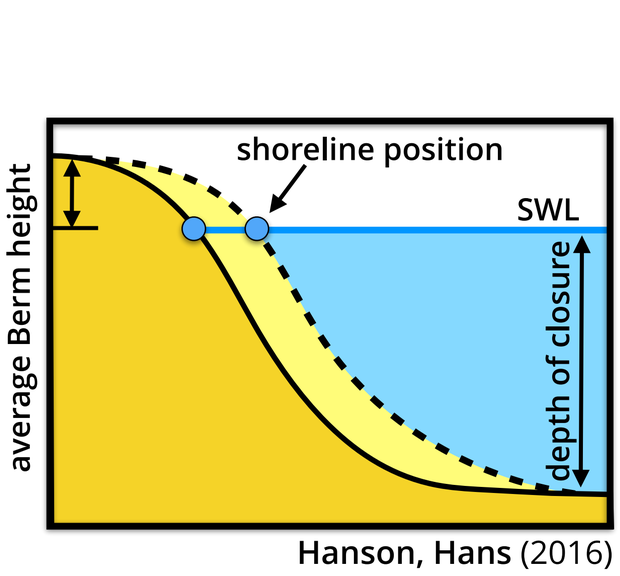
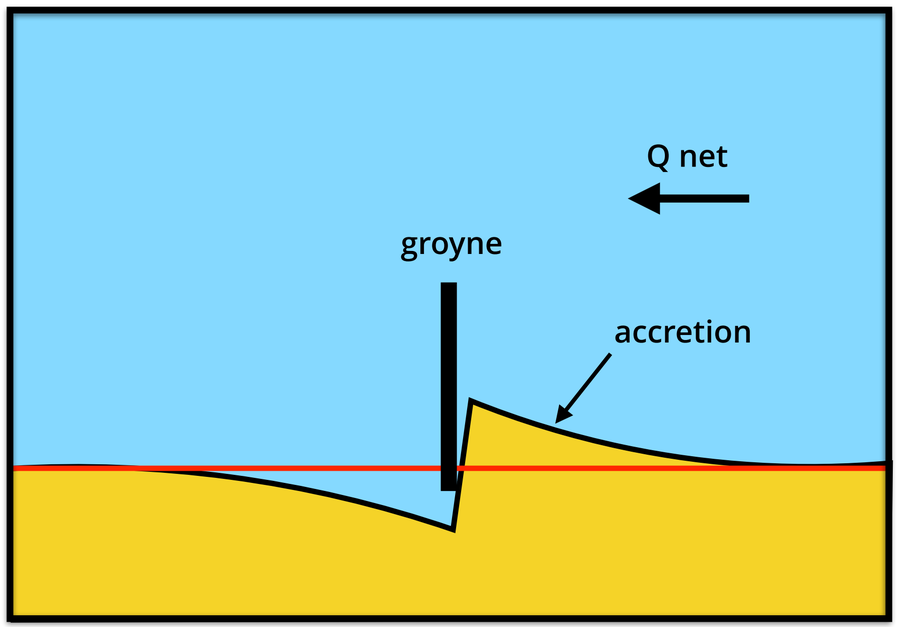
# 1-line model

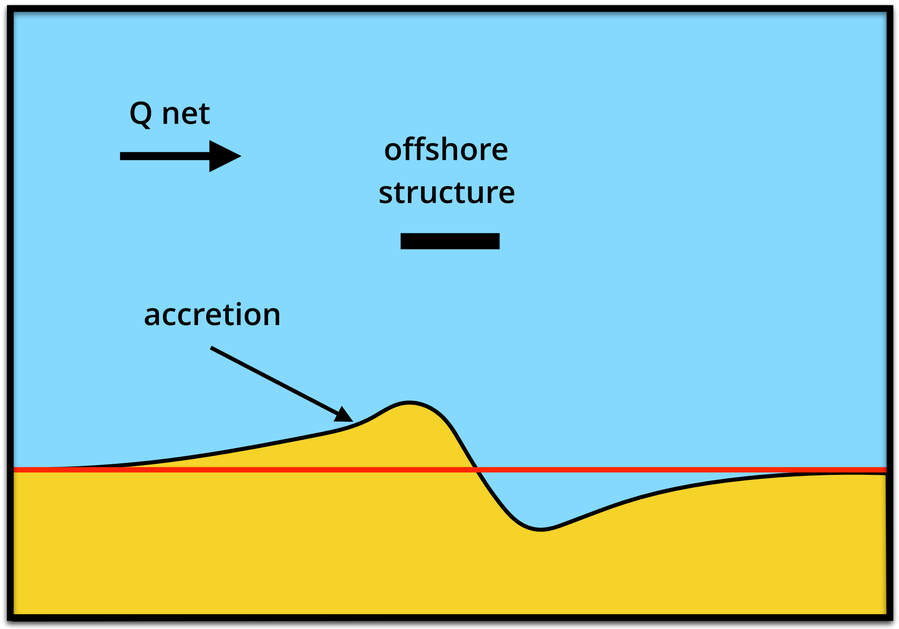
- The 1-line concept rests on a common observation that the beach profile maintains an average shape that is characteristic of the particular coast, apart from times of extreme change (i.e. storms).

- Assumption: **long term shoreline changes** is induced by **longshore sediment transport** caused by **waves breaking at an angle** to the shore and **wave induced nearshore current** circulation.




Hanson, Hans (2016)




- First 1-line model was presented by Pelnard-Considère (1956) who examined the behaviour of groynes on a beach.

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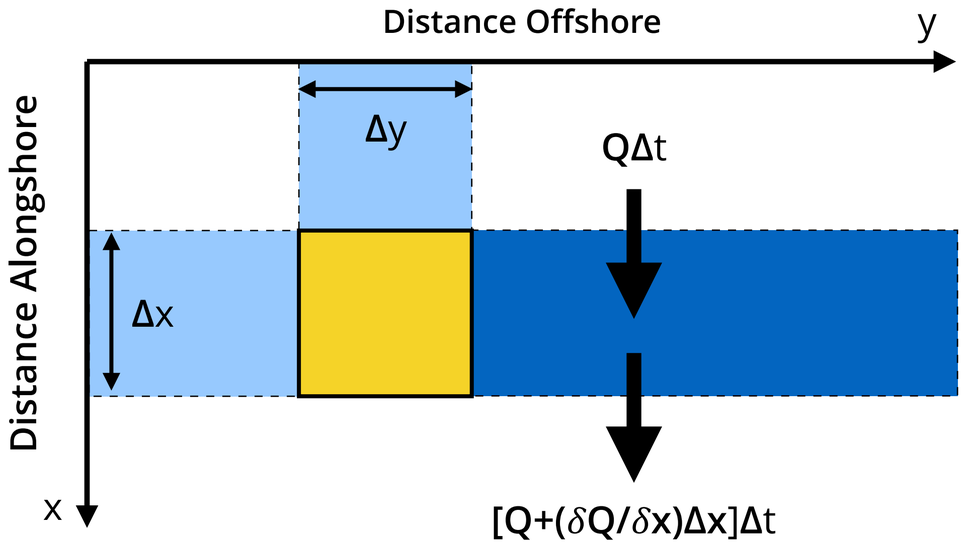


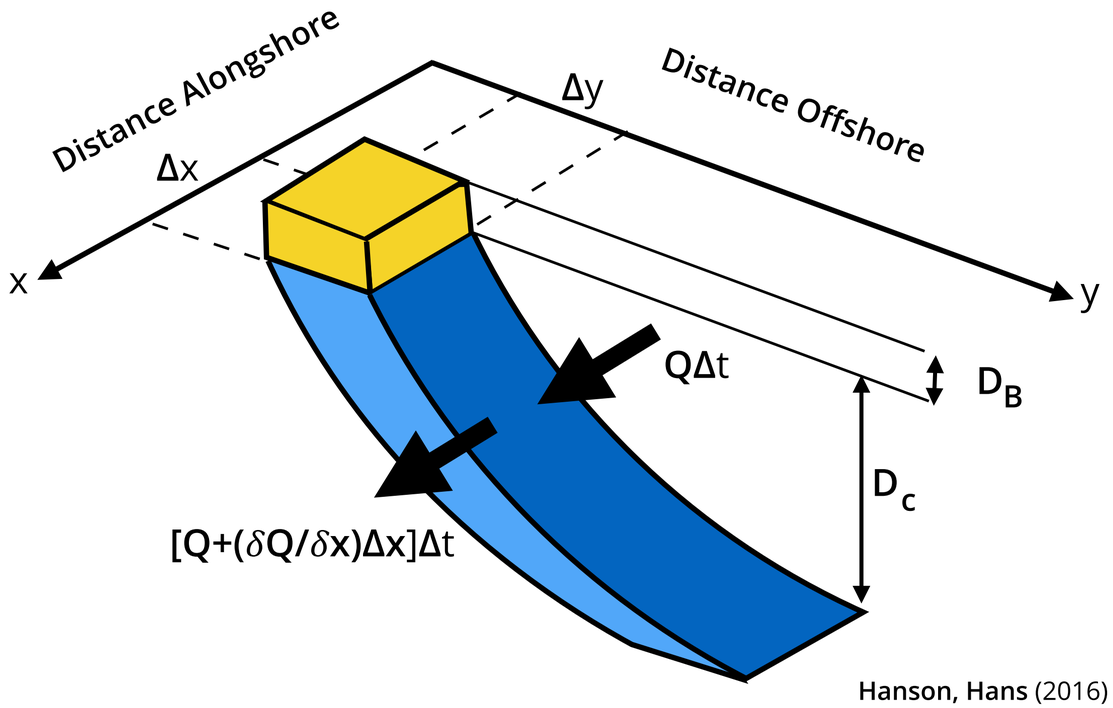


Hanson, Hans (2016)

The profile is in equilibrium in the cross-shore direction.

if $Q_{in} > Q_{out}$:

**accretion** ⟶ **shoreline advance offshore**

if $Q_{in} < Q_{out}$:

**erosion** ⟶ **shoreline retreat**

Conservation of mass implies:

$$\frac{\Delta y}{\Delta t} + \frac{1}{D_B + D_C}\frac{\Delta Q}{\Delta x} = 0$$