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The time-varying characteristics in tidal duration asymmetry

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Tides always behaves different rising and falling durations, which can mostly attribute to the shallow-water effect and interactions among tidal constituents. The duration asymmetry may lead to an inequality in flood/ebb tidal current magnitudes, affecting the net sediment transport. Tidal duration asymmetry has time-dependent characteristics. We deducted a general framework for identifying the time-variability in tidal duration asymmetry. The application to the global tides showed that the fortnightly variability in tidal asymmetry is universal and that duration asymmetry can be stronger during neap tide than during spring tide. Then the framework is applied to the tides in the Changjiang Estuary. Prominent seasonal variation in tidal asymmetry is revealed, mainly relate to the river-tide interaction. Application to the tides in the Yangshan Harbor sea area revealed that the local-scale tidal asymmetry can be changed strongly by a large coastal engineering.

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