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Understanding Regional Sea Level Rise Acceleration Along the North American Eastern Seaboard

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The East Coast of North America has experienced rates of sea level rise (SLR) five times larger than the global average. This steep increase in SLR contributed to a higher frequency of coastal flooding events along the southeastern seaboard and the worst nuisance flooding event in Miami, FL during the last 20 years. Using tide gauge data from several stations, empirical mode decomposition (EMD) was used to understand sea level variability along the East Coast of the U.S., and its connectivity to atmospheric and oceanic circulation and thermosteric effects. This is a unique approach in identifying the “in phase” sea level variability and how it relates to the atmosphere and the ocean on varying timescales. The EMD modes were also used to understand the “out of phase” components of sea level variability such as the “hot spot” of SLR between Cape Hatteras, NC and Key West, FL where sea levels increased at rates of 25.5mm/year compared to a global average of 4.5 mm/year. Similar techniques were then applied to climate model simulations using sea surface height at coastal locations as proxies for the tide gauge data. The EMD approach was applied at both ocean eddy parameterized and ocean eddy resolving scales. The goal was to determine if the natural variability in the models have similar characteristics to the observational estimates. And, to assess whether the modes associated with the trend in observations have appropriate analogues to the model simulations. By comparing pre-industrial simulations with historical simulations, we will be assessing whether a changing climate affects the natural variability.