

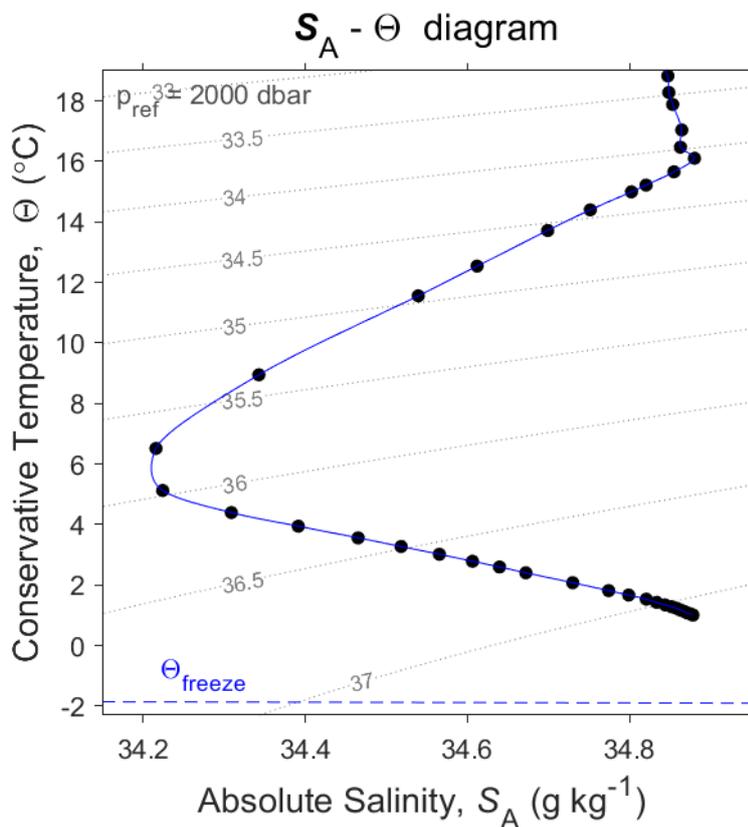
## TEOS-10 and GSW in a nutshell

In order to analyse oceanographic data under TEOS-10, the observed values of Practical Salinity  $S_p$  and *in situ* temperature  $t$  need to be converted into Absolute Salinity  $S_A$  and Conservative Temperature  $\Theta$ , as follows,

**Step 1.** calculate Absolute Salinity,  $S_A = \text{gsw\_SA\_from\_SP}(S_p, p, \text{long}, \text{lat})$ ,

**Step 2.** calculate Conservative Temperature,  $\Theta = \text{gsw\_CT\_from\_t}(S_A, t, p)$ .

Having converted  $(S_p, t, p)$  to  $(S_A, \Theta, p)$ , the GSW functions listed on page 14 of this document are then used for analysing the data. The use of these GSW functions ensures consistency between theoretical oceanography, observational oceanography and ocean modelling.



Under TEOS-10, the  $S_A - \Theta$  diagram is the new “T-S” diagram. The above  $S_A - \Theta$  diagram was plotted using `gsw_SA_CT_plot`. The  $\sigma_2$  potential density anomaly contours were evaluated inside this function using `gsw_rho(SA,CT,2000)`. This same function can be used to evaluate *in situ* density via `gsw_rho(SA,CT,p)`. In the above diagram the raw data appears as black dots and the blue line was produced using the function `gsw_SA_CT_interp`.