REPORT ON CAST #19 – station ES1 from cruise 2015-46

Cindy Wright reported that the CTD salinity did not compare well with salinity from a CTD on a near-by mooring. Overall agreement was good with other moorings, so the question is whether there was anything about that cast that might have caused a problem.

I first re-derived the data using the post-cruise calibrations and the salinity in the archived data appears to be low by about 0.0036 if we assume all the drift occurred before the cruise. The history of the sensor would suggest that most of it had. So we should add that amount to the salinity. The temperature was reading low by about 0.0013.

The factory drift reports are rough and show the conductivity cell error leading to salinity being low by 0.0041 which was partly offset by the temperature reading low by ~0.0008 deg C, for a net salinity error of something like -0.0033. That is reasonably close to the drifts found above given that the drift statement of 0.0002/month could be anywhere between 0.00015 or 0.0024 per month.

So I will recalibrate the whole cruise by adding 0.0036 to primary salinity and 0.0013 to temperature.

I then looked at the standard deviations in the salinity data in the 1-metre bins from casts 2 to 23. The values are quite high at many casts, but cast, ES1 -#19, did not stand out as odd compared to others. Compared to #15 (PC1) which I would expect to be most similar, the Std Dev is about the same except below 160db where it is higher for #19 at about 0.003. A rough estimate of standard deviations for the depths where there are mooring observations is:

 15m 0.01

 40m 0.003

 150m 0.0015

 175m 0.0025

(See plot below.)

That may be partly due to #19 getting closer to the bottom and having a jerkier descent rate near the bottom. So there may have been more corruption by shed wakes which would bring some lower salinity into the mix. I would guess that shed wakes bounced off the bottom further confusing things. (See plot below.)

On a T-S surface the differences between #15 and #19 along σt-lines are small near the bottom, ~0.003 for salinity. (See plot below.)

The standard deviations in salinity would certainly account for large differences for many casts, but for cast #19 they are only very large at 15m. The variability at 40m and 175m is moderate. However, there could be a section near the bottom with fairly steady values but ones that mostly come from a shed wake, so there might be salinity values lower than ambient conditions. This could account for larger differences than seen from other sensors. At mid-depths this could be an issue as well, but this is not likely since the descent rate was quite steady there.





