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2022 Salish Sea Ecosystem Conference
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Apr 27th, 4:00 PM - 4:30 PM

Salinity variance mixing in the Salish Sea is controlled by river flow

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Broatch, Erin and MacCready, Dr. Parker, "Salinity variance mixing in the Salish Sea is controlled by river flow" (2022). *Salish Sea Ecosystem Conference*. 18.
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Mixing in a salinity variance budget for the Salish Sea is controlled by river flow

Erin Broatch and Parker MacCready

Where and when does mixing occur in the Salish Sea?

Mixing is required for the development of the estuarine exchange flow and affects the residence time of the estuary.

Using output from a numerical model, we determine the spatial distribution of mixing and its correlation with forcing factors

Salinity variance is a measure of mixing

$$\int (s - \bar{s})^2 dV$$

Mean salinity



Unmixed water:
High variance



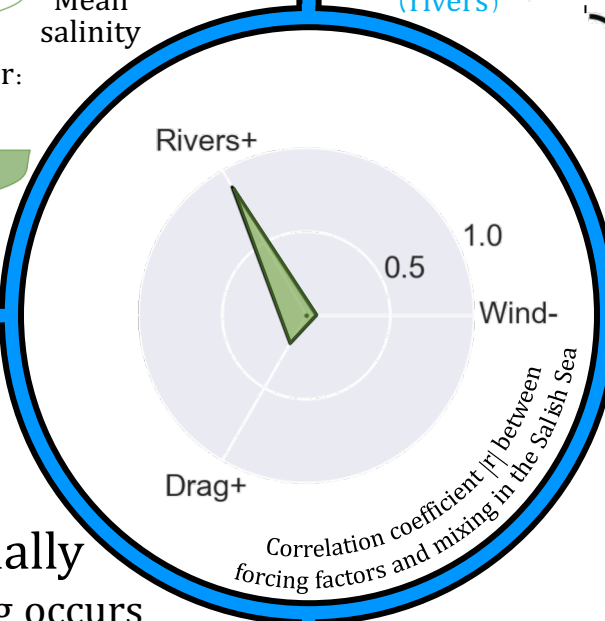
Mixed water:
Low variance

Construct a salinity variance budget from model output to calculate the mixing

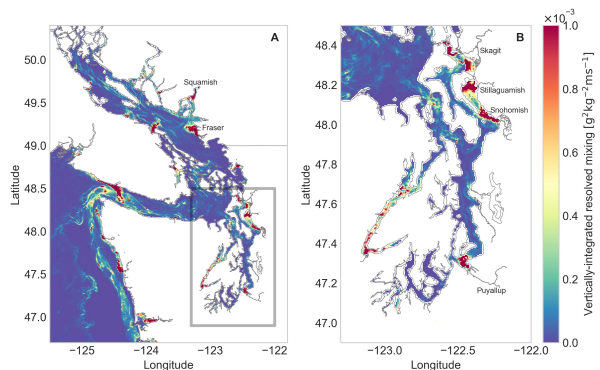


$$\frac{d}{dt} \int s'^2 dV = - \int u_n s'^2 dA - 2 \int K (\nabla s')^2 dV$$

Storage Boundary fluxes including rivers Mixing



Spatially
Mixing occurs
at river mouths



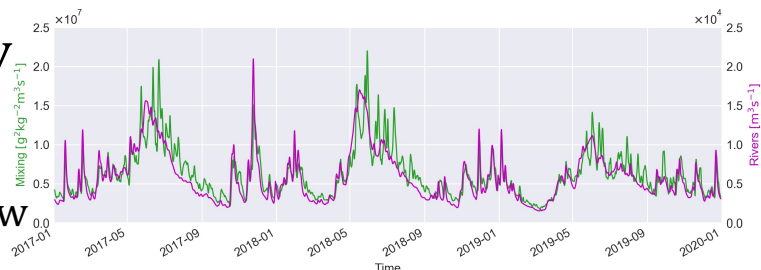
Insights:

Mixing in the Salish Sea is most strongly correlated with river flow

This is different from other estuaries studied using this method where the spring-neap cycle (drag) is more important

Because the mean salinity in the Salish Sea is high (>30psu), the freshwater rivers are an important source of high-variance water

Temporally Mixing is correlated with river flow



Contact: ebroatch@uw.edu
Model information and today's 3-day forecast: <https://faculty.washington.edu/pmacc/LO/LiveOcean.html>



This project was supported by NSF Award 1736242: Using Salinity Variance to Link Estuarine Mixing and Exchange Flow