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Quantifying weather-related tides using the Global Tide and Surge Model

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It is often assumed that tide predictions based on observations are equivalent to astronomic tides, but they also contain radiational tides - periodic sea-level changes due to atmospheric conditions and solar forcing. Accurate separation of these different components is critical for understanding and predicting extreme sea levels, as well as validating storm surge models. Radiational tides pose a problem for forecasts of total water level during storm surges, which add local tidal predictions to "non-tidal residuals" from surge models, and risk double-counting these effects. The observed tides may be directly affected by climate change, as well as indirect effects due to sea-level rise.

We use the Global Tide and Surge Model from Deltares to quantify weather-related tides. We show that the global S2 atmospheric tide is captured by the model. We explore the contribution of higher tidal constituents around the world, and quantify the extent to which the "Highest Astronomical Tide", which is derived from tide predictions based on observations, also contains weather-related components.