Corrigendum

In Chapter 2, Equations (2.3) and (2.4) should be

$$\partial_t U + (\nabla \cdot \mathbf{V}u) - \partial_x(p\phi_\eta) + \partial_\eta(p\phi_x) = F_U \tag{2.3}$$
$$\partial_t V + (\nabla \cdot \mathbf{V}v) - \partial_y(p\phi_\eta) + \partial_\eta(p\phi_y) = F_V \tag{2.4}$$

In Chapter 2, Governing Equations, the correct equation (2.33) should be:

$$F_{V_{cor}} = -\left(f + u\frac{\partial m}{\partial y} - v\frac{\partial m}{\partial x}\right)U + eW\sin\alpha_r - \frac{vW}{r_e} \tag{2.33}$$

In Chapter 3, Model Discretization, the coefficient C on page 12 should be defined as

$$C = c_s^2/\mu^{t^*}{\alpha_d^{t^*}}^2$$

.
The correct equation 3.11 is

$$\delta_\tau W'' - m^{-1}g\overline{\left[(\alpha/\alpha_d)^{t^*}\left[\partial_\eta(C\partial_\eta\phi'') + \partial_\eta\left(\frac{c_s^2}{\alpha^{t^*}}\frac{\Theta''}{\Theta^{t^*}}\right)\right] - \mu_d''\right]}^{\tau} = {R_W}^{t^*} \tag{3.11}$$

The correct equations (3.12) and (3.26) are:

$$\delta_\tau\phi'' + \frac{1}{\mu_d^{t^*}}[m\Omega''^{\tau+\Delta\tau}\phi_\eta^{t^*} - \overline{gW''}^{\tau}] = {R_\phi}^{t^*} \tag{3.12}$$

$$\delta_\tau\phi'' + \frac{1}{\mu_d^{t^*}}[m\Omega''^{\tau+\Delta\tau}\delta_\eta\phi^{t^*} - \overline{gW''}^{\tau}] = {R_\phi}^{t^*} \tag{3.26}$$

For equations (3.13), (3.14), (3.15), and (3.17), the correct ones are:

$$\begin{aligned}
R_U^{t^*} =& -m[\partial_x(Uu) + \partial_y(Vu)] - \partial_\eta(\Omega u) - (\mu_d\alpha\partial_x p' - \mu_d\alpha'\partial_x\bar{p}) \\
&- (\alpha/\alpha_d)(\mu_d\partial_x\phi' - \partial_\eta p'\partial_x\phi + \mu_d'\partial_x\phi) + F_U \qquad (3.13)\\
R_V^{t^*} =& -m[\partial_x(Uv) + \partial_y(Vv)] - \partial_\eta(\Omega v) - (\mu_d\alpha\partial_y p' - \mu_d\alpha'\partial_y\bar{p}) \\
&- (\alpha/\alpha_d)(\mu_d\partial_y\phi' - \partial_\eta p'\partial_y\phi + \mu_d'\partial_y\phi) + F_V \qquad (3.14)\\
R_{\mu_d}^{t^*} =& -m^2[\partial_x U + \partial_y V] - m\partial_\eta\Omega \qquad (3.15)\\
R_W^{t^*} =& -m[\partial_x(Uw) + \partial_y(Vw)] - \partial_\eta(\Omega w) \\
&+ m^{-1}g(\alpha/\alpha_d)[\partial_\eta p' - \bar{\mu}_d(q_v + q_c + q_r)] - m^{-1}\mu_d' g + F_W \qquad (3.17)
\end{aligned}$$

At the top of page 14 in Chapter 3, we have corrected the statement concerning the lower boundary condition for the vertically-implicit solution for W'', the correct lower boundary condition being $\Omega = \Omega'' = 0$.

Also in Chapter 3, page 18, the correct equation for V component of the Coriolis and curvature term is

$$F_{V_{cor}} = -\left(\overline{f}^{y} + \overline{\overline{u}^{x}\delta_y m - \overline{v}^{y}\delta_x m}^{y}\right)\overline{U}^{xy} + \overline{e}^{y}\overline{W}^{y\eta}\,\overline{\sin\alpha_r}^{y} - \frac{v\overline{W}^{y\eta}}{r_e}$$

In Chapter 4, Turbulent Mixing and Model Filters, equation (4.6) has been corrected to:

$$K_{h,v} = C_s^2\, l_{h,v}^2 \max\left[0., \left(D^2 - P_r^{-1}N^2\right)^{1/2}\right], \tag{4.6}$$

$$D^2 = \frac{1}{2}\left[D_{11}^2 + D_{22}^2 + D_{33}^2\right] + \left(\overline{D_{12}}^{xy}\right)^2 + \left(\overline{D_{13}}^{x\eta}\right)^2 + \left(\overline{D_{23}}^{y\eta}\right)^2$$