

itself. Distributions of EPF at three locations - at the mouth, in the wedge and at the node, would qualitatively appear as shown in Fig. 10.2. When interpreted in terms of tidal flows, these distributions reflect the general observation that in the mixing zone of the estuary flood flows landward at the bottom and ebb flows seaward at the surface.

The trends indicated by the EPF distributions suggest the dominating influence of hydrodynamics on sediment movement. As noted in Fig. 10.2, riverborne (alluvial) sediments from upstream fresh water sources arrive in suspension in the mixing zone. The comparatively high degree of turbulence, associated shearing rates and the increasingly saline waters will cause sediment aggregates to grow in size as a result of frequent inter-particle collisions and cohesion, and large aggregates will settle. Aggregate settling velocities can be up to four orders of magnitude larger than the settling velocities of the elementary particles. Some of the sediment will deposit onto the bed, and some will be carried upstream near the bottom until times close to slack water when the bed shear stresses decrease sufficiently to permit deposition. The deposited sediment will start to consolidate due to overburden.

The depth to which the new deposit scours when the currents increase after slack will depend on the bed shear stresses imposed by the flow and the shear strength of the deposit. If the currents during both flood and ebb are sufficient to scour all of the new deposit, the net movement will be determined approximately by current predominance. However, if the bed shear stress during ebb is less than sufficient to suspend all of the newly deposited material, a portion of the material will remain on the bed during ebb, and will be resuspended and transported during the predominant flood flows, resulting in a net upstream transport. Net deposition, i.e. shoaling, will occur when the bed shear during flood, as well as during ebb, is insufficient to resuspend all of the material deposited during preceding slack periods. Some of the fine material that is resuspended will be re-entrained throughout most of the length of the mixing zone to levels above the salt water-fresh water interface and will be transported downstream to form larger aggregates once again, and these will settle as before. At the seaward end some material may be transported out of the system. A portion or all of which could ultimately return with the net upstream current.