

Salt Wedging Encyclopedia Article

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Salt Wedging

Salt wedging in an **estuary** is the process by which a distinct layer of **saltwater** forms below a layer of **freshwater** due to differences in density. Salt wedging is the result of weak tidal currents that cannot mix the saltwater with the freshwater, thus creating a halocline. Because freshwater is less dense than saltwater, it will float on top of the saltwater. A halocline is a zone in the **water** column where an abrupt alteration in the salinity creates a sharp freshwater-saltwater interface. Salt wedging typically occurs in an estuary along a salinity gradient when a fresh body of water such as a river meets, but does not mix with saltwater from an ocean or sea.

The rate of freshwater **runoff** from a river into an estuary is a major determinant of salt wedge formation. Salt wedging occurs when there is continuous flow of freshwater running into an estuary that opens into an ocean or sea with small tidal currents. Additionally, **evaporation** must be significantly lower than the freshwater runoff in order for salt wedging to occur.

Conversely, if there is no runoff of freshwater into the estuary, or if the runoff of freshwater is less than its evaporation, the salt water flowing in from the ocean will become more diluted within the estuary. Because the rate of evaporation is higher than the freshwater runoff, the top layer of water where evaporation occurs, will have a higher salinity than the other layers of the estuary.

Typically, the weak bottom current of a salt wedge estuary flows toward land while the dominant, turbulent current on the surface of the estuary flows toward sea. The horizontal layer where the two opposing currents meet creates internal waves that grow and eventually break as they move out toward sea, causing water to flow upward. The breaks in the internal waves shift diminutive volumes of saltwater from the bottom layer into the surface layer, causing the bottom layer to invariably flow towards land.

See Also

Hydrogeology; Tides