APPENDIX

1.
Seawater density ρ can be expressed as a function of salinity s (psu), water temperature t (°C) and pressure p (bar) as follows.

$$\rho(s,t,p) = \frac{\rho(s,t,0)}{1 - p/K(s,t,p)}$$

$\rho(s, t, 0)$ is a density at $p = 0$ and expressed as follow.

$$\begin{aligned}
\rho\ (s,t,o)\ =\ & \\
&+999.842\,594 && +6.793\,952\times10^{-2}\times T \\
&-\ 9.095\,290\times10^{-3}\times T^2 && +1.001\,685\times10^{-4}\times T^3 \\
&-\ 1.120\,083\times10^{-6}\times T^4 && +6.536\,332\times10^{-9}\times T^5 \\
&+\ 8.244\,93\ \times10^{-1}\ \times S && -4.089\,9\ \ \times10^{-3}\times T\ \times S \\
&+\ 7.643\,8\ \ \times10^{-5}\times T^2\times S && -8.246\,7\ \ \times10^{-7}\times T^3\times S \\
&+\ 5.387\,5\ \ \times10^{-9}\times T^4\times S && -5.724\,66\ \times10^{-3}\ \ \times S^{3/2} \\
&+\ 1.022\,7\ \ \times10^{-4}\times T\ \times S^{3/2} && -1.654\,6\ \ \times10^{-6}\times T^2\times S^{3/2} \\
&+\ 4.831\,4\ \ \times10^{-4}\ \ \times S^2 &&
\end{aligned}$$

$$\begin{aligned}
K\ (s,t,p)\ =\ & \\
&+19\,652.21 && \\
&+\ 148.420\,6\ \ \times T && -2.327\,105\times\ \ T^2 \\
&+\ 1.360\,477\times10^{-2}\times T^3 && -5.155\,288\times10^{-5}\times T^4 \\
&+\ 3.239\,908\ \ \times p && +1.437\,13\ \times10^{-3}\times T\ \times p \\
&+\ 1.160\,92\ \ \times10^{-4}\times T^2\times p && -5.779\,05\ \times10^{-7}\times T^3\times p \\
&+\ 8.509\,35\ \times10^{-5}\ \ \times p^2 && -6.122\,93\ \times10^{-6}\times T\ \times p^2 \\
&+\ 5.278\,7\ \ \times10^{-8}\times T^2\times p^2 && \\
&+\ 54.674\,6\ \ \times S && -0.603\,459\ \ \times T\ \ \times S \\
&+\ 1.099\,87\ \times10^{-2}\times T^2\ \ \times S && -6.167\,0\ \ \times10^{-5}\times T^3\ \ \times S \\
&+\ 7.944\ \ \times10^{-2}\ \ \times S^{3/2} && +1.648\,3\ \ \times10^{-2}\times T\ \ \times S^{3/2} \\
&-\ 5.300\,9\ \ \times10^{-4}\times T^2\ \ \times S^{3/2} && +2.283\,8\ \ \times10^{-3}\ \ \times p\ \times S \\
&-\ 1.098\,1\ \ \times10^{-5}\times T\ \times p\ \times S && -1.607\,8\ \ \times10^{-6}\times T^2\times p\ \times S \\
&+\ 1.910\,75\ \times10^{-4}\ \ \times p\ \times S^{3/2} && -9.934\,8\ \ \times10^{-7}\ \ \times p^2\times S \\
&+\ 2.081\,6\ \ \times10^{-8}\times T\ \times p^2\times S && +9.169\,7\ \ \times10^{-10}\times T^2\times p^2\times S
\end{aligned}$$

2.
Potential water temperature θ can be expressed as a function of salinity S (psu), water temperature t (°C) and pressure p (bar) as follow.

$$\begin{aligned}\theta(S,t,p) = {} & t - p\,(3.6504\times10^{-4} + 8.3198\times10^{-5}t - 5.4065\times10^{-7}t^2 \\ & + 4.0274\times10^{-9}t^3) - p\,(S-35)\,(1.7439\times10^{-5} \\ & - 2.9778\times10^{-7}t) - p^2\,(8.9309\times10^{-7} - 3.1628\times10^{-8}t \\ & + 2.1987\times10^{-10}t^2) + 4.1057\times10^{-9}\,(S-35)\,p^2 \\ & - p^3\,(-1.6056\times10^{-10} + 5.0484\times10^{-12}t)\end{aligned}$$