

Outline of Tides in Estuaries Lecture at PASI on Estuaries, Aug 2007

(Focus is on barotropic, cross-sectionally averaged tides)

1. Describing the observed tide in estuaries
  - a. Elevation, velocity
  - b. Phase, standing vs. progressive
2. Scaling the dynamics of barotropic tides in estuaries
  - a. Momentum
  - b. Continuity
  - c. Estimating scales from observed data
3. Tides in short estuaries
  - a. Solving for velocity from continuity
  - b. Estuarine hypsometry
  - c. Example: Swash Bay
4. Tides in long, shallow, funnel-shaped estuaries
  - a. Scaling continuity
  - b. Example: Thames Estuary
  - c. Scaling momentum
  - d. Solution, first-order wave equation
5. Tides in long, deep, straight estuaries
  - a. Scaling continuity
  - b. Example: Chesapeake Bay
  - c. Scaling momentum
  - d. Solution, second-order wave equation
6. Tides in long, shallow, straight estuaries
  - a. Scaling continuity, momentum
  - b. Solution, diffusion equation
  - c. Example: The Fleet
  - d. Tidal asymmetries in shallow, straight estuaries
7. Tides in long estuaries, general “equilibrium” estuary
  - a. Scaling continuity, momentum
  - b. Solution, weakly varying, forward propagating wave
  - c. Example: James Estuary
8. Tides in intermediate length, deep, constant width estuaries
  - a. Scaling continuity, momentum
  - b. Solution, incident and reflected progressive waves
  - c. Example: Gulf St. Vincent
  - d. Nodes, resonance
9. Tides in intermediate length, constant width, arbitrary depth estuaries
  - a. Scaling, solution damped reflection
  - b. Example, Long Island Sound
10. Summary

Afternoon exercises: Use observations of tides from real estuaries to derive and apply the above solutions.