

Session summary

Perillo

-review of estuary sedimentation and application to Rio de la Plata

Geomorphology 1st? sediment dynamics first? Heterogeneity in system is huge. How to determine net budget for whole estuary?

Geomorphology controls tidal range (SF Bay) = tidal pumping

Key role of tidal pumping.

Discussions @ Pejrup

-key ideas

-tidal pumping: the concept has been overextended

-lag concept: this concept has been overextended

-aggregation is the key. It is very quick (1/2 hr). Not biological?

-net retention in an estuary = redistribution including from a wetlands

-Discussion

-Geomorphology determines sediment transport, or vice-versa? Does that question neglect the history of infilling? (interaction between the ocean tides and the geomorphology drives sediment transport, which changes the geomorphology, which changes the tides). Residual flux changes the geomorphology. The important point is the cycling. Sediment transport drives the evolution of the estuary.

-events of short term deposition of mud: important for net budgets

-tidal pumping: why not call it residual flux?

pushes sediment upgradient = increases the gradient in SSC

The residual movement is not just the tidal current asymmetry

Qualitatively, just tidal asymmetry is enough for the net result

Two widely different systems:

-estuary with increasing tidal range landward <different> estuary
with decreasing tidal range landward

-lag effects: a major issue?

are they necessary? Turbidity maximum can be produced not just by lag effects (i.e. settling at slack tide; even if no river input), it can also be produced by differential settling (Grimshaw paper).

-lateral variation (export of clean water in main channel) can produce tidal pumping. Sediment is at the bottom at slack tide? Lag effects are there, these require the sediment to be at the bottom around slack tide (high water).

-Shear diffusion also redistributes the sediment.

Top down modeling vs bottom up modeling? Top down simulates geomorphology from basic laws such as cross section area A vs tidal prism or from concepts such as flux divergence theory. This changes elevations, thus produces geomorphology, without knowing the sediment transport.

Bottom up model requires knowledge of sediment dynamics, and computes from that the evolution of an estuary.