

2.20 Isobaric heat capacity

The specific isobaric heat capacity c_p is the rate of change of specific enthalpy with temperature at constant Absolute Salinity S_A and pressure p , so that

$$c_p = c_p(S_A, t, p) = \left. \frac{\partial h}{\partial T} \right|_{S_A, p} = -(T_0 + t) g_{TT}. \quad (2.20.1)$$

The isobaric heat capacity c_p varies over the $S_A - \Theta$ plane at $p = 0$ by approximately 5%, as illustrated in Figure 4.

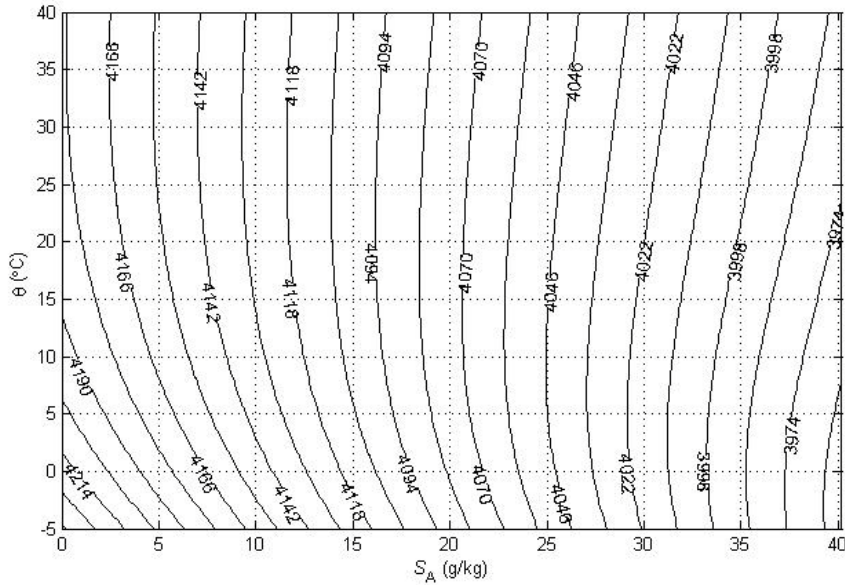


Figure 4. Contours of isobaric specific heat capacity c_p of seawater (in $\text{J kg}^{-1} \text{K}^{-1}$), Eqn. (2.20.1), at $p = 0$.

The isobaric heat capacity c_p has units of $\text{J kg}^{-1} \text{K}^{-1}$ in both the SIA and GSW computer software libraries.

2.21 Isochoric heat capacity

The specific isochoric heat capacity c_v is the rate of change of specific internal energy u with temperature at constant Absolute Salinity S_A and specific volume, v , so that

$$c_v = c_v(S_A, t, p) = \left. \frac{\partial u}{\partial T} \right|_{S_A, v} = -(T_0 + t) (g_{TT} g_{PP} - g_{TP}^2) / g_{PP}. \quad (2.21.1)$$

Note that the isochoric and isobaric heat capacities are related by

$$c_v = c_p - \frac{(T_0 + t) (\alpha^t)^2}{(\rho \kappa^t)}, \quad \text{and by} \quad c_v = c_p \frac{\kappa}{\kappa^t}. \quad (2.21.2)$$

The isochoric heat capacity c_v has units of $\text{J kg}^{-1} \text{K}^{-1}$ in both the SIA and GSW computer software libraries.