

# Wind Direction Drives Shelf-water Intrusions into Narragansett Bay

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The purpose of this study is to understand the physics that drive intrusions of high-nutrient shelf-water into Narragansett Bay and, for the first time, to be able to predict these events. Water mass exchange between Narragansett Bay and Rhode Island Sound is an active area of research, with recent findings showing that episodic intrusions of shelf water could be an even bigger source of nutrients than all of Narragansett Bay's rivers and wastewater treatments plants combined.

A monitoring station will be deployed at the mouth of the Bay in 2019 to measure the magnitude and chemical properties of the inflowing shelf water, but a key question remains: what causes these sporadic intrusions? To find out, I use a state-of-the-art 3D ocean model and run a set of experiments using different wind speeds and wind directions. The results so far show that these events are triggered by westerly winds. This result agrees well with the observed intrusions from the summer 2018 currents data. Westerly winds are an uncommon wind direction for this region, which would also explain why these intrusions are so rare.

With chemical data from the new monitoring station, we hope to link these flux estimates with chemical concentrations to develop an accurate Narragansett Bay nutrient budget.