

Influence of Intertidal Flats on Tidal Asymmetry

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Abstract

The generation of tidal asymmetries in estuaries is analyzed by examining the differences in celerity at high and low tide. An analytical expression for the difference between ebb and flood durations is introduced and applied to a cross-section composed by a channel flanked by tidal flats. The expression depends on the cross-sectional average of the celerity, for which two approximations are proposed and verified with a numerical model. Results confirm that tidal flats enhance ebb dominance, while large tidal amplitudes promote flood dominance. Maximum ebb dominance occurs for tidal flats at, or above, mean water level, depending on tidal amplitude and the extent of the tidal flats. Finally, qualitative arguments indicate that friction also enhances flood dominance.

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