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Seasonal sea level cycle in the Caribbean Sea

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The seasonal sea level cycle has been investigated in the Caribbean Sea using altimetry and tide gauge time series from 27 stations and is characterized by large spatial variability. The coastal annual harmonic has amplitudes that range from 2 cm to 9 cm, peaking between August and October and semi-annual harmonic with maximum amplitude of 6 cm, with most stations peaking in April and October. The coastal seasonal sea level cycle accounts for up to 76% of the monthly sea level variance. The barometric effect on the coastal sea level seasonal cycles is insignificant in the annual component but dominant at 9 stations in the semi-annual cycle. The seasonal sea level cycle from 18 years of altimetry confirm the results obtained from the tide-gauges. In addition it illustrates areas where particularities in the seasonal cycle exist. The seasonal sea level cycle in the Caribbean Sea is unsteady in time, with significant variations in amplitude and phase lag at most of the stations, where the 5-year amplitude in the coastal annual cycle can change over 6 cm in a 24 year period. The seasonal sea level cycle has a larger range than the range from the annual and semi-annual components, and peaks about October when the probability of coastal impacts increases, especially in the northern coast of South America where the range is larger. This analysis is supported by the Lloyd's Register Trust Fund project Marine Extremes.