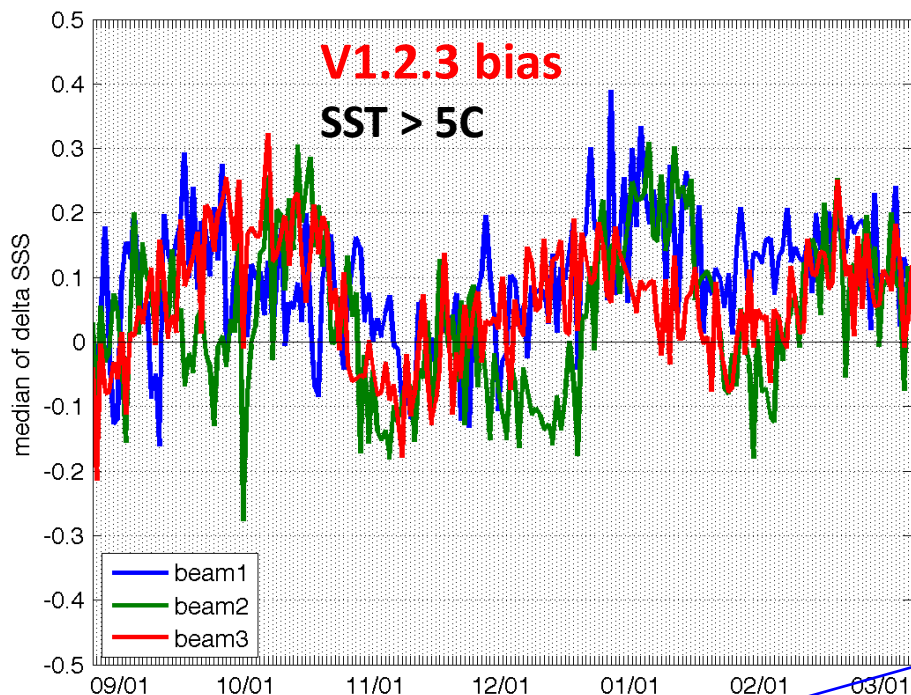
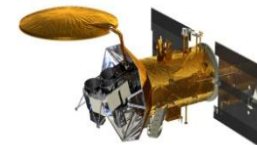
V1.2.3

10/1/2011-2/29/2012

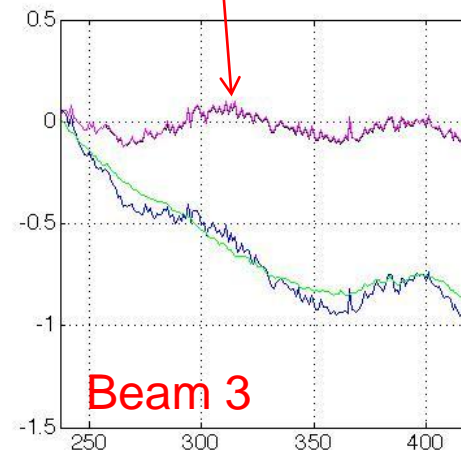
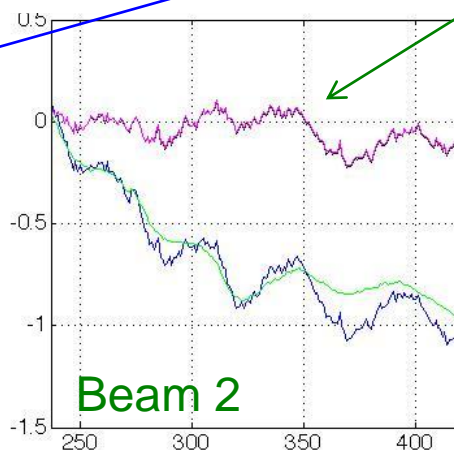
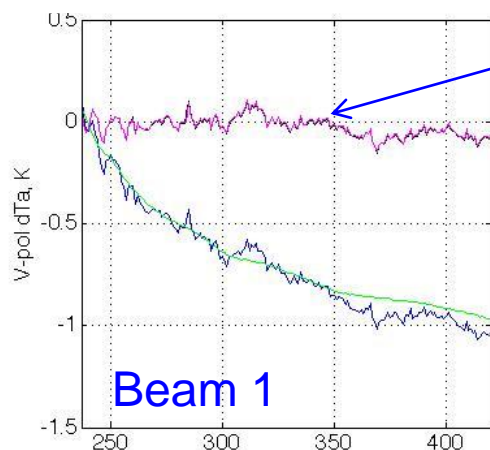
SST > 5C

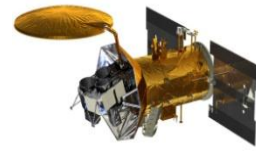
land and ice frac < 0.0005



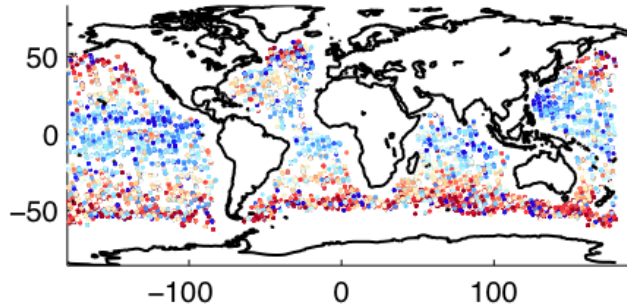


Residual quasi-monthly SSS-Argo bias variations of +/- 0.2 psu are related to the residual radiometer calibration bias variations after the long-term calibration trend was removed with the deflection ratio model

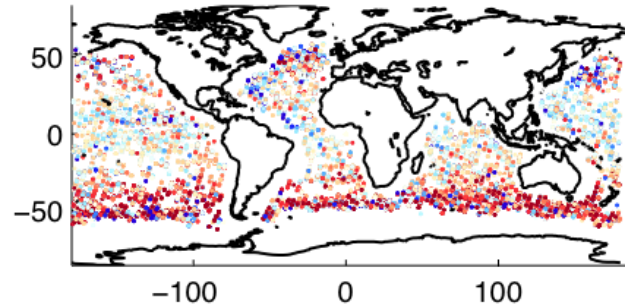




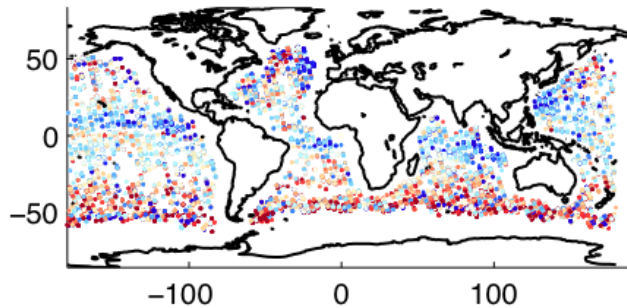
dSSS in ascending
Beam 1



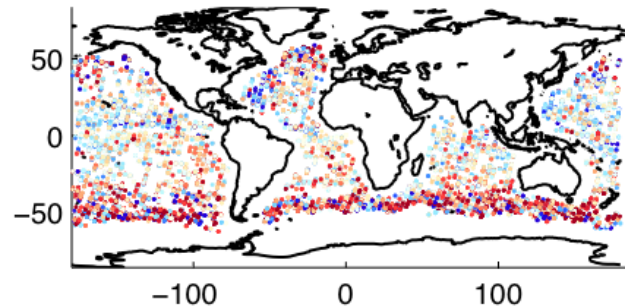
dSSS in descending
Beam 1



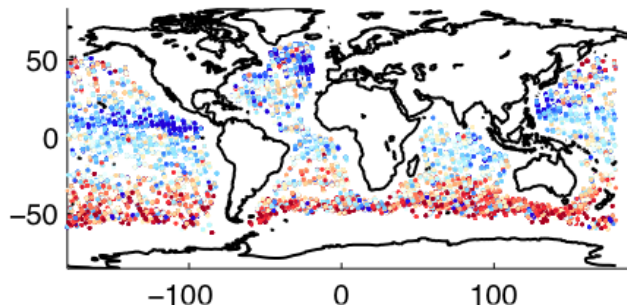
Beam 2



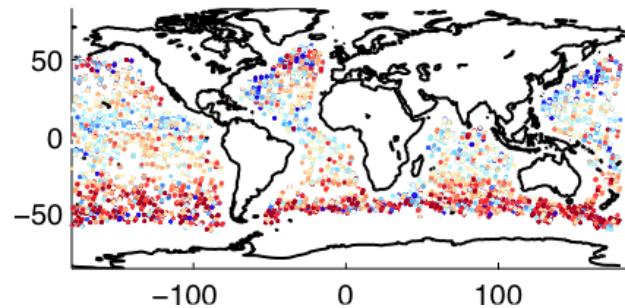
Beam 2



Beam 3



Beam 3

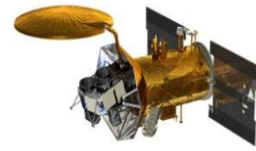


Aquarius – Argo differences

Descending passes biased high in each beam.

Ascending passes are low in mid latitudes, and high in high latitudes.

AQUARIUS/SAC-D Ascending vs Descending Orbits

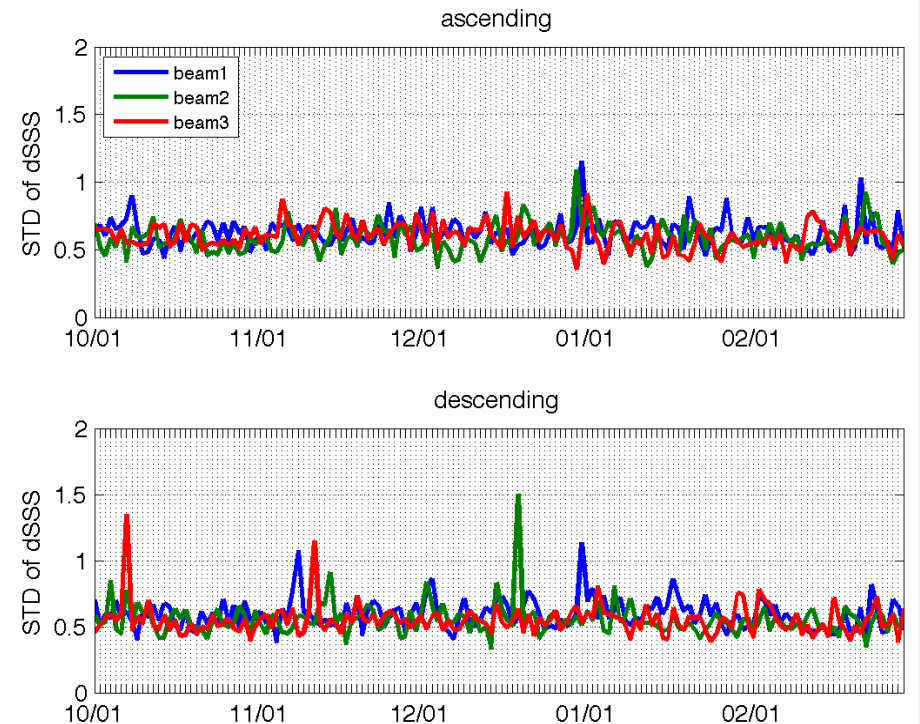
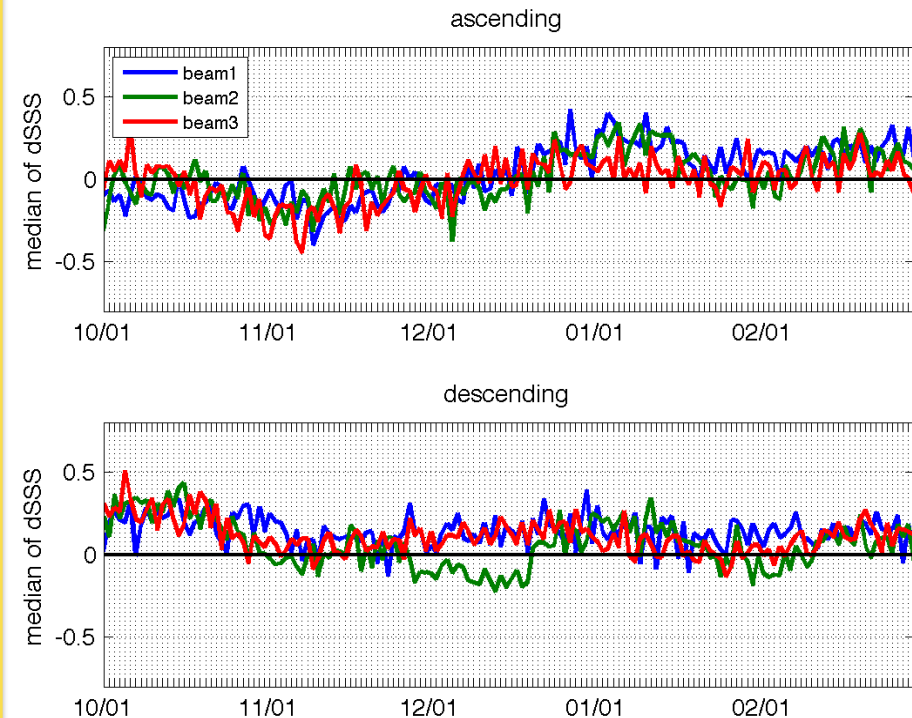


Ascending orbit bias has slight positive trend;
Descending bias consistently > 0 and slight negative trend

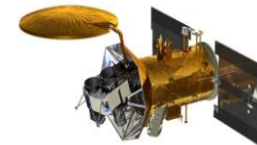
Time series of the daily **median bias**

Time series of the daily **bias STD V1.2.3**

V1.2.3

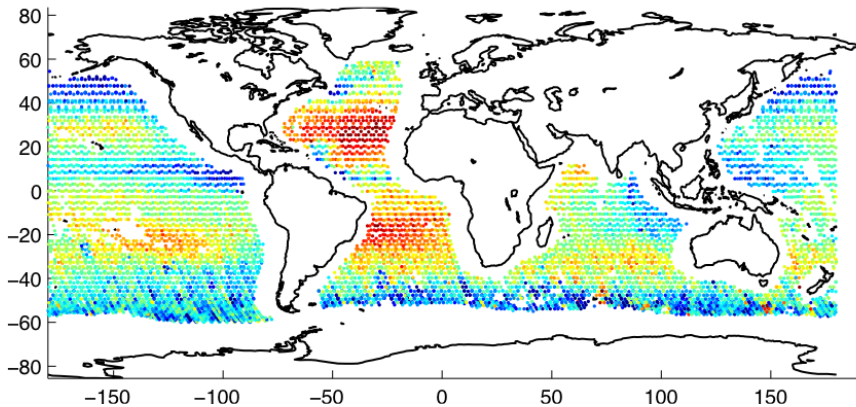


V1.2.3 10/1/2011-2/29/2012; land and ice frac < 0.0005

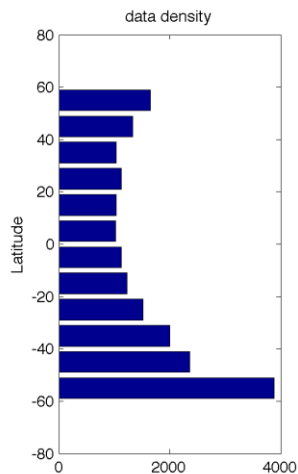
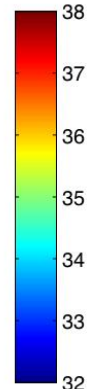
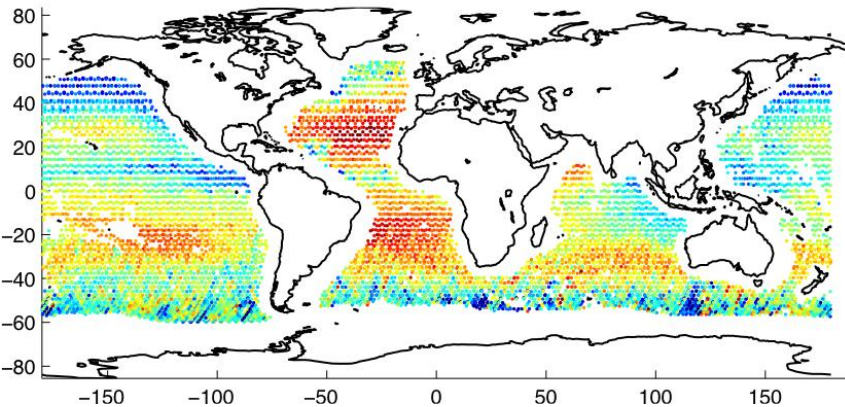


One week cross over differences map of all three beams; 9/1/2011-9/7/2011

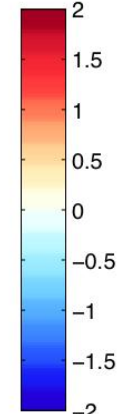
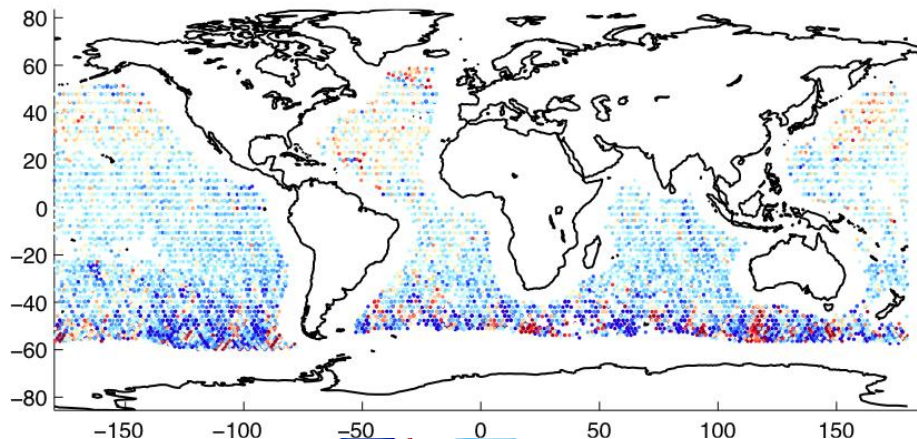
ascending SSS

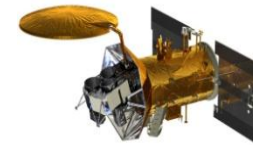


descending SSS

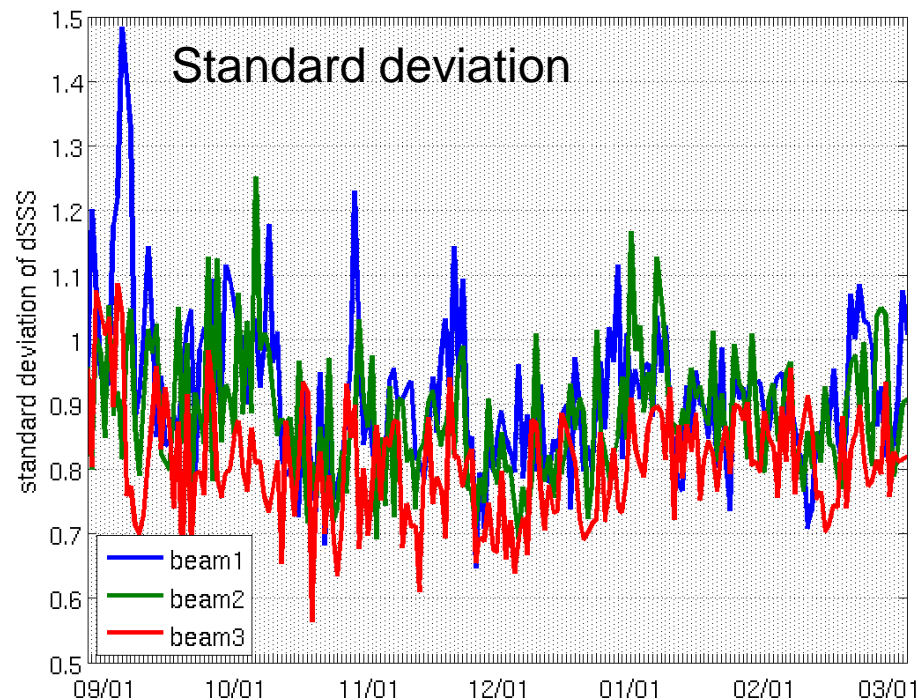
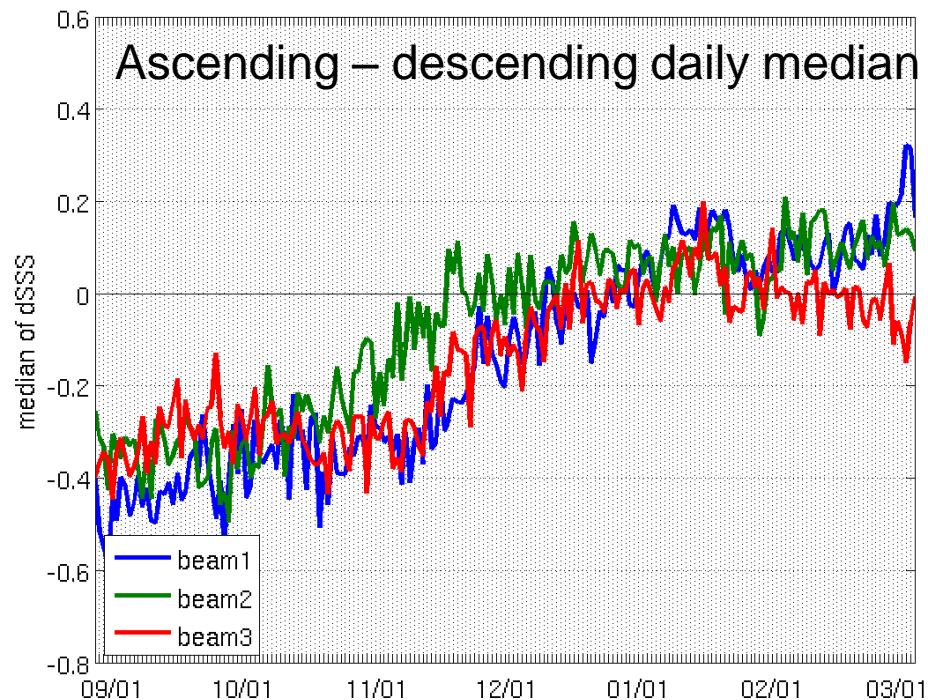


ascending – descending SSS

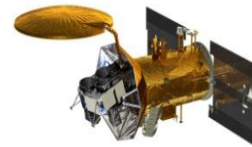




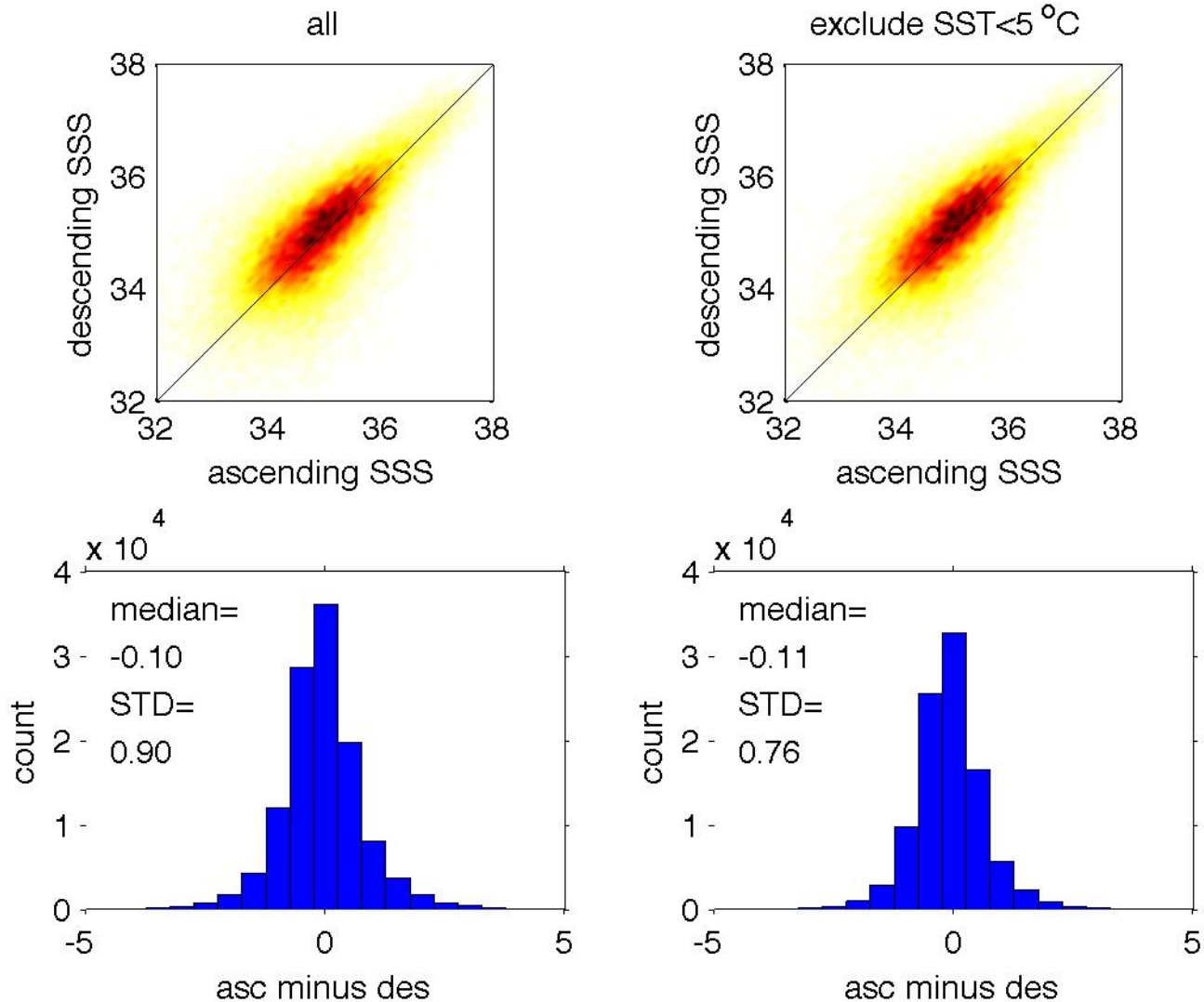
Ascending – descending crossover differences have a positive trend in each beam. This is consistent with the ascending and descending buoy differences shown earlier.

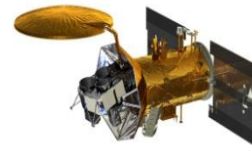


V1.2.3 10/1/2011-2/29/2012; land and ice frac <0.0005

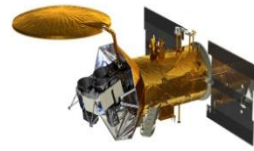


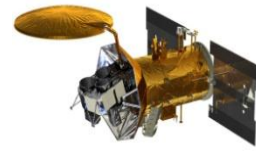
Ascending – descending median bias is ~ -0.1 psu
 The STD reduced after excluding the cold water region





1. Argo buoy point measurement differences are ~ 0.6 psu rms, with SST $> 0.5^{\circ}\text{C}$ and land fraction < 0.0005 .
2. In high latitude, cold water regions, Aquarius SSS retrievals are biased high and much noisier.
3. In the tropics, Aquarius SSS values are less than Argo, likely due to rainfall and surface stratification.
4. There are residual quasi-monthly radiometer calibration errors resulting in quasi-monthly ± 0.2 psu variations relative to Argo buoys.
5. Ascending and descending passes have different bias trends over the first 7 months. This could be a seasonal artifact, but the cause is not known.
6. Ascending – descending bias is ~ 0.1 psu on average.





1. A note about V1.2.3 and V1.3
2. Land correction and Island effect – to be updated in next version
3. Buoy difference maps Oct-Feb
4. Buoy difference histograms ~ 0.6 psu point measurements
5. Buoy differences by SST zones
6. Time series V1.1 & V1.2.3
7. Residuals +/- 0.2 weekly due to residual drift correction
8. Ascending vs Descending: Ascending bias has trend while desc is flat, but >0
9. Asc & desc buoy maps
10. Crossover analysis...