

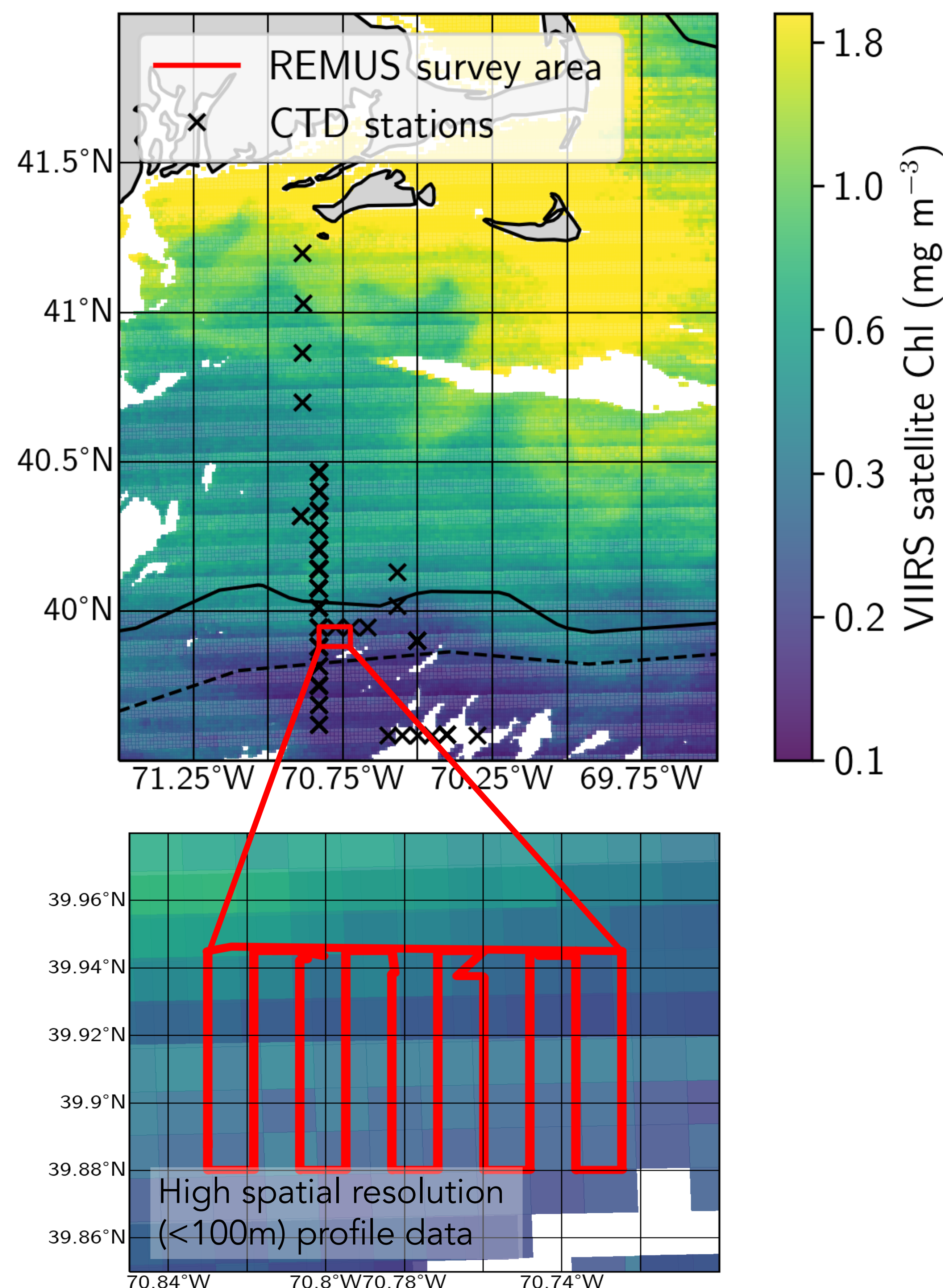
# Fine scale biogeochemical patchiness in a chlorophyll hotspot at the New England Shelf Break Front

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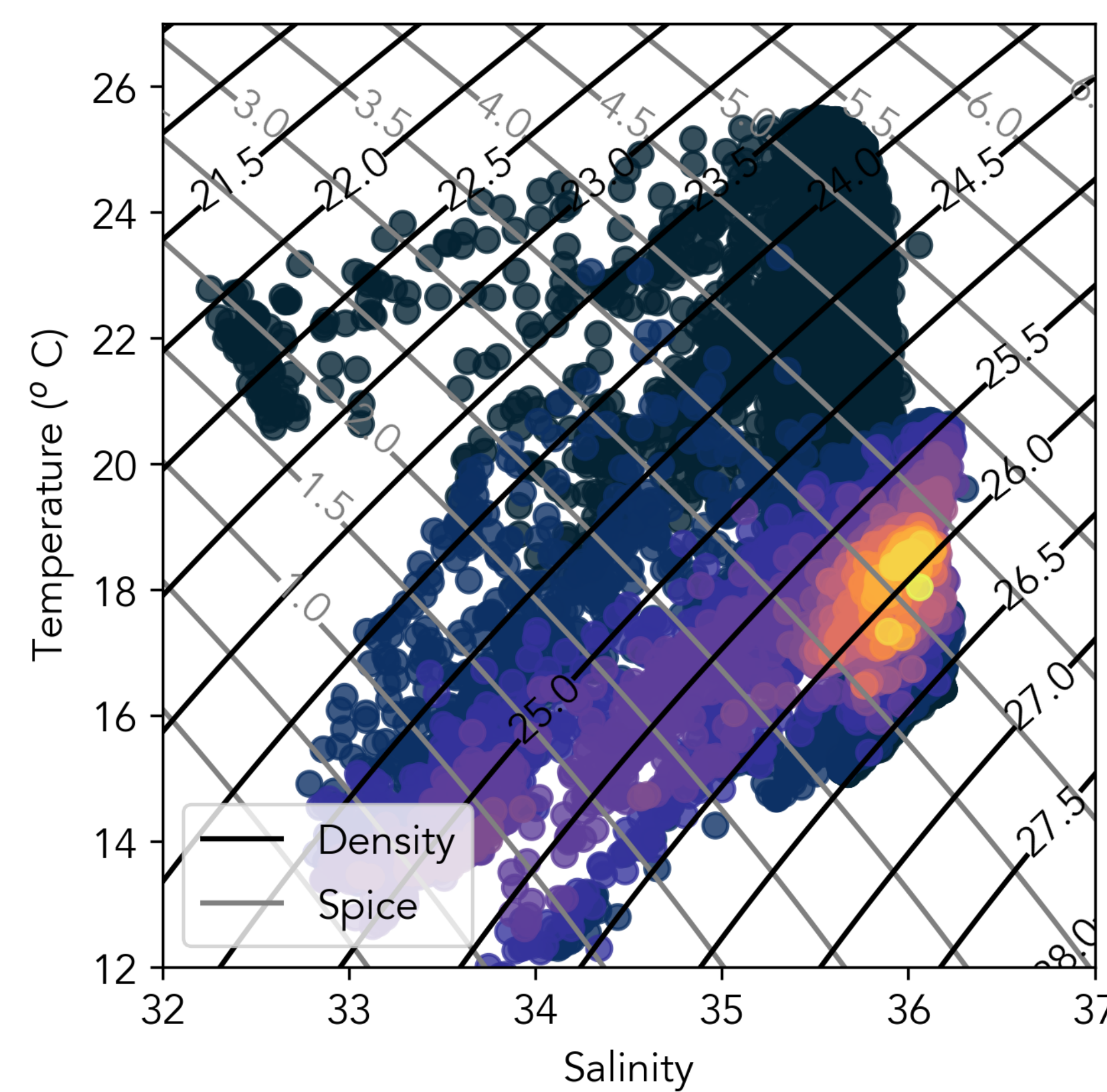
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**ABSTRACT:** The Middle Atlantic Bight shelf break off the coast of New England supports a productive and diverse ecosystem, which is thought to be fueled in part by episodic fine scale upwelling events at the front.

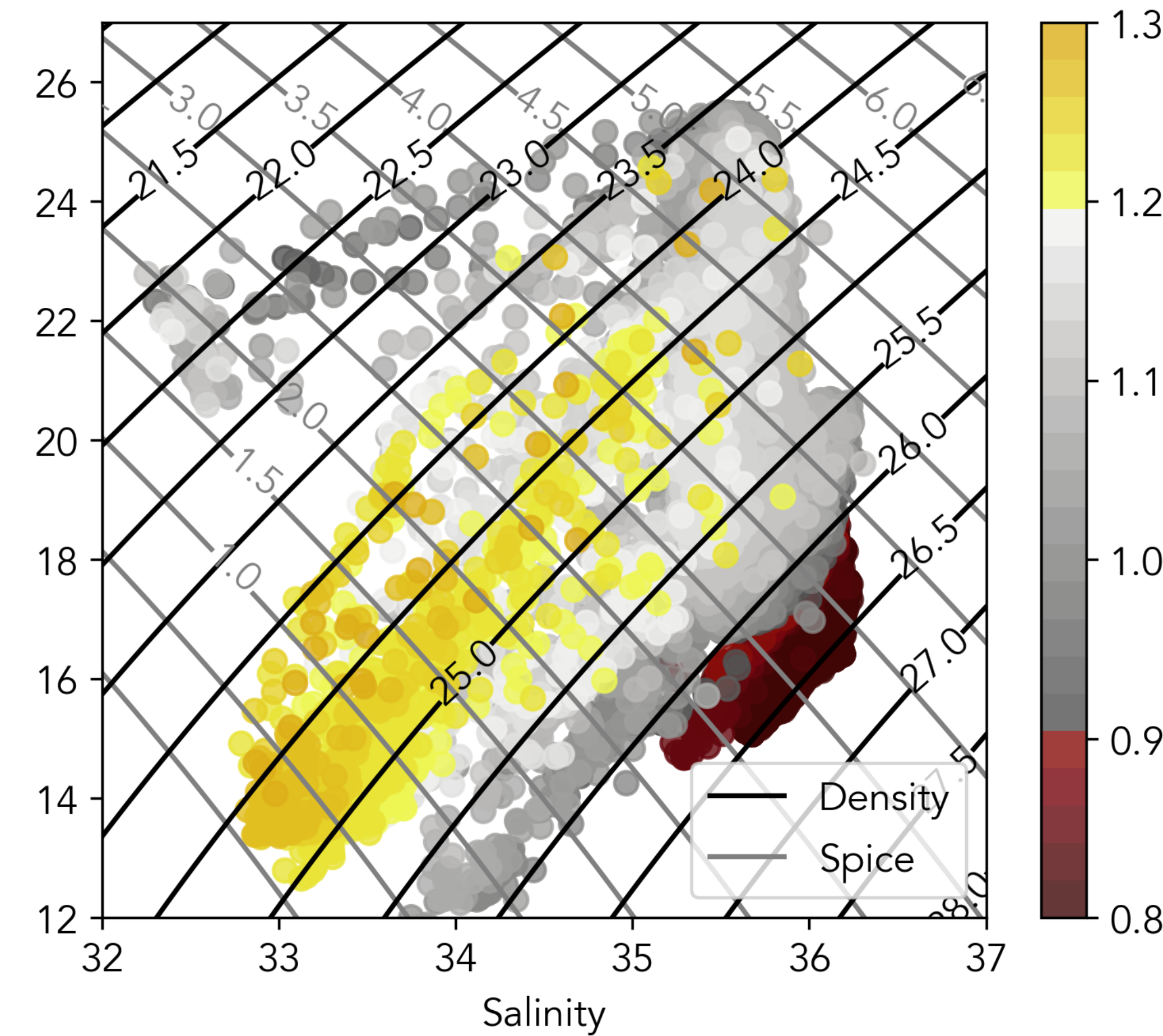
On July 15<sup>th</sup> 2019, a REMUS AUV equipped with a suite of biogeochemical sensors was deployed to conduct a survey (Fig 1, red box) of a chlorophyll hotspot at the New England Shelfbreak Front as part of the Shelfbreak Productivity Interdisciplinary Research Operation at the Pioneer Array (SPIROPA) study.



**Figure 1.** Surface chlorophyll from VIIRS over the SPIROPA study regions for July 15<sup>th</sup> 2019, with CTD stations (black crosses) and REMUS survey (red box) and the 200m (solid line) and 1000m (dashed line) isobaths.

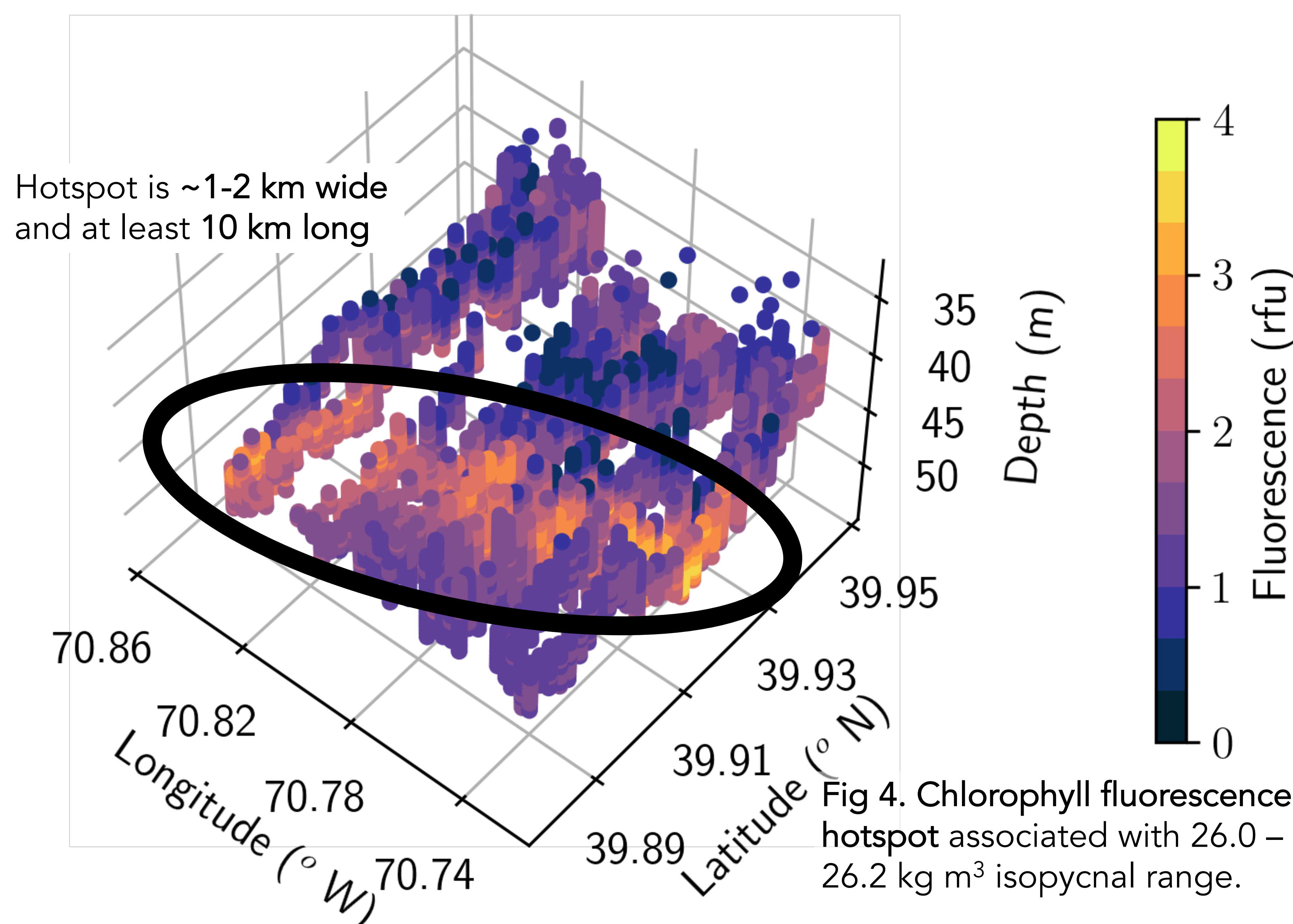


**Fig 2.** T/S diagram showing chlorophyll fluorescence along with contours of (black) density and (grey) spice

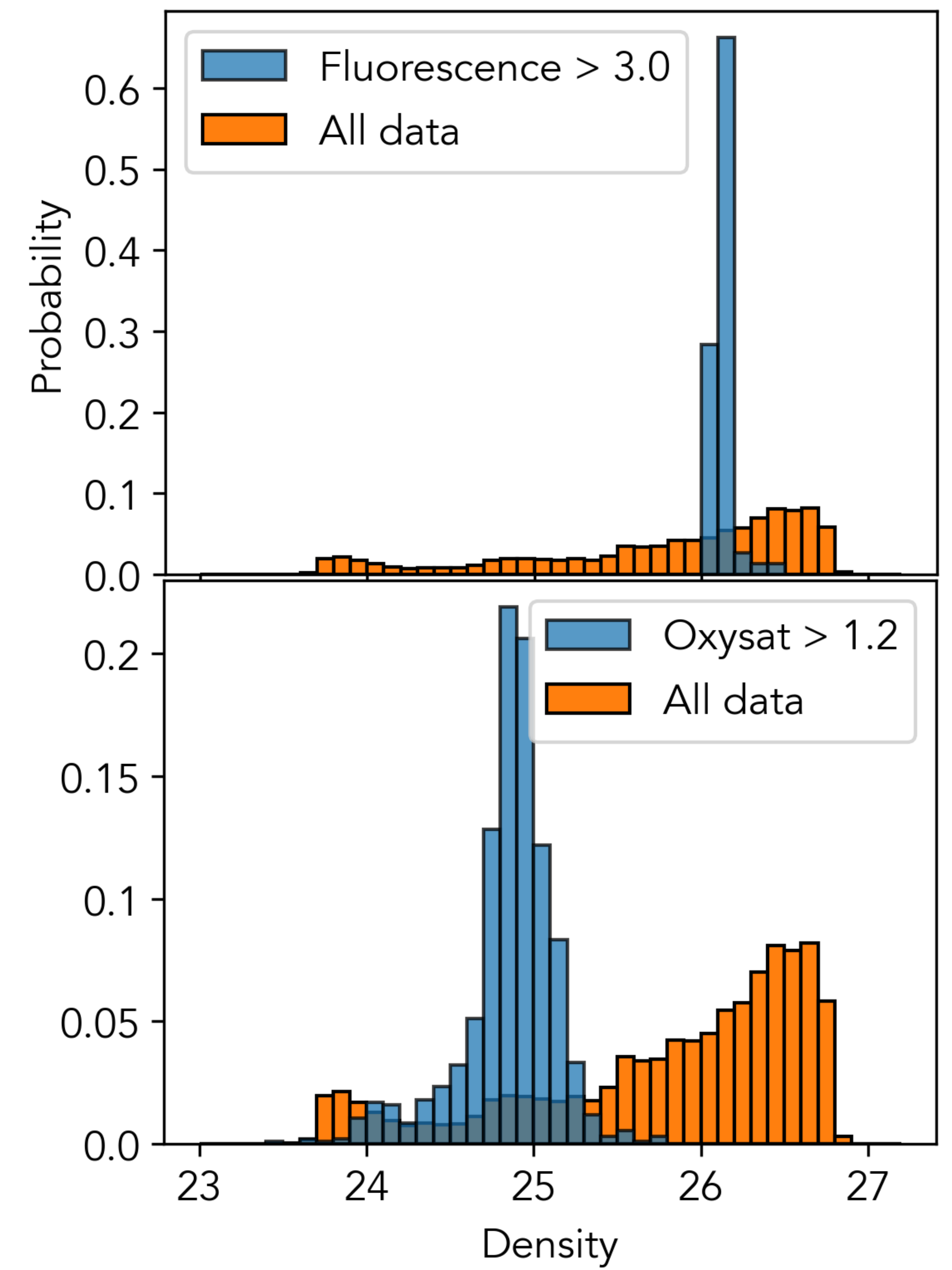


**Fig 3.** T/S diagram showing oxygen saturation along with contours of (black) density and (grey) spice

**Chlorophyll hotspot** associated with higher salinity, 'spicier' waters which likely originated from the Gulf Stream, as well as lower dissolved oxygen concentrations than adjacent waters along the same isopycnal range, suggesting a recent upwelling event.



**Fig 4.** Chlorophyll fluorescence hotspot associated with 26.0 – 26.2 kg m<sup>3</sup> isopycnal range.



**Figure 5.** Probability distribution functions of chlorophyll fluorescence (left) and oxygen saturation (right) from the REMUS profiles. High chlorophyll is associated with a tight density range ~ 26.0 – 26.2 kg m<sup>3</sup>, whereas waters oversaturated with respect to oxygen are found in wider range of less dense waters.

**Key points:**

- High fluorescence was associated with 'spicy' waters likely mixed in from the GS.
- Waters oversaturated with oxygen were not associated with high chlorophyll fluorescence.
- Observed strong submesoscale variability in physical and biogeochemical water column properties along isopycnal surfaces.

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