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Sea level variability across the Northwest Atlantic shelf

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Ocean dynamics plays a prominent role in the change of sea level variability on approach to the coast. While some studies have focused on decadal changes at tide gauges, a gap remains in understanding higher frequency variability, which provides a significant proportion of total variability in the coastal region. The Northwest Atlantic, an area including the U.S. East coast and Atlantic Canada, is a known hotspot of sea level rise and shows spatial differences in lower frequency variability along the shelf. However, the higher frequency variability is rarely explored, despite being at least partly captured by the observation systems.

In this study, we evaluated the sea level variability across the sub-annual timescales on the shelf of the Northwest Atlantic and linked it to the local and far-field ocean dynamics. The drivers of sea level variability include both wind-driven and buoyancy-driven circulation. We used high-frequency tide gauge records, eddy-resolving high-resolution (1/12°) ocean reanalysis, and high-precision synthetic aperture radar (SAR) altimeter along-track data to obtain sea level anomalies for the analysis. We evaluated the coherence of sea level signal for all sources and with the drivers of ocean circulation.