Notes on the GSW function gsw_CT_from_t for calculating Conservative Temperature Θ from in situ temperature t

This function essentially amounts to the following calls to two other GSW functions,

```
pt0 = gsw_pt0_from_t(SA,t,p);
CT  = gsw_CT_from_pt(SA,pt0);
```

That is, from the inputs (S_A, t, p), the potential temperature pt0 referenced to 0 dbar is first formed, and this is used to calculate Conservative Temperature using gsw_CT_from_pt which calculates the potential enthalpy h^0 (referenced to 0 dbar) and then simply divides h^0 by the fixed "specific heat" $c_p^0 \equiv 3991.867\,957\,119\,63 \ \mathrm{J\,kg^{-1}\,K^{-1}}$.

Note Figure A.17.1 below (from IOC *et al.* (2010)) showing the difference between potential temperature and Conservative Temperature.
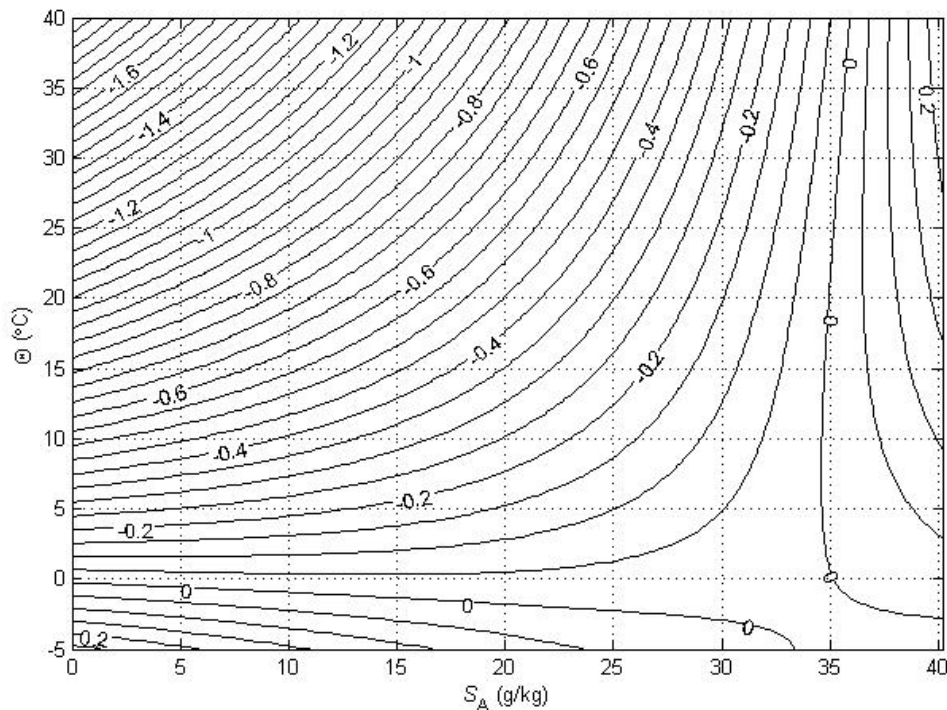

Figure A.17.1. Contours (in °C) of the difference between potential temperature and Conservative Temperature $\theta - \Theta$. This plot illustrates the non-conservative production of potential temperature θ in the ocean.

References
IOC, SCOR and IAPSO, 2010: *The international thermodynamic equation of seawater – 2010: Calculation and use of thermodynamic properties*. Intergovernmental Oceanographic Commission, Manuals and Guides No. 56, UNESCO (English), 196 pp. Available from http://www.TEOS-10.org