

BARRIER INLET ENVIRONMENT MODEL

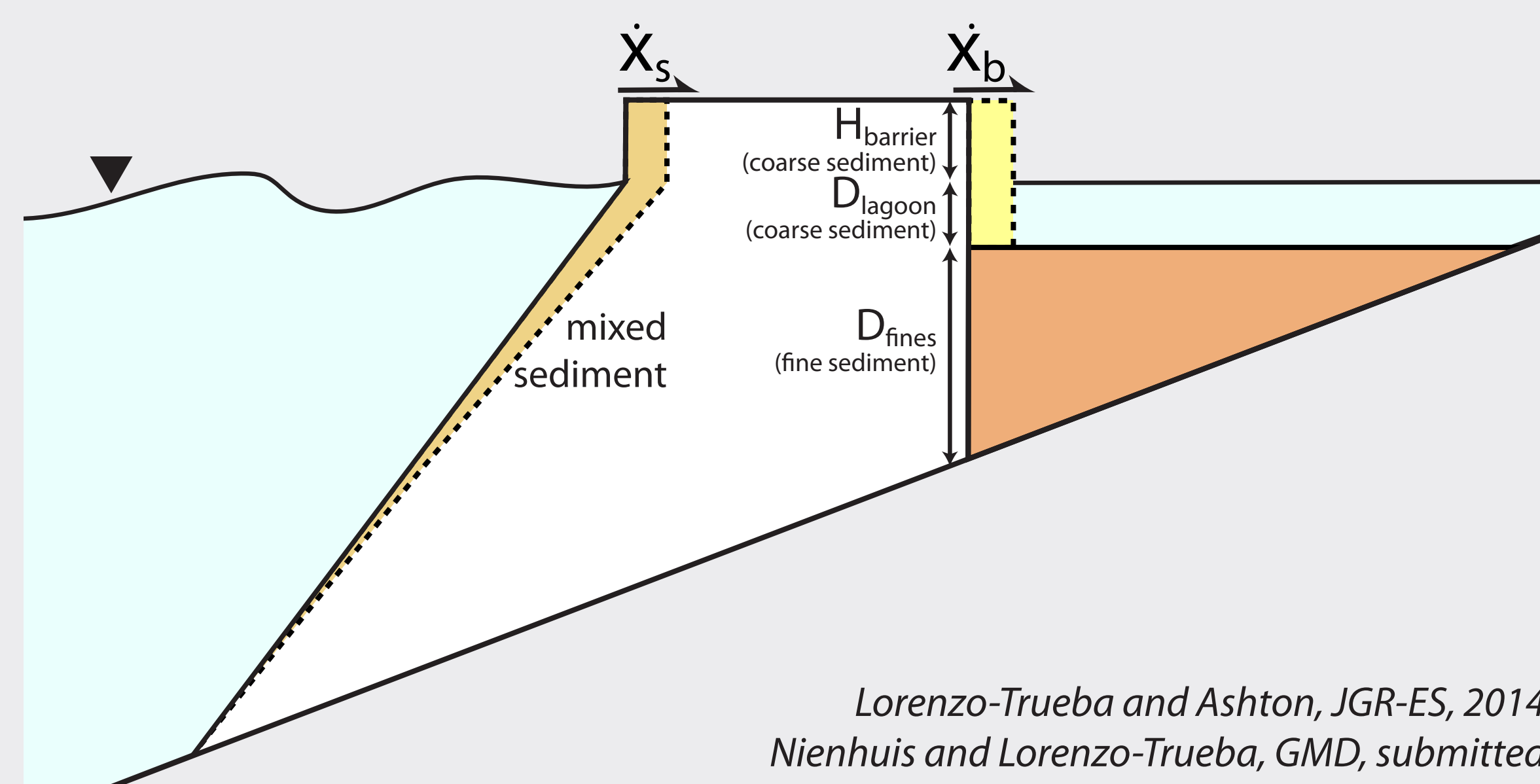
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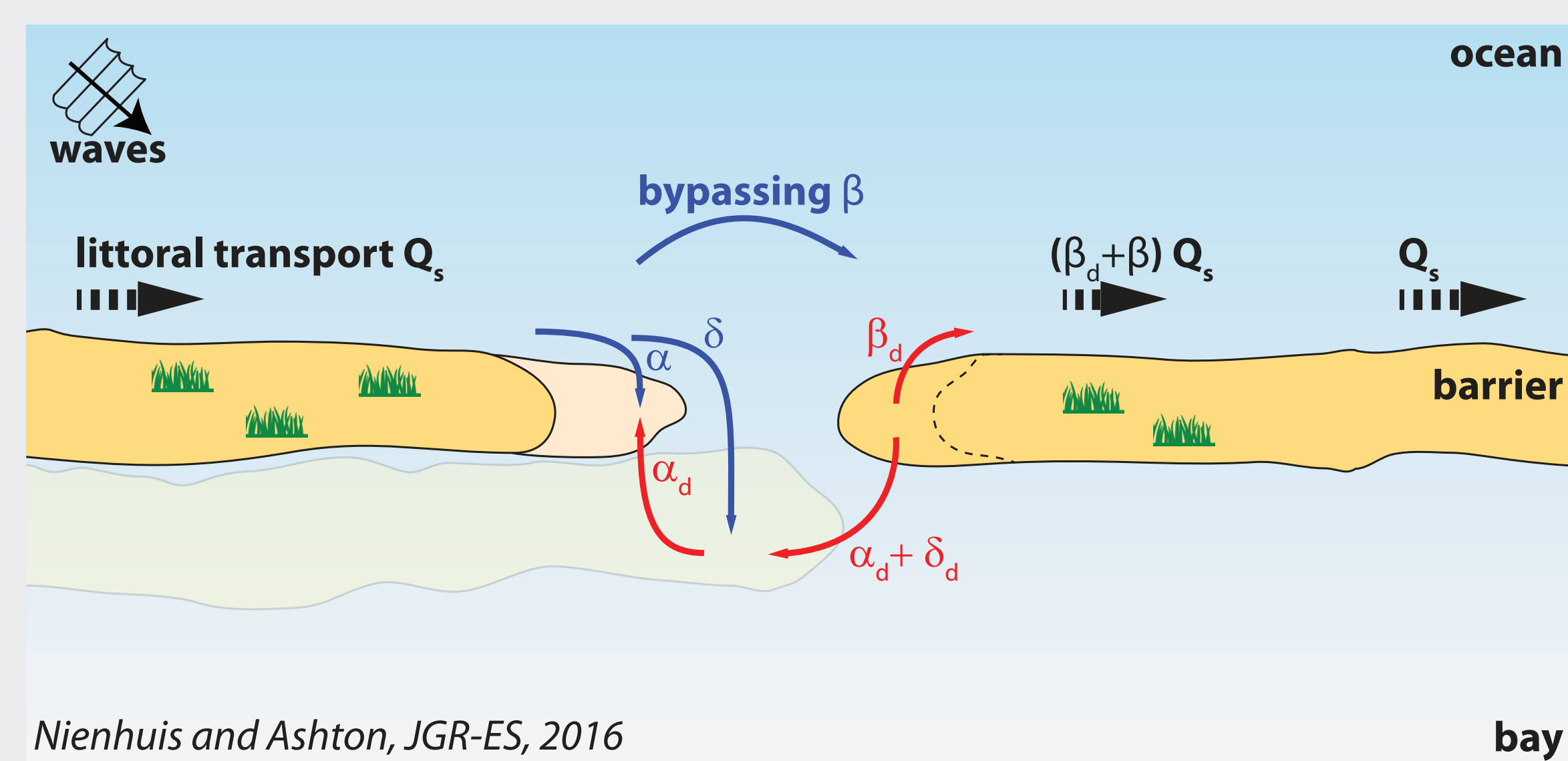
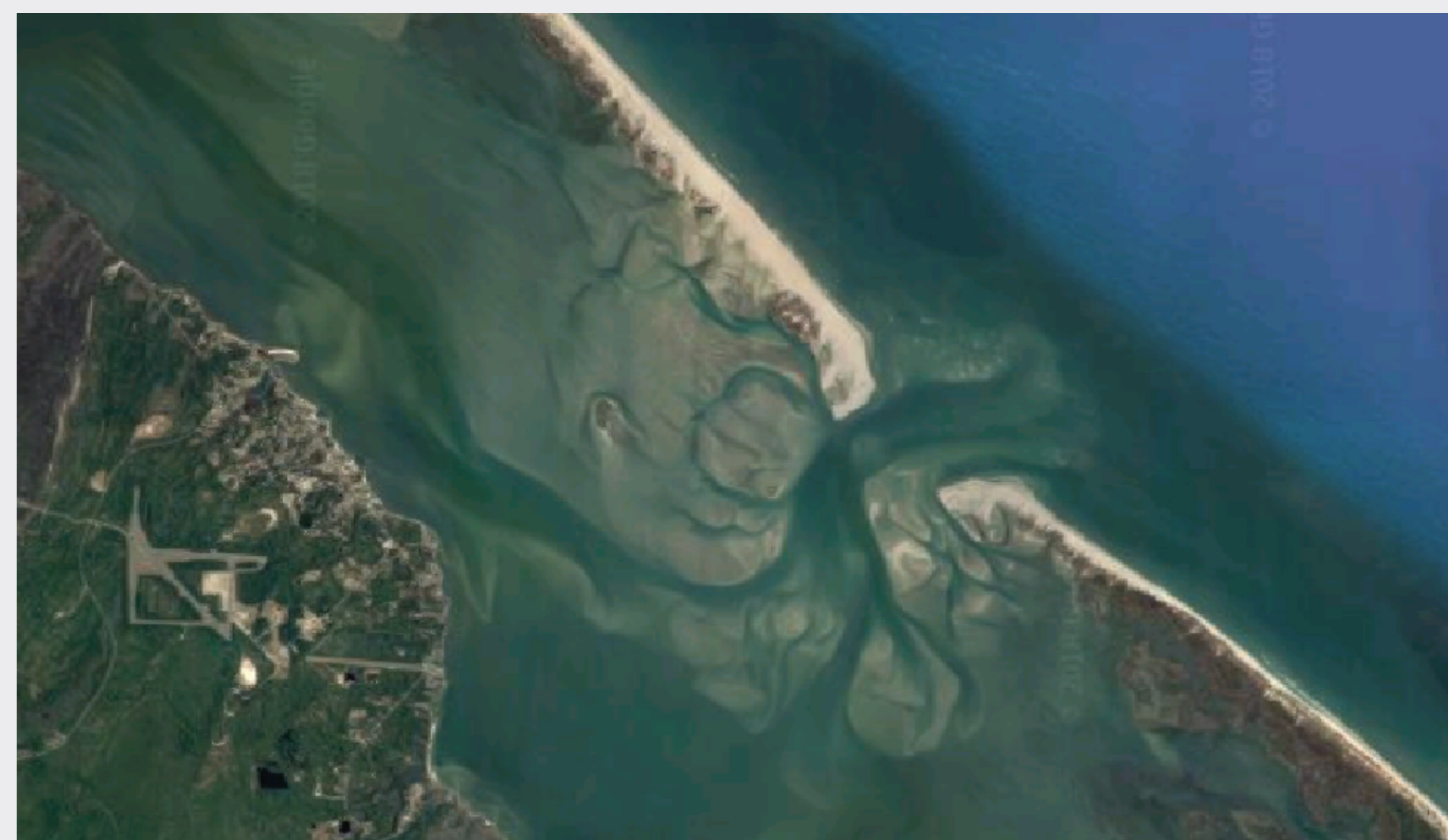
Storm overwash



Lorenzo-Trueba and Ashton, JGR-ES, 2014
Nienhuis and Lorenzo-Trueba, GMD, submitted

Storm-driven overwash fans deposited in the back-barrier lagoon transgress barrier islands and can make them keep pace with sea level (McGee, 1890).

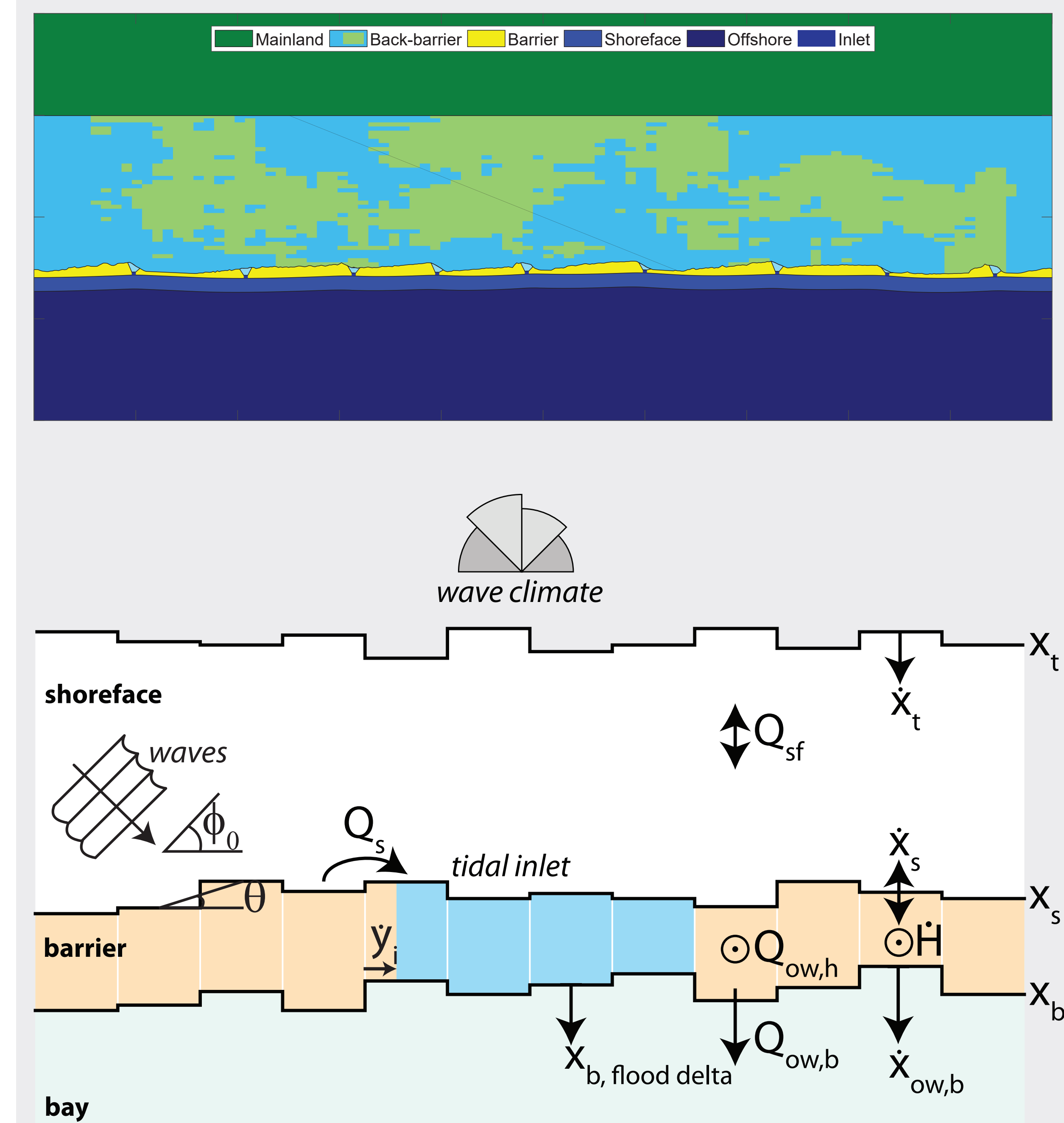
Tidal inlet morphodynamics



Nienhuis and Ashton, JGR-ES, 2016

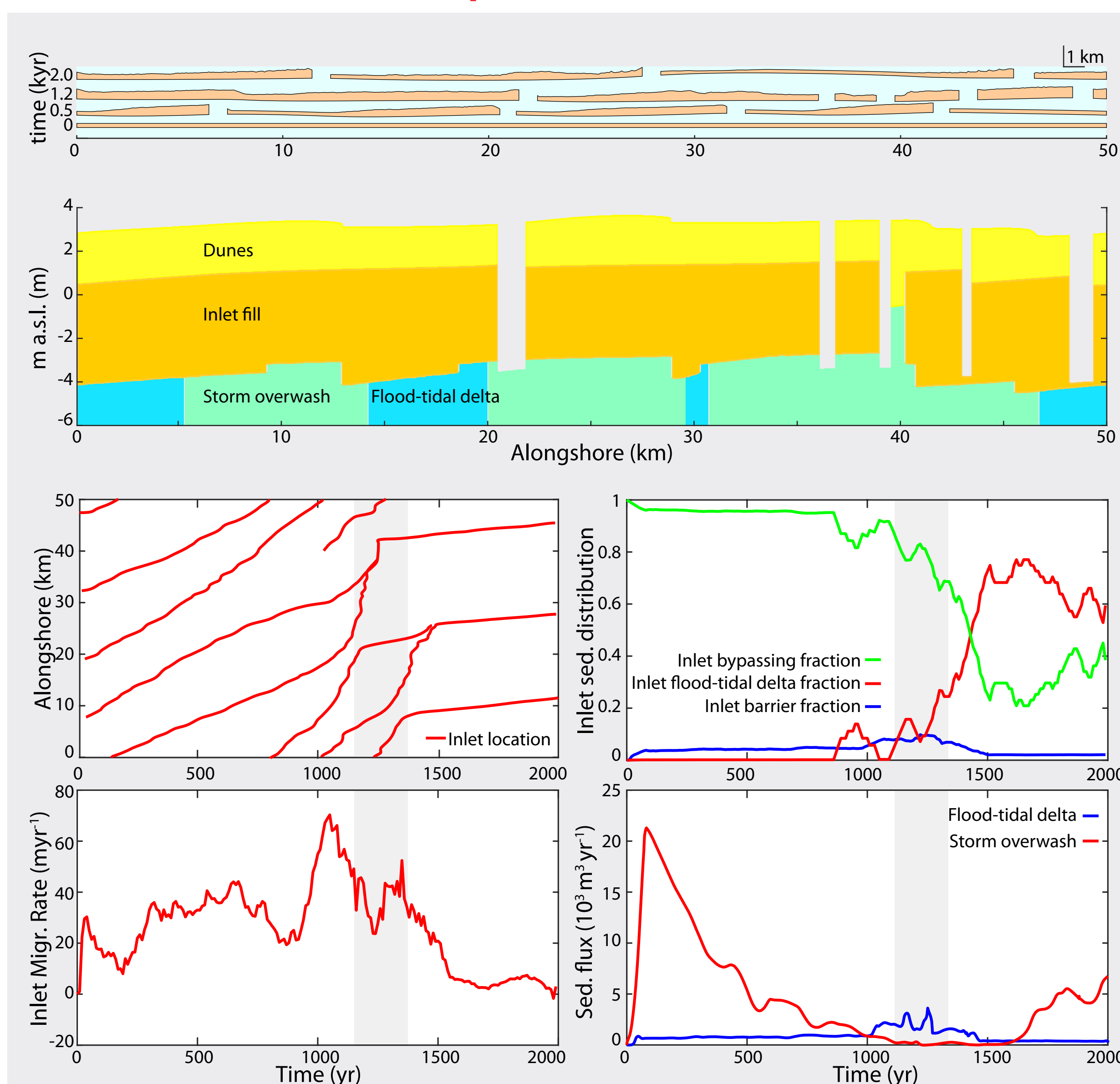
Flood-tidal delta deposits are a sink of littoral sediment brought through tidal inlets, and can also transgress barrier islands (Pierce, 1969).

Model setup



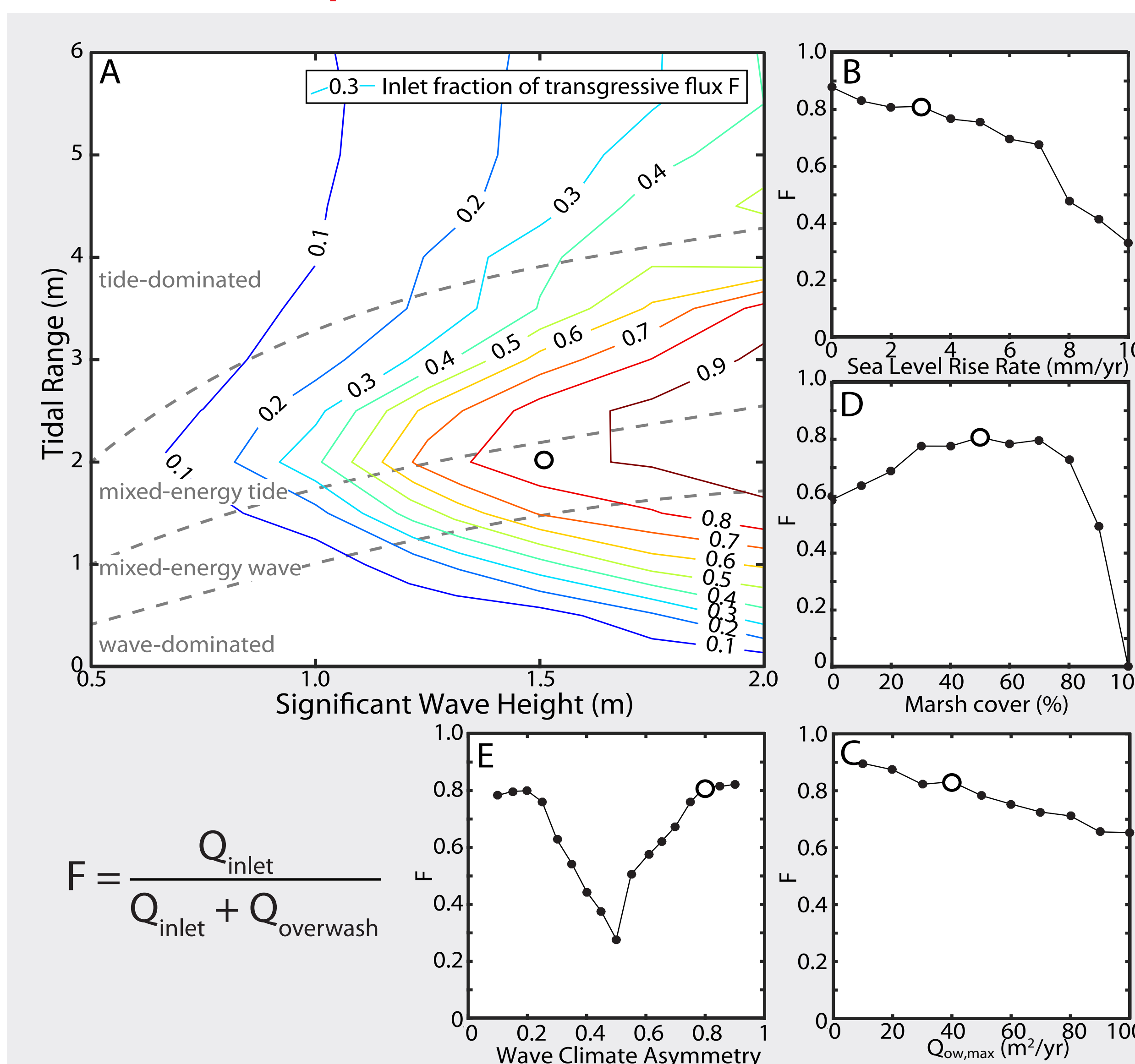
We developed a numerical model (BRIE) to assess the combined effects of overwash and tidal inlets on barrier response to sea-level rise.

Example model run



The model is dynamic under steady boundary conditions, with periods of large storm-overwash deposition interrupted by periods of rapid inlet migration and flood-tidal delta deposition.

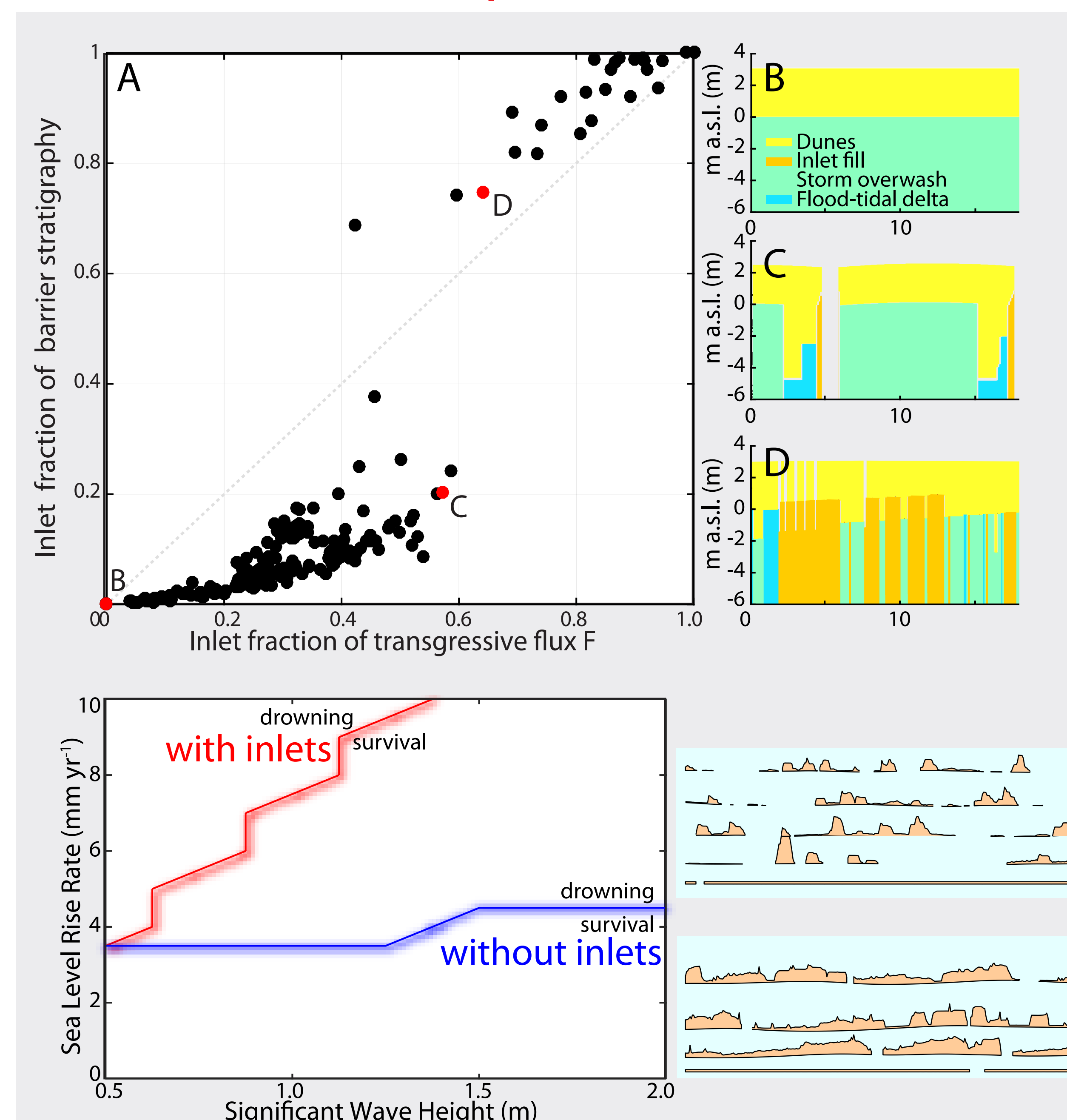
Importance of tidal inlets



$$F = \frac{Q_{inlet}}{Q_{inlet} + Q_{overwash}}$$

Inlets can be important in barrier transgression. The inlet fraction of the transgressive flux is high if the environment supports ephemeral and rapidly migrating inlets.

Paleo inlets as a potential constraint?



Barrier facies are generally a good indicator of past inlet activity and of the importance of inlets in barrier transgression. The extra transgressive flux can also keep barriers above sea-level.