Multi-model Seasonal Sea Level Forecasts for Vulnerable Coasts

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Coastal high water events are increasing in frequency and severity as global ocean levels rise. With higher relative sea levels, minor coastal flooding is occurring more often during periods of higher astronomical tides. If combined with above-normal seasonal sea levels, often associated with climate-driven variability in the ocean, coastal flooding becomes more severe. Such total high water events expose coastlines to potentially damaging storm-related flooding, yet seasonal prediction of coastal high water is in an early development stage.

With recent advancements in forecasting seasonal climate variability using state-of-the-art coupled ocean-atmosphere models, which have the ability to assimilate and predict sea level, come the opportunity to predict the potential for future high water events many months in advance. By compiling monthly sea level anomaly predictions from multiple models, which are typically skillful out to at least 6 months in the tropical Pacific, improved future outlooks are achieved. From this multi-model ensemble comes forecasts that are less prone to individual model errors and also an uncertainty measurement achieved by comparing retrospective forecasts with the observed sea level. We deliver a new real-time forecasting product of monthly mean sea level anomalies that is being served online to the Pacific island community in an effort to reduce the residual between predicted tides and observed water levels by predicting relative sea level changes. Here, we will report on the status of the forecasting framework including efforts to increase the number of models and expand the areal coverage of new coastal-flood products.

Keywords: Seasonal forecasting, Relative sea level change, Coastal flooding, Climate variability