

Outline of Sediment Transport Lecture at PASI on Estuaries, Aug 2007

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- 1) Introduction – Forcing vs. Response
 - a) Forcing – waves, tides, gravitational circulation, wind-forced circulation, bottom boundary layers and different forms of shear stress
 - b) Response – cohesive vs. non-cohesive, mixed
 - i) Non-cohesive (sand transport)
 - ii) Cohesive (suspended transport)
 - iii) Mixed (most complicated scenario)
- 2) Modes of sediment transport
 - a) Initiation of motion
 - i) Non-cohesive: particle size and excess weight (Shield's Criteria)
 - ii) Cohesive: bed properties, critical shear stress as a function of depth
 - b) Mode of Transport (Rouse parameter (P), criteria, and excess shear stress)
 - i) Bedload transport: (large P) bedload equations, bedforms, form drag, skin friction
 - ii) Suspended load: (small P) 3-D governing equations, simplified to 1-D Rouse equation, settling versus mixing, dependence on particle characteristics and stratification
 - c) Calculation of total transport rates – integration of suspended transport, total load formulae
- 3) Estuarine sediment transport
 - a) Sediment fluxes in different types of estuaries (averaging and analysis of different components of flux)
 - b) Turbidity maxima
 - c) Convergences and high concentrations suspensions
- 4) Measuring and modeling sediment transport
 - a) Instrumentation (examples of instrumentation will be introduced throughout the lecture for different topics)
 - b) Numerical models and the community modeling movement
- 5) Problems and exercises (to be developed, sediment transport problems using existing data sets from different estuarine environments)