Changing phytoplankton community structure across the Western Antarctic Peninsula in response to climate change.

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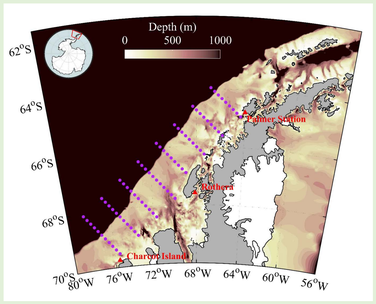


SEA ICE

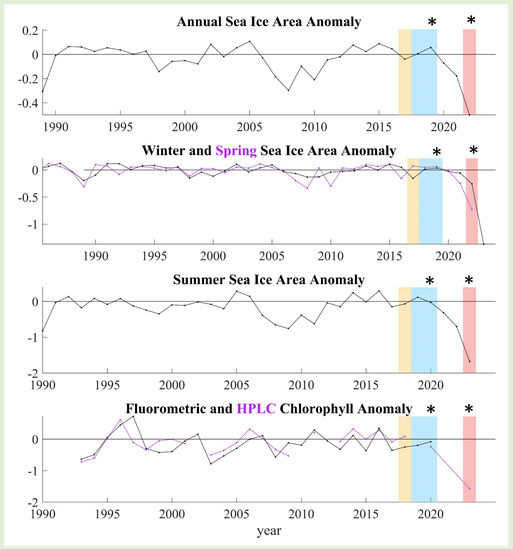
Sea ice area over the WAP leading to the 2018 austral summer were average, while the conditions leading to the 2019 and 2020 summers were above average. The 2022-2023 Antarctic sea ice season, however, set record lows, with impacts observed across the entire ecosystem and trophic levels.

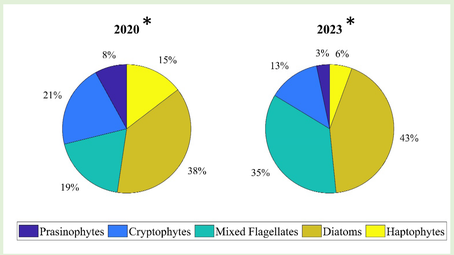
We hypothesize that sea ice influences chlorophyll and phytoplankton community composition.

BACKGROUND

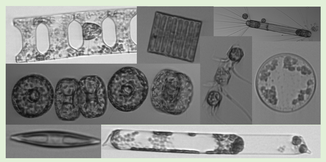
The Western Antarctic Peninsula has been experiencing well documented changes due to climate warming. Climate changes affect the bottom-up controls driving the productive food web along the WAP, which is closely tied to phytoplankton community dynamics. Chlorophyll concentrations show large interannual and spatial variability rather than long-term trended change. Understanding the drivers of and changes in the phytoplankton community due to climate change is critical to understanding the WAP food web.

Using data collected by the Palmer Long Term Ecological Research Program and new technologies, we assess how the phytoplankton community shifts and responds along the WAP to sea ice conditions.

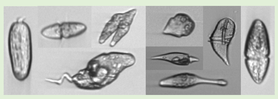




DIATOMS

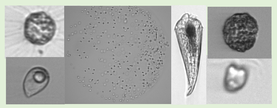


FLAGELLATES



CRYPTOPHYTES

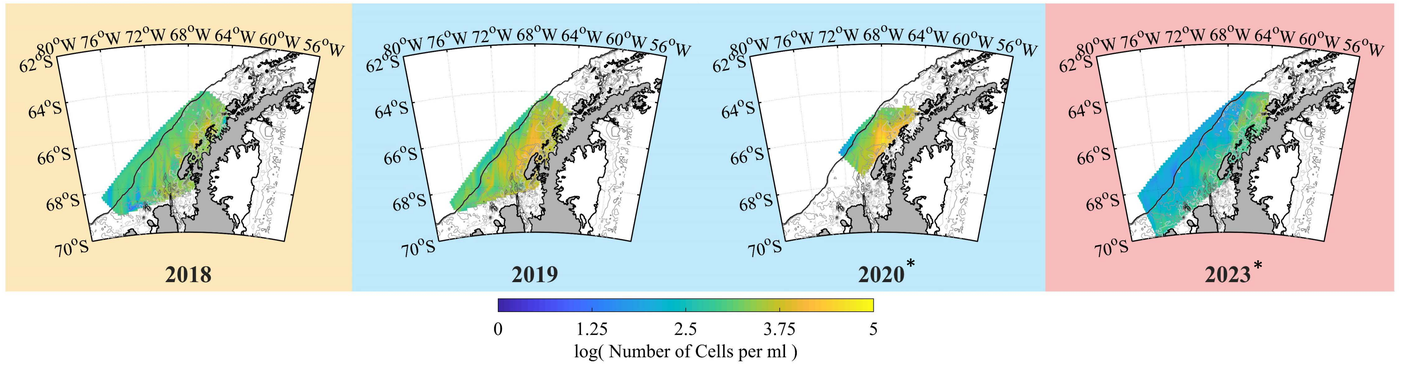
OTHER

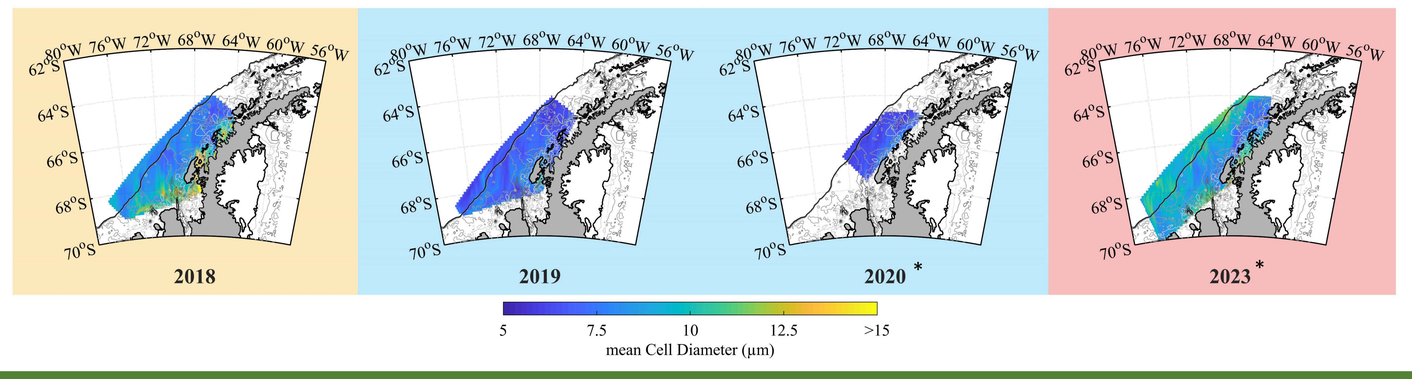


METHODS

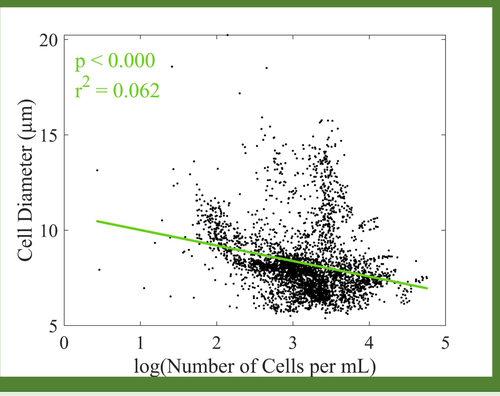
An Imaging Flow Cytobot (IFCB) deployed over annual summer cruises is used to determine cell counts, size distributions and taxonomic groups, which cannot be obtained from the traditional chlorophyll and accessory pigment analyses. Non-fluorescing cells captured by the IFCB were not included in this analysis.

WHAT IS THE COMMUNITY COMPOSITION UNDER LOW SEA ICE?

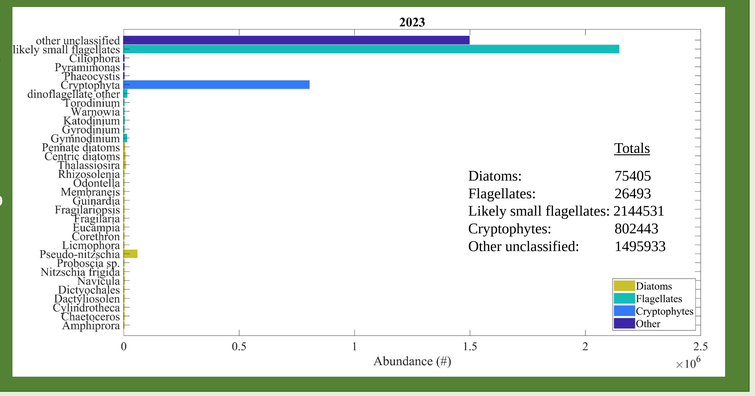




In the low sea ice year of 2023, there were 60% fewer particles and cells were larger than in higher ice years.



Preliminary IFCB image analysis from the 2023 cruise shows approximately 2% Diatoms, 47% flagellates, and 18% Cryptophytes.



CONCLUSIONS

- **Under very low sea ice, there is very low chlorophyll and very few phytoplankton cells.**
- **Phytoplankton community composition has a high abundance of cryptophytes and flagellates in a low sea ice year.**

ACKNOWLEDGEMENTS

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