

# The Exner Equation (Sediment Mass Conservation)

$$\frac{\Delta\eta}{\Delta t} = -\frac{1}{1-p} \left( \frac{\Delta q_s}{\Delta x} + \frac{\Delta CH}{\Delta t} \right)$$

The time rate of change of elevation is equal to changes in sediment flux scaled by the porosity of a deposit.

$\eta$  = bed elevation [L]

$t$  = time [T]

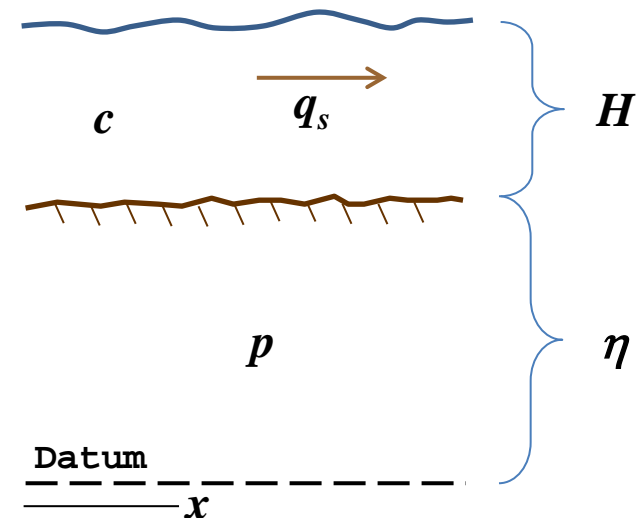
$p$  = porosity [-]

$q_s$  = sediment flux [ $L^2/T$ ]

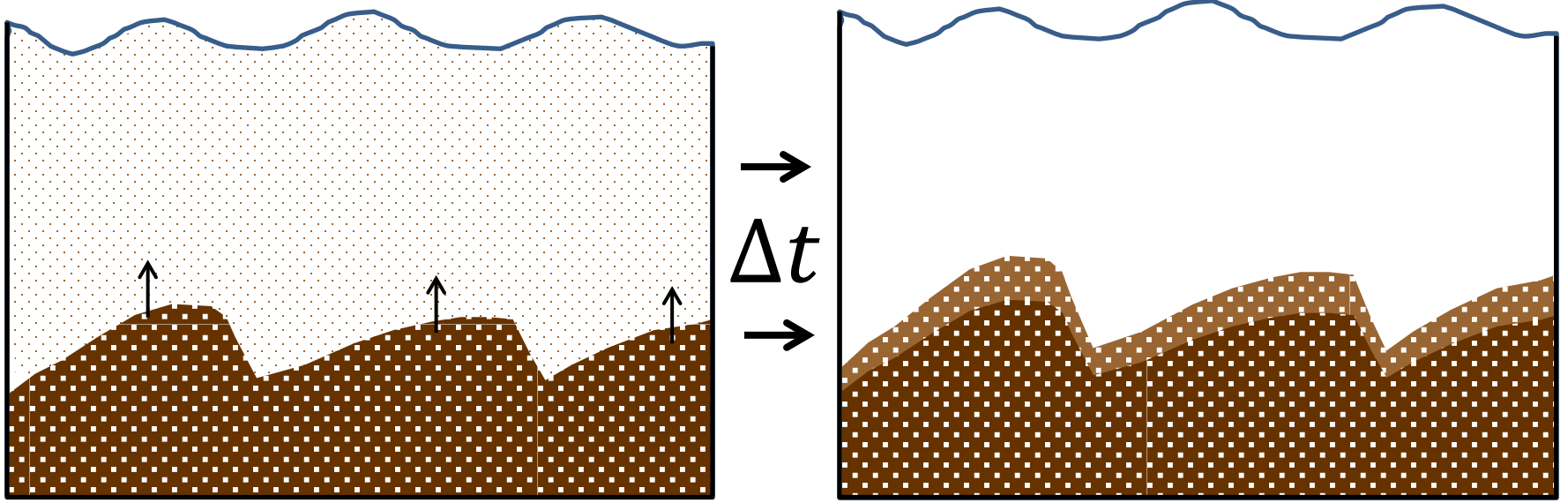
$x$  = horizontal coordinate [L]

$H$  = flow depth [L]

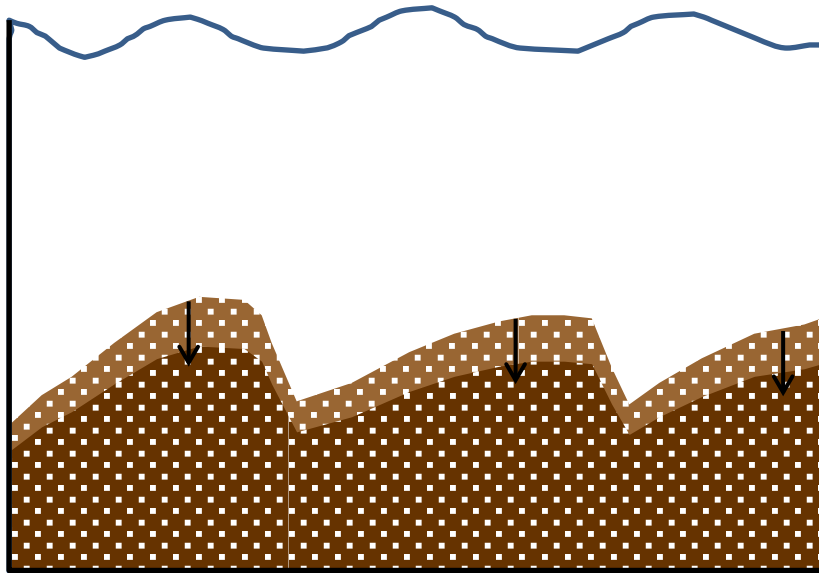
$C$  = sediment concentration [-]



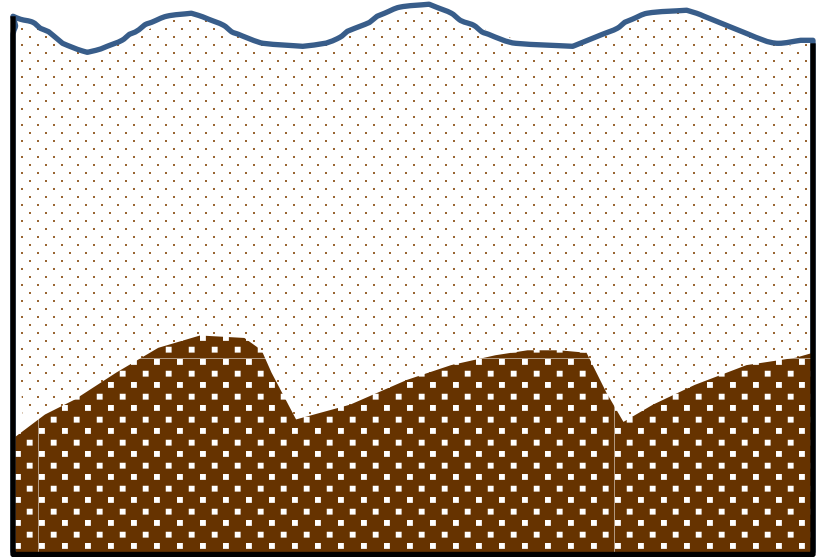
$$\frac{\Delta CH}{\Delta t} < 0 ; \quad \frac{\Delta \eta}{\Delta t} > 0$$



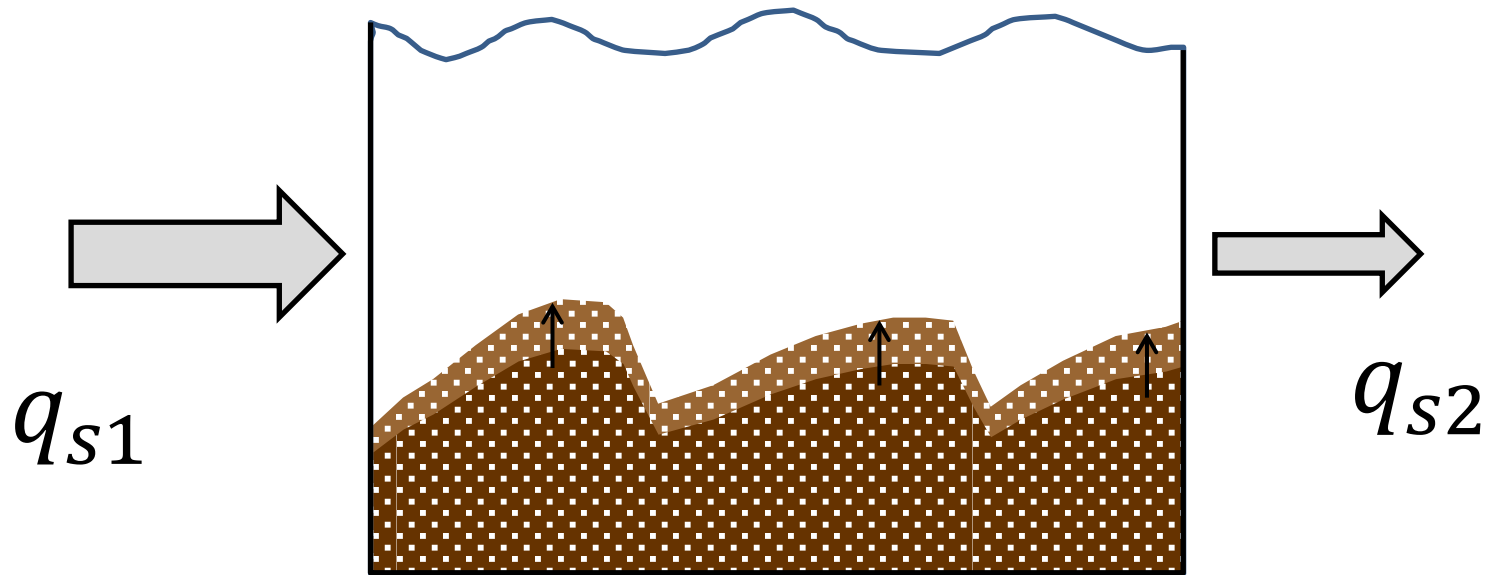
$$\frac{\Delta CH}{\Delta t} > 0 ; \quad \frac{\Delta \eta}{\Delta t} < 0$$



→  
 $\Delta t$   
→



$$q_{s2} < q_{s1}; \quad \frac{\Delta q_s}{\Delta x} < 0; \quad \frac{\Delta \eta}{\Delta t} > 0$$



$$q_{s2} > q_{s1}; \quad \frac{\Delta q_s}{\Delta x} > 0; \quad \frac{\Delta \eta}{\Delta t} < 0$$

