

Reservoir system	Water balance equation	Process functions
Interception	$\frac{\Delta S_i}{\Delta t} = P - P_e - E_i \approx 0$	$E_i = \min(E_p, \min(P, I_{\max}))$
Surface	$\frac{\Delta S_o}{\Delta t} = P_e - Q_F - Q_{\text{HOF}} - E_o$	$Q_F = \min\left(\frac{S_o}{\Delta t}, F_{\max}\right)$ $Q_{\text{HOF}} = \max\left(\frac{0, S_o - S_{\max}}{\Delta t}\right)$ $E_o = \max\left(0, \min\left(E_p - E_i, \frac{S_o}{\Delta t}\right)\right)$
Unsaturated zone	$\frac{\Delta S_u}{\Delta t} = (1 - C) \cdot P_e - E$	$C = 1 - \left(1 - \frac{S_u}{S_{u,\max}}\right)^\beta$ $E = \min\left((E_p - E_i) \min\left(\frac{S_u}{\Delta t}, (E_p - E_i) \cdot \frac{S_u}{S_{u,\max}} \cdot \frac{1}{C_e}\right)\right)$
Groundwater recharge		$R_s = W \cdot C \cdot P_e$
Fast runoff	$\frac{\Delta S_f}{\Delta t} = R_{\text{fl}} - Q_f$	$R_{\text{fl}} = T_{\text{lag}}(C \cdot P_e - R_s) \rightarrow$ in a linear delay function T_{lag} $Q_f = \frac{S_f}{K_f}$
Groundwater	$\frac{\Delta S_s}{\Delta t} = R_{s,\text{tot}} - Q_s - E_s + Q_{\text{inf}}$	$R_{s,\text{tot}} = \sum_{i=1}^{i=4} R_s; \text{HRU}_i$ $Q_s = \frac{S_s}{K_s}$ $E_s = 0$ and $Q_{\text{inf}} = 0$ for all sub-basins except Sand $Q_{\text{inf}} = \min\left(\frac{S_{s,\max} - S_s}{\Delta t}, Q_f\right)$ for Sand sub-basin $E_s = \max\left(0, \min\left(E_p - E_i - E_o - E, \frac{S_s}{\Delta t}\right)\right)$ for Sand sub-basin
Total runoff		$Q_m = Q_s + \sum_{i=1}^{i=4} Q_f; \text{HRU}_i$