

The model with noise and interaction

$$\begin{aligned}\frac{dh}{dt} &= M_h + I_h + S_h \\ h \frac{d\langle s_l \rangle}{dt} &= M_s + I_s \\ h \frac{d\langle q_t \rangle}{dt} &= M_q + I_q\end{aligned}$$

The mixed layer physics

$$\begin{aligned}M_h &= E - \mathcal{D}h \\ M_s &= V(s_{l,0} - \langle s_l \rangle) + E(s_{l,+} - \langle s_l \rangle) - \Delta F_s \\ M_q &= V(q_{t,0} - \langle q_t \rangle) + E(q_{t,+} - \langle q_t \rangle) - \Delta F_q \\ \Delta F_q &= 3.4 \frac{(h - b)^3}{N}\end{aligned}$$