

# Comparing Phytoplankton Density Between Buzzards Bay and Vineyard Sound

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## Introduction

- Phytoplankton are photosynthetic marine organisms that function as the base for marine food webs, fix high amounts of carbon from the atmosphere, and produce oxygen as byproducts.



**Figure 1** – Example of a ceratium found at site 3.

## Objectives

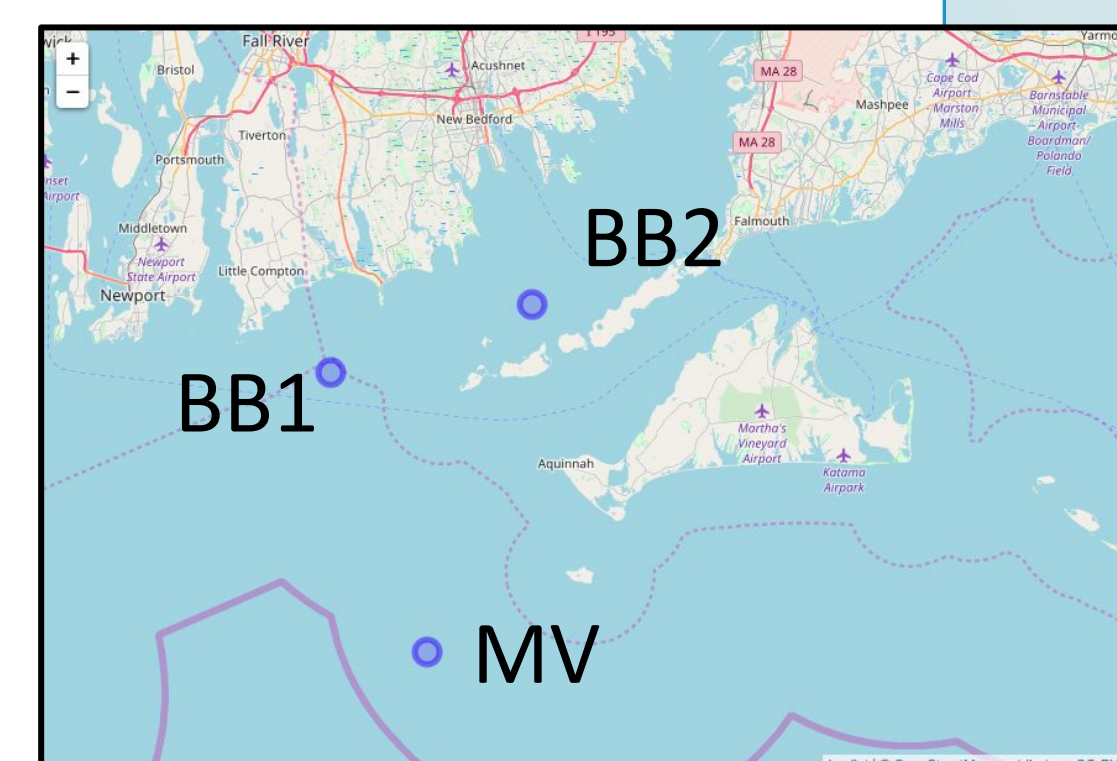
- Compare data collected on the SSV Corwith Cramer to compare the abundance of phytoplankton between coastal and open ocean systems using the Vineyard Sound and Buzzards Bay as field sites.
- It is hypothesized that more phytoplankton will be present near the coast than towards the open ocean.

**Figure 2** - Image of a CTD

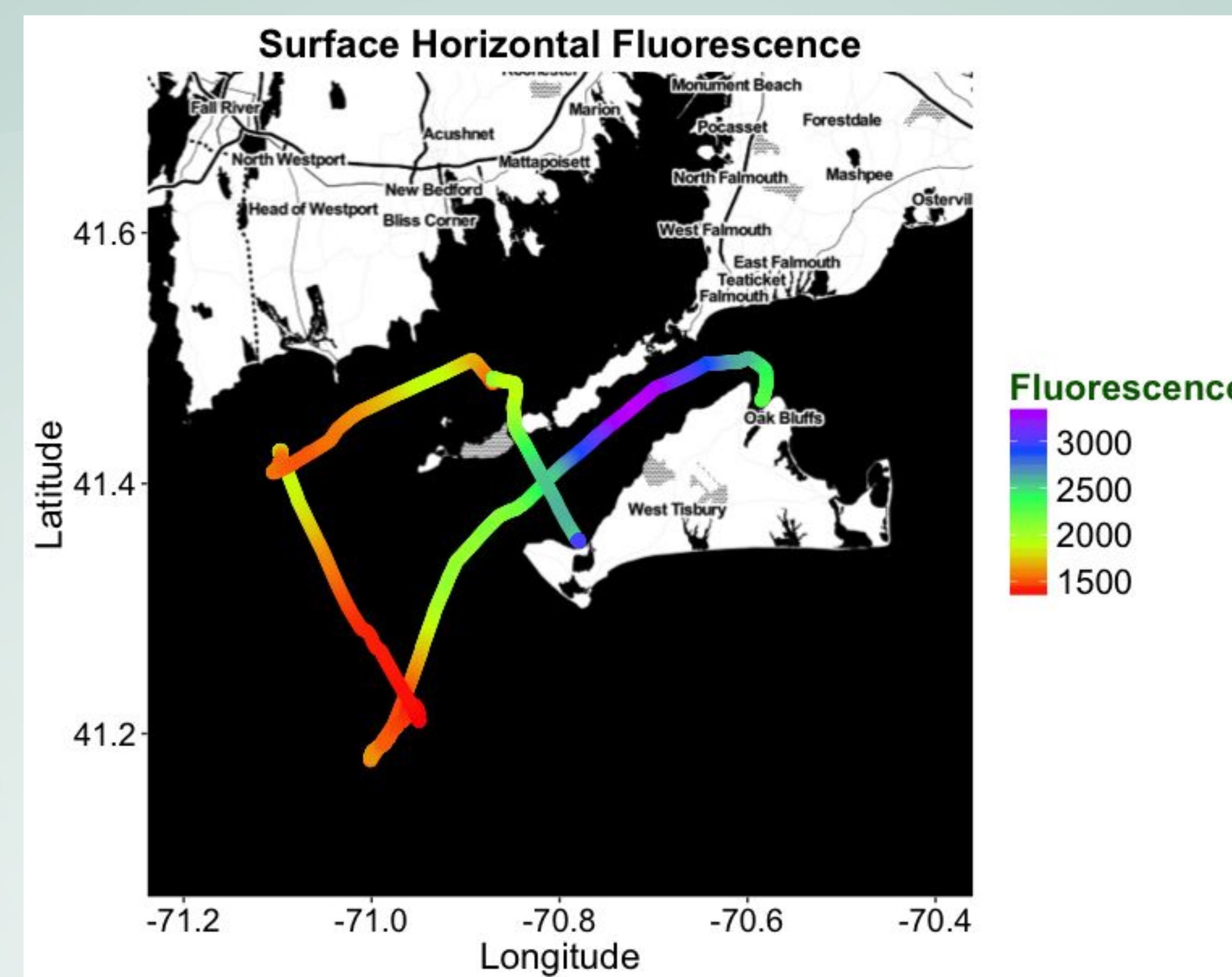


## Materials and Methods

- A CTD (conductivity, temperature, depth) and niskin rosette was used to measure oxygen, fluorescence, and chlorophyll a. (Figure 2)
- Data was collected at three locations:
  - Vineyard Sound (MV)
  - Mouth of Buzzards Bay (BB1)
  - Buzzards Bay (BB2)
- Fluorescence and chlorophyll a measurements serve as a proxy for approximately phytoplankton biomass.

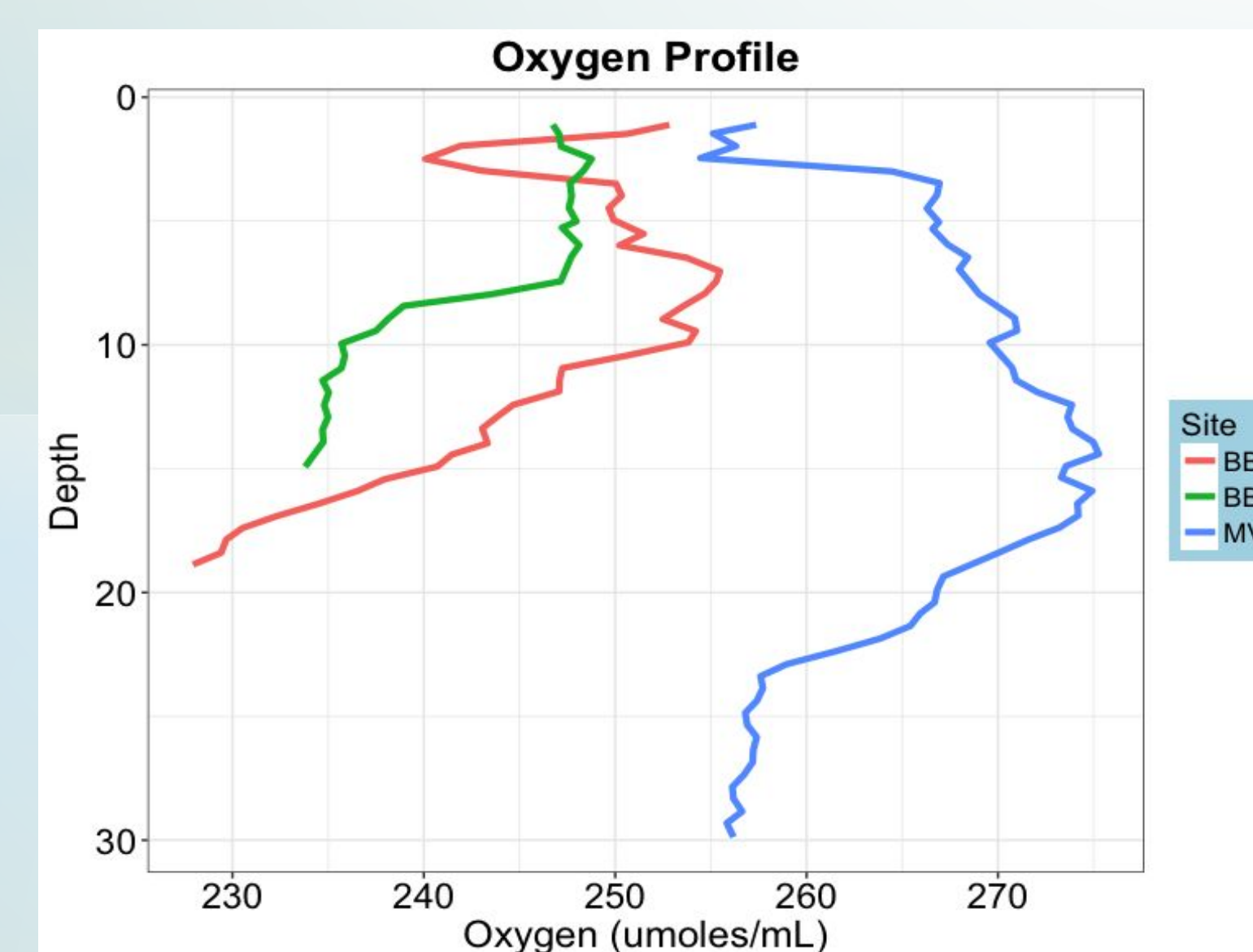
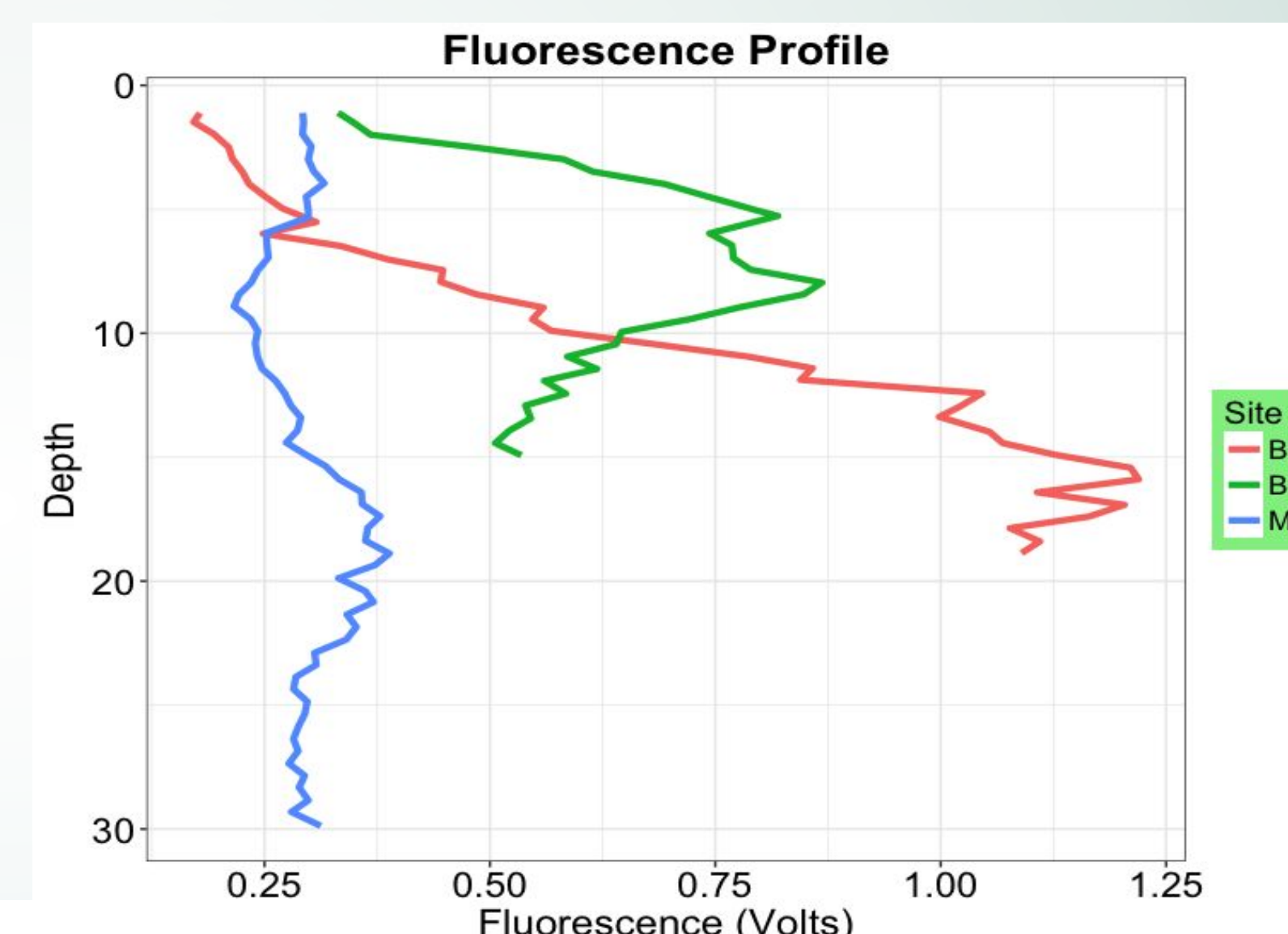


## Results



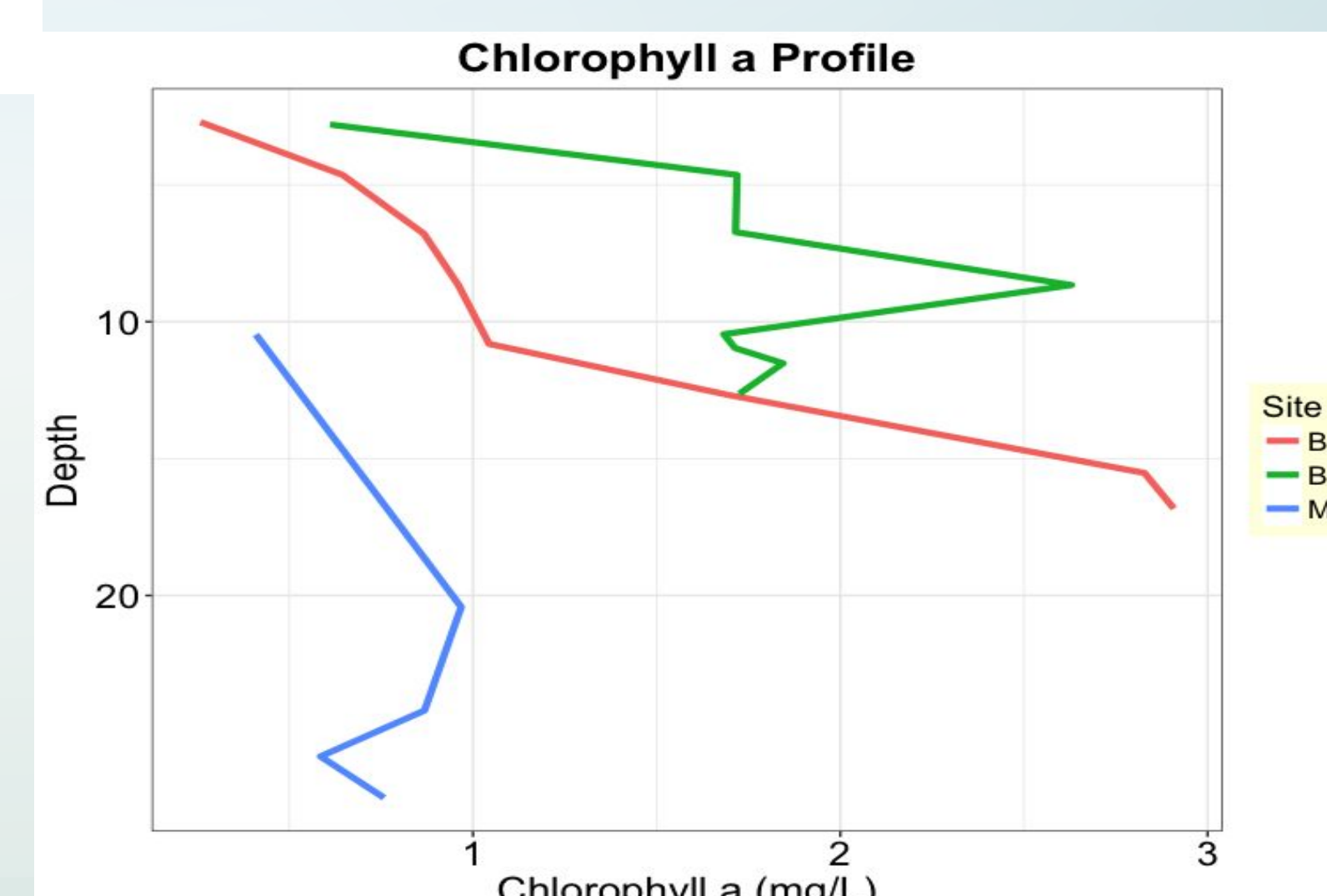
**Figure 3** – Continuous fluorescence measurements taken at the surface along cruise track

**Figure 4** – Fluorescence is highest at site BB1, second highest at BB2, and lowest at MV.



**Figure 5** – Oxygen levels were higher in the the Sound (MV) than at both sites in Buzzards Bay.

**Figure 6** – Chlorophyll a centration was highest at site BB1, second highest at BB2, and lowest at MV.



## Conclusion

- Surface fluorescent measurements show highest values in the ship traffic channels on the NW side of Martha's Vineyard, lowest values in the Sound (site MV), and intermediate values in Buzzards Bay.
- Vineyard Sound is nitrogen limited, resulting in low levels of chlorophyll and phytoplankton density**
- Chlorophyll a measurements reveal phytoplankton abundance is higher in Buzzards Bay (BB1 and BB2) than in the Sound (MV)
- Unexpectedly, oxygen levels are higher in the Sound (MV) than in Buzzards Bay, given that photosynthesizing phytoplankton are in least abundance in the Sound.

Several reasons could be:

- High levels of pollution in the Bay may facilitate bacterial growth that deplete oxygen levels
- Protection from wind and waves in the Bay may hinder the diffusion and mixture of oxygen
- Another biological process is occurring at depth (zooplankton)

## Acknowledgments

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## References

- Kiefer, D. A. (1973). Fluorescence properties of natural phytoplankton populations. *Marine Biology*, 22(3), 263-269. (Specifically the discussion)
- NOAA. What are Phytoplankton? National Ocean Service website, <https://oceanservice.noaa.gov/facts/phyto.html>, 10/10/2017.