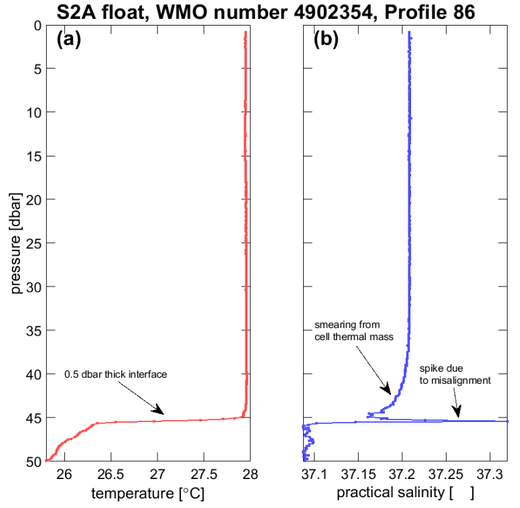
The Second String:
A proposal to improve Argo salinity data from CTDs with onboard dynamic corrections

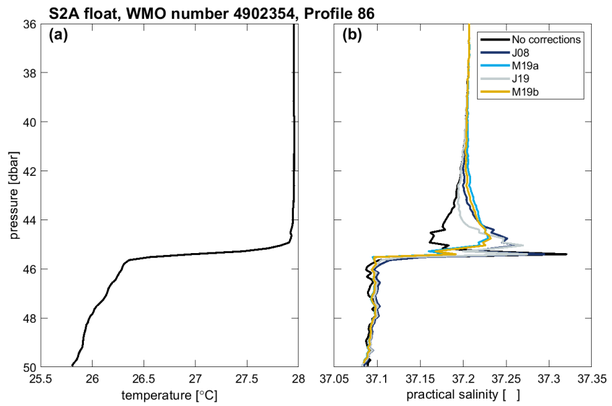
Kim I. Martini and David J. Murphy

The best practice for CTD data is to apply dynamic corrections to raw temperature, conductivity and pressure data, calculate derived variables (e.g. practical salinity) then bin average for data reduction. Due to the limitations of satellite data transmission and the potential to add additional error that cannot be removed if the wrong correction is applied, data from CTDs on Argo floats are telemetered back to shore bin averaged and without dynamic corrections.



Thermal gradients (> 4 °C/m) amplify dynamic errors in CTDs, salinity spiking and smearing, before corrections. Ideally, before binning CTD temperature and conductivity would be corrected for thermistor thermal mass, temperature and conductivity alignment and conductivity cell thermal mass. The data above are from a MRV SOLO-II float profiling up through the base of the mixed layer in the North Atlantic.

Recent work has shown that dynamic corrections to raw Argo CTD temperature and conductivity has the potential to substantially improve practical salinity, but there is still a risk if the true corrections deviate from idealized models. In the example below, various corrections can potentially add more error.



We propose a solution: add a second practical salinity data stream where dynamic corrections have been applied onboard the float before bin-averaging. This allows for direct comparisons of corrected and uncorrected data, flexibility to refine dynamic corrections in the future, and retain continuity with historical Argo data.

An additional channel with dynamically corrected salinity would be a 20% increase in CTD data per transmission. For Sea-Bird Navis floats, this would be a 11% increase in total data per satellite transmission. Strategically deploying 5-10 floats with a second, dynamically corrected salinity channel would provide a reference to continuously improve Argo data.

We must test sensor corrections in the field to continuously improve Argo Data

SEA-BIRD SCIENTIFIC