

Tracking krill distributions using a glider in Palmer Deep canyon, a West Antarctic Peninsula penguin and whale foraging hot spot

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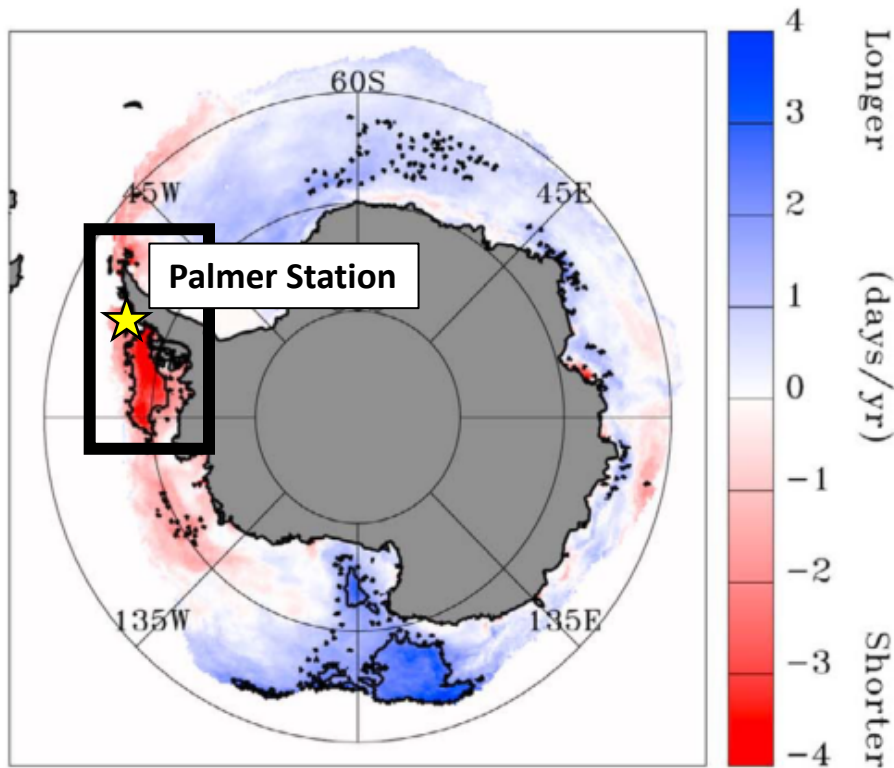
Acknowledgements:

Grace Saba
Josh Kohut
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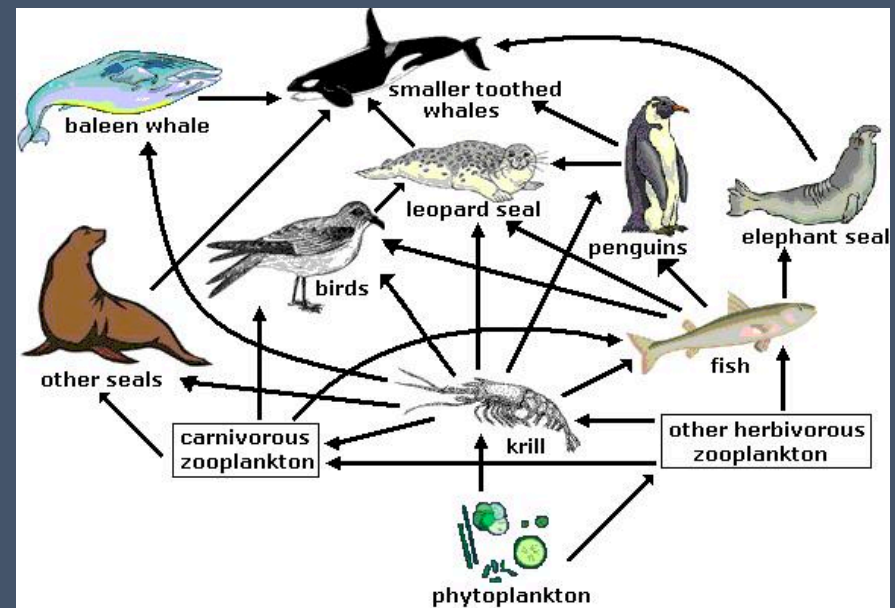


West Antarctic Peninsula is experiencing rapid warming, impacting the Antarctic food web

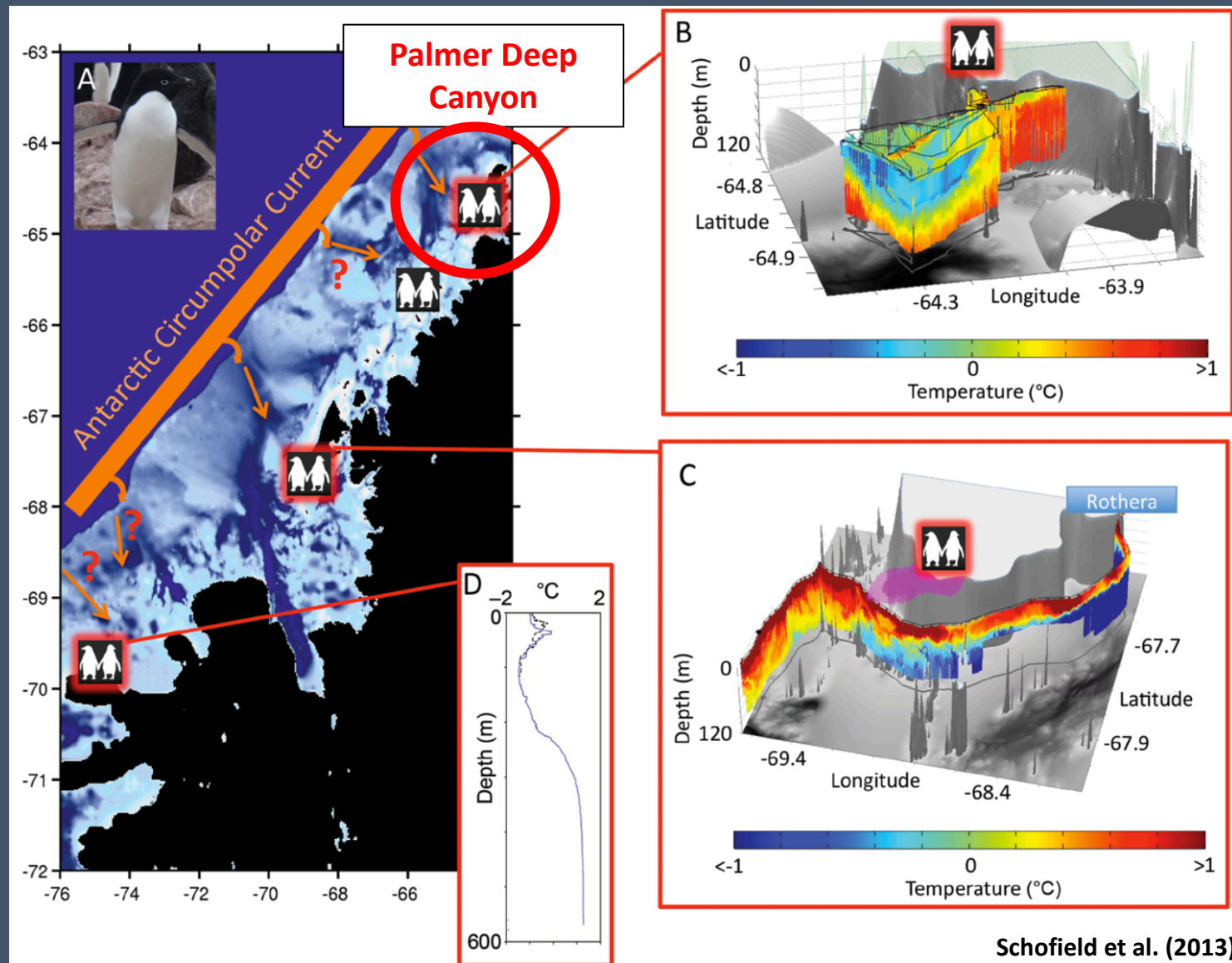
Ice Season Duration (1979/80 – 2010/2011)



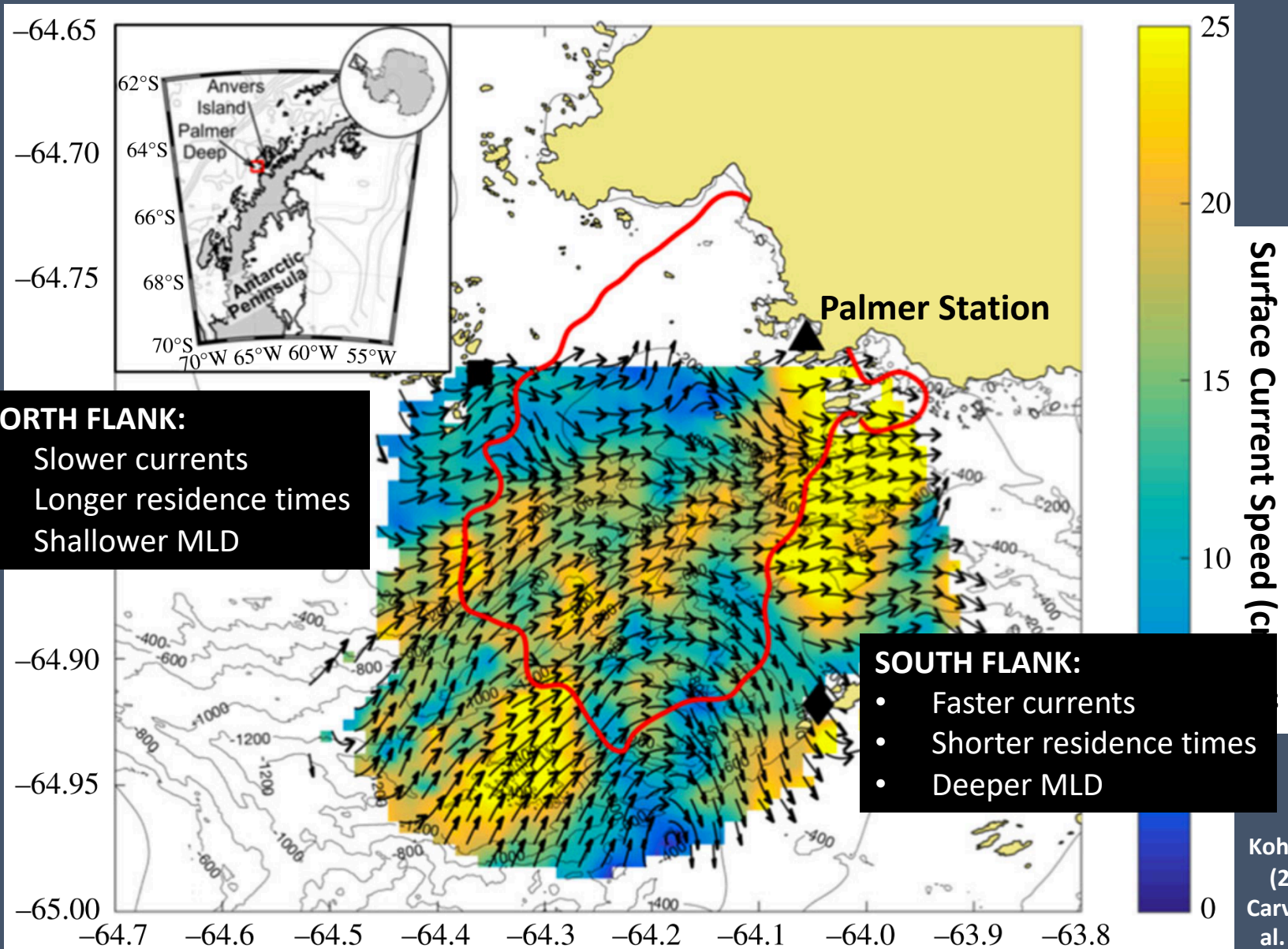
Stammerjohn et al. (2012)



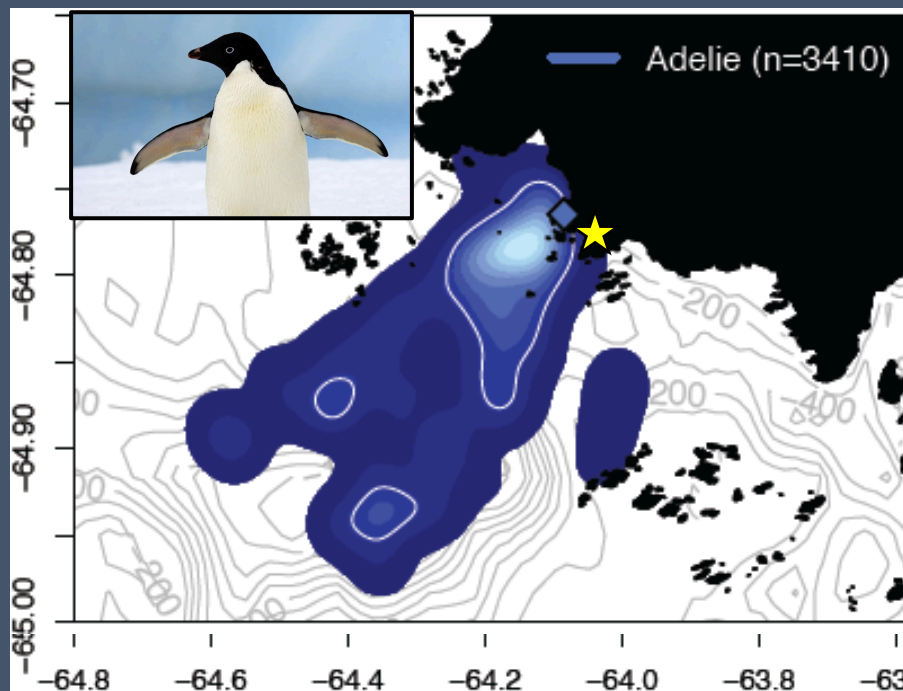
Biological hot spots along the West Antarctic Peninsula



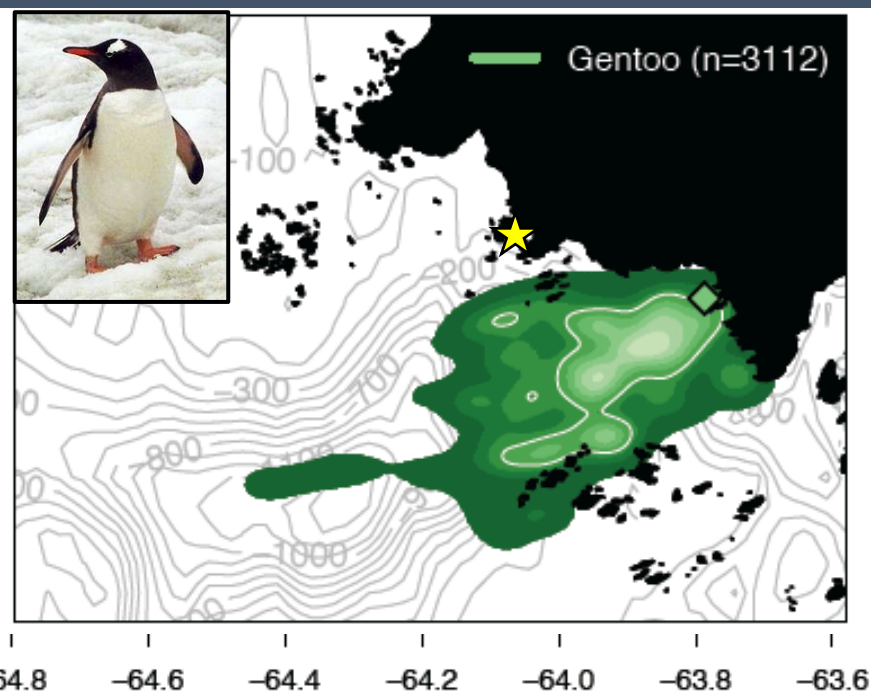
“Conveyor belt” physics transports new phytoplankton production into Palmer Deep Canyon



Differing foraging strategies of local penguin populations



**Polar Adélie penguins
forage in north canyon above
the mixed layer depth**



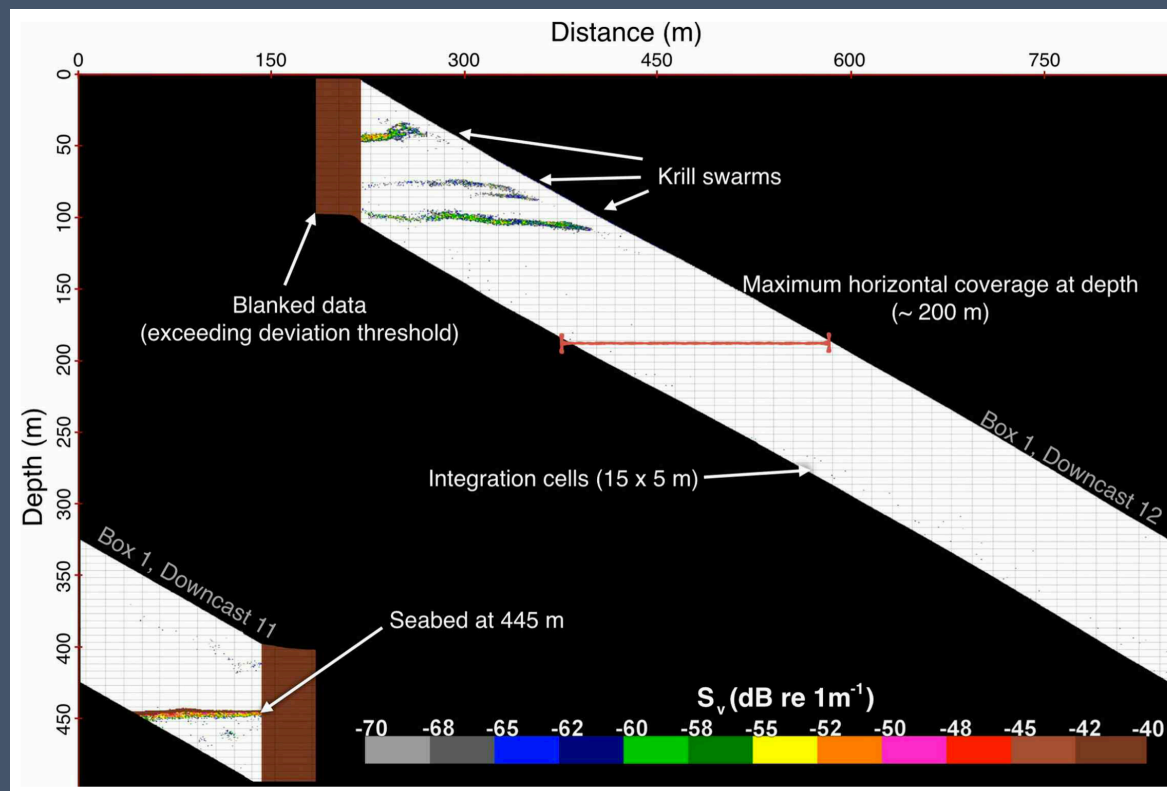
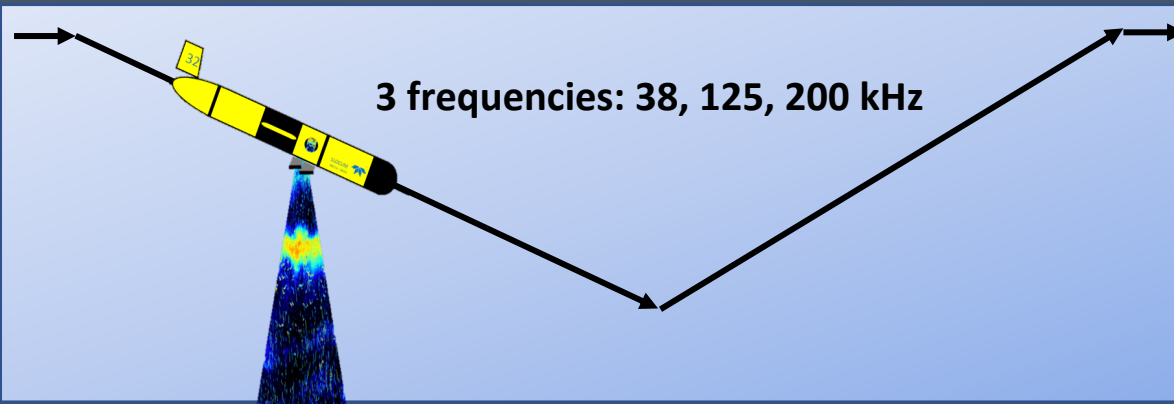
**Subpolar Gentoo penguins
forage in south canyon
down to 150m depths**

What are the krill doing?



Limited by ship time and access to the canyon

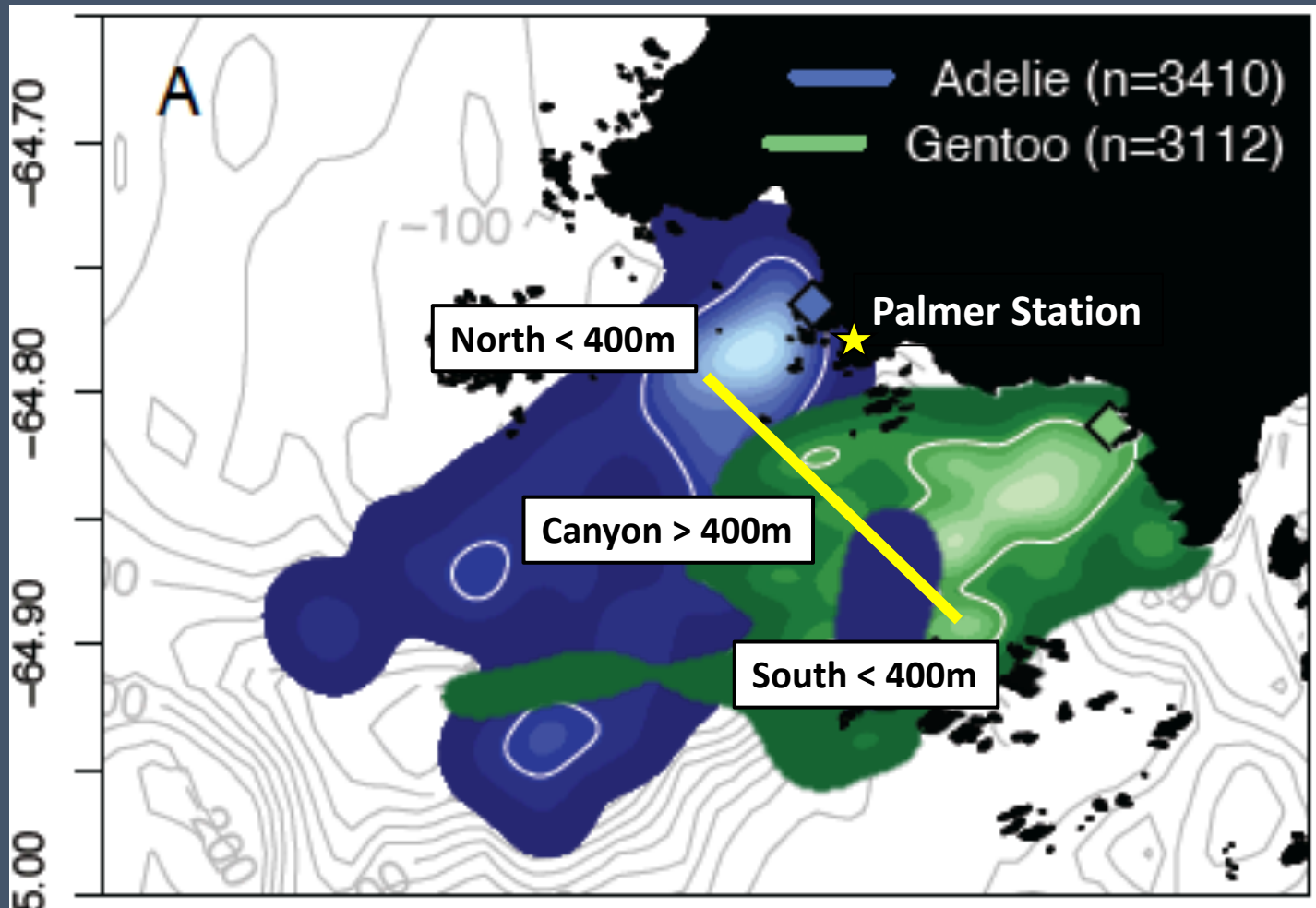
Acoustic Zooplankton and Fish Profiler (AZFP)



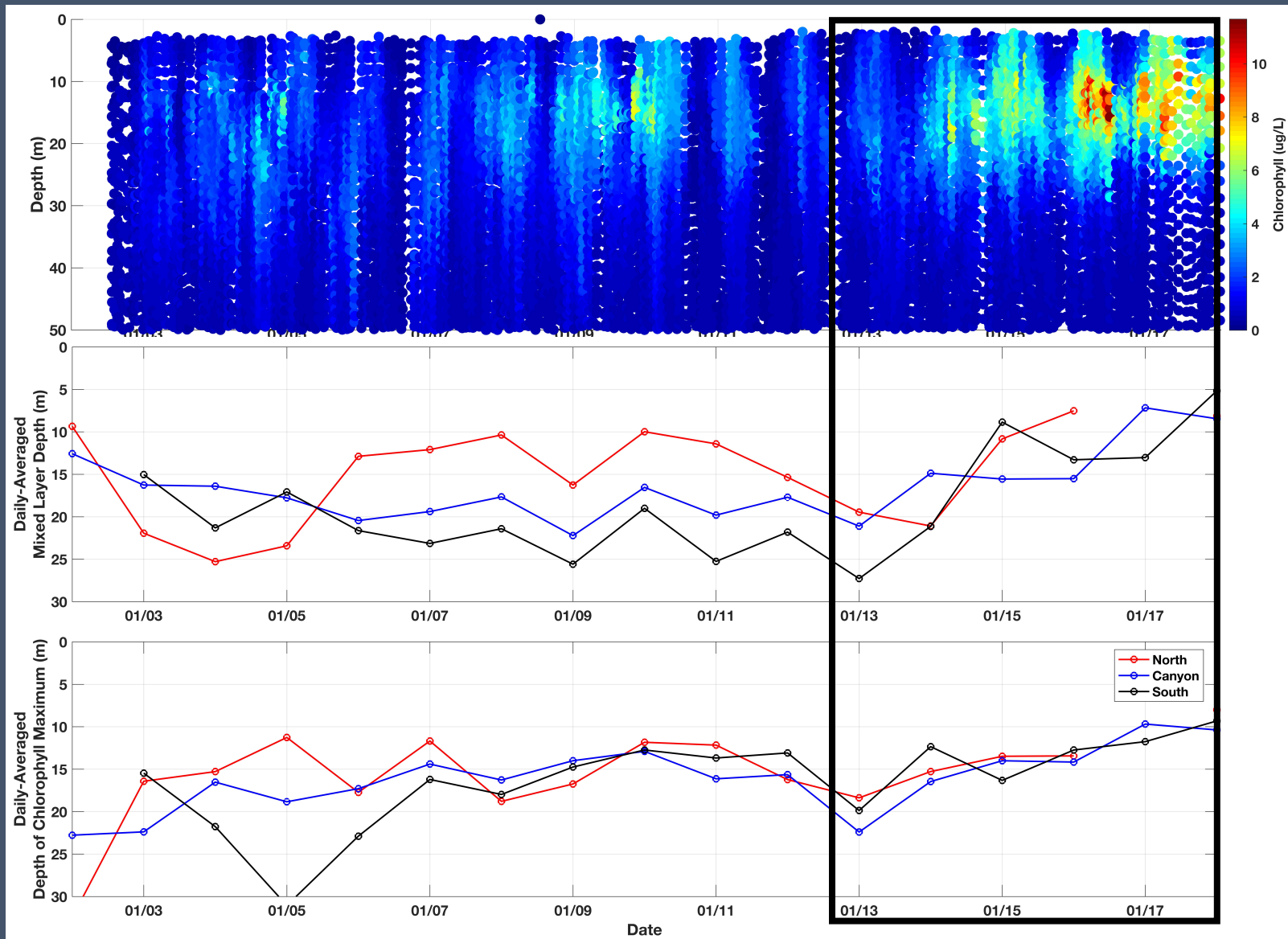
- AZFP sensor integrated into Slocum Webb G2 glider in spring 2017
- Deployed for the first time in the Ross Sea in January 2018

17-day cross-canyon mission sampling in both Adélie and Gentoo foraging regions

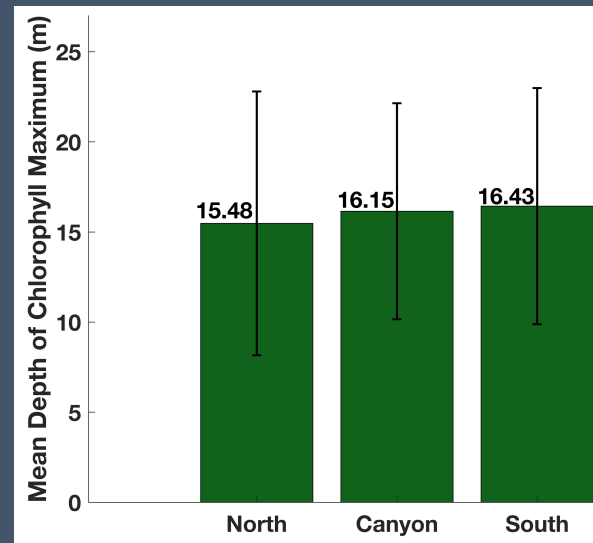
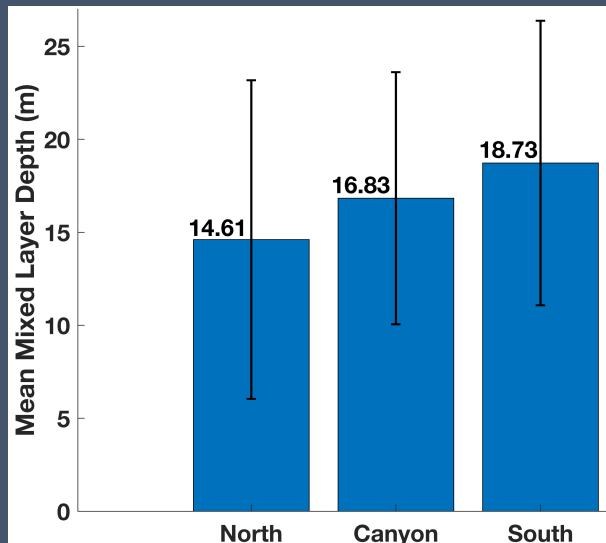
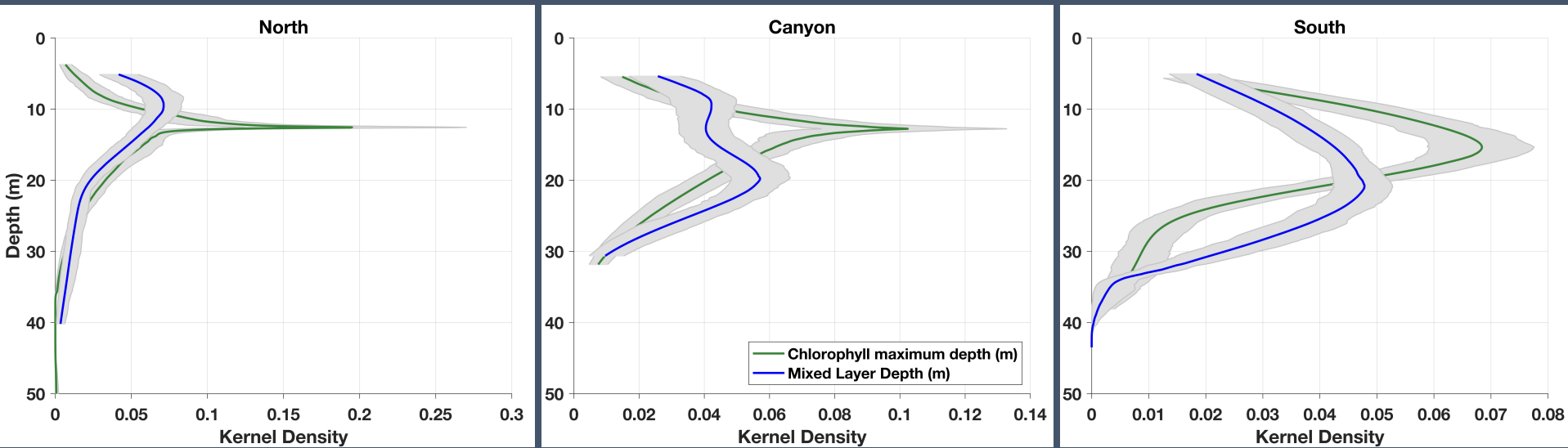
January 2-18, 2019



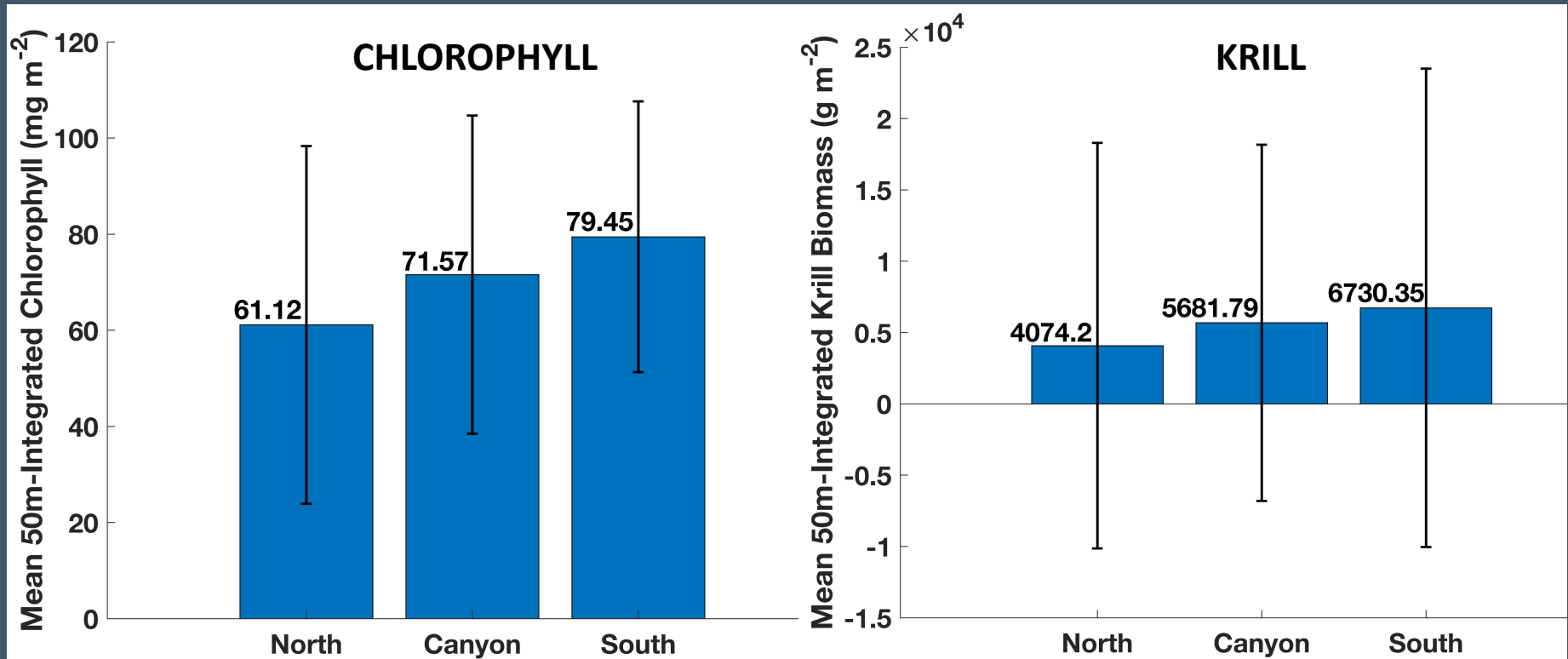
Captured a large phytoplankton bloom, concurrent with shallowing chlorophyll maximum and mixed layer depth



Mixed layer depth and chlorophyll maximum are shallowest on the northern flank and deepest on the southern flank



Chlorophyll and krill biomass are highest over the southern flank



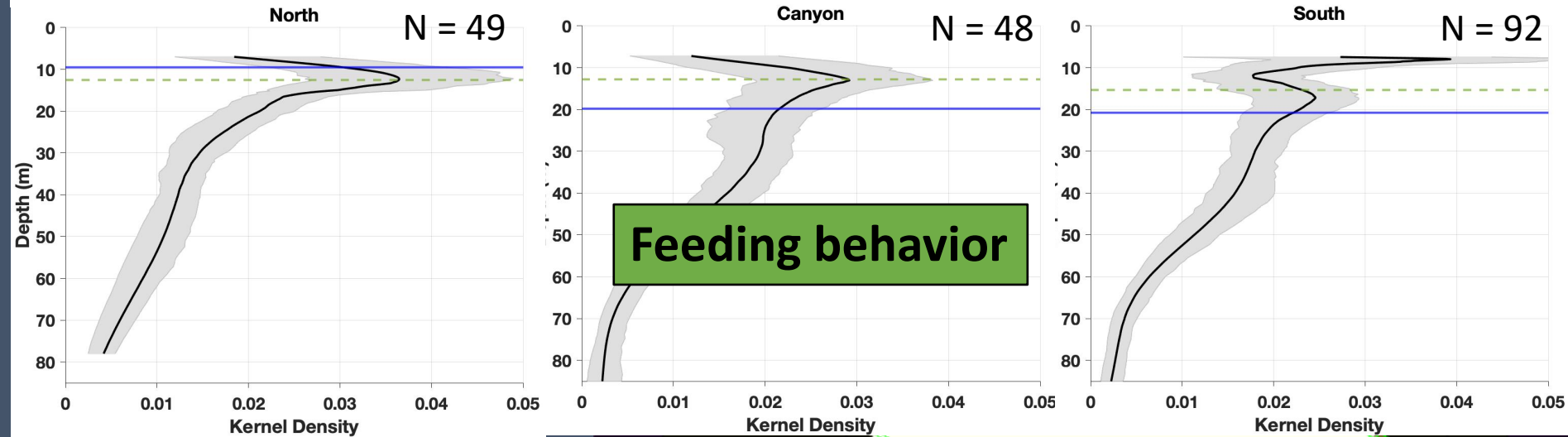
Lots of offshore production funneled in through conveyor belt in the south?

Deeper mixed layer depth allowing more room for production?

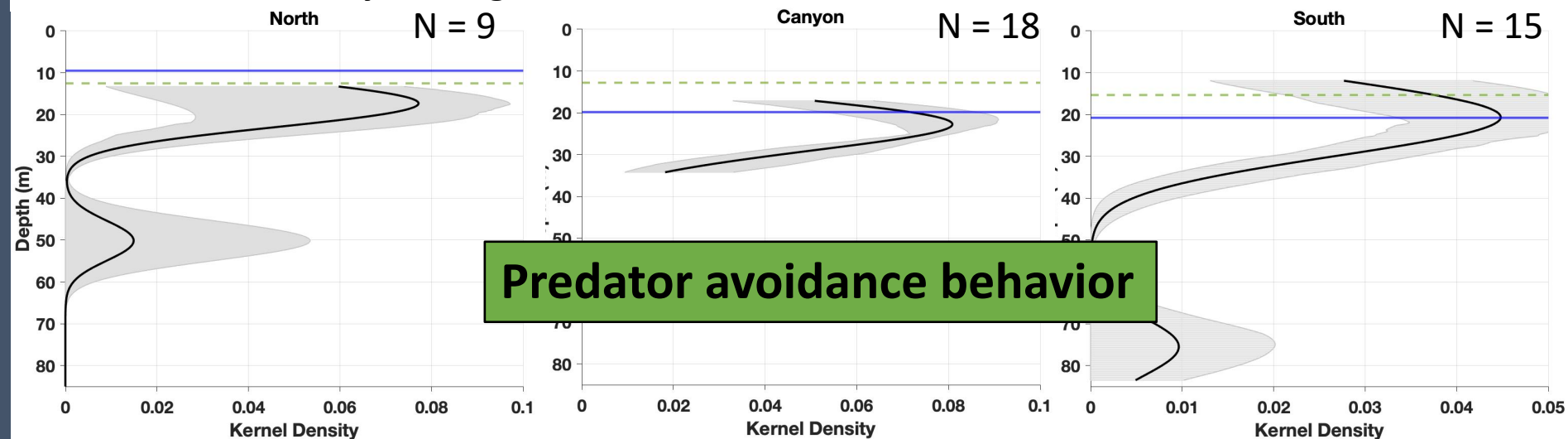
Small diffuse krill aggregations found at the chlorophyll maximum

Large dense krill aggregations found just below mixed layer depth

Diffuse – mean density 45.9 g m^{-2}



Dense – mean density 213.4 g m^{-2}



Conclusions

- **Gliders with integrated acoustics offer HUGE potential to gain a better understanding of the bottom of the Antarctic food web**
- **Next steps in the analysis include:**
 - **Determining drivers of krill aggregation dynamics**
 - **Tying in data from tagged penguins**
 - **Incorporating water sample data to look at differences in phytoplankton community composition**
- **Project SWARM 2019/2020 Antarctic summer field season looking at Palmer Deep dynamics with 3 acoustic gliders**