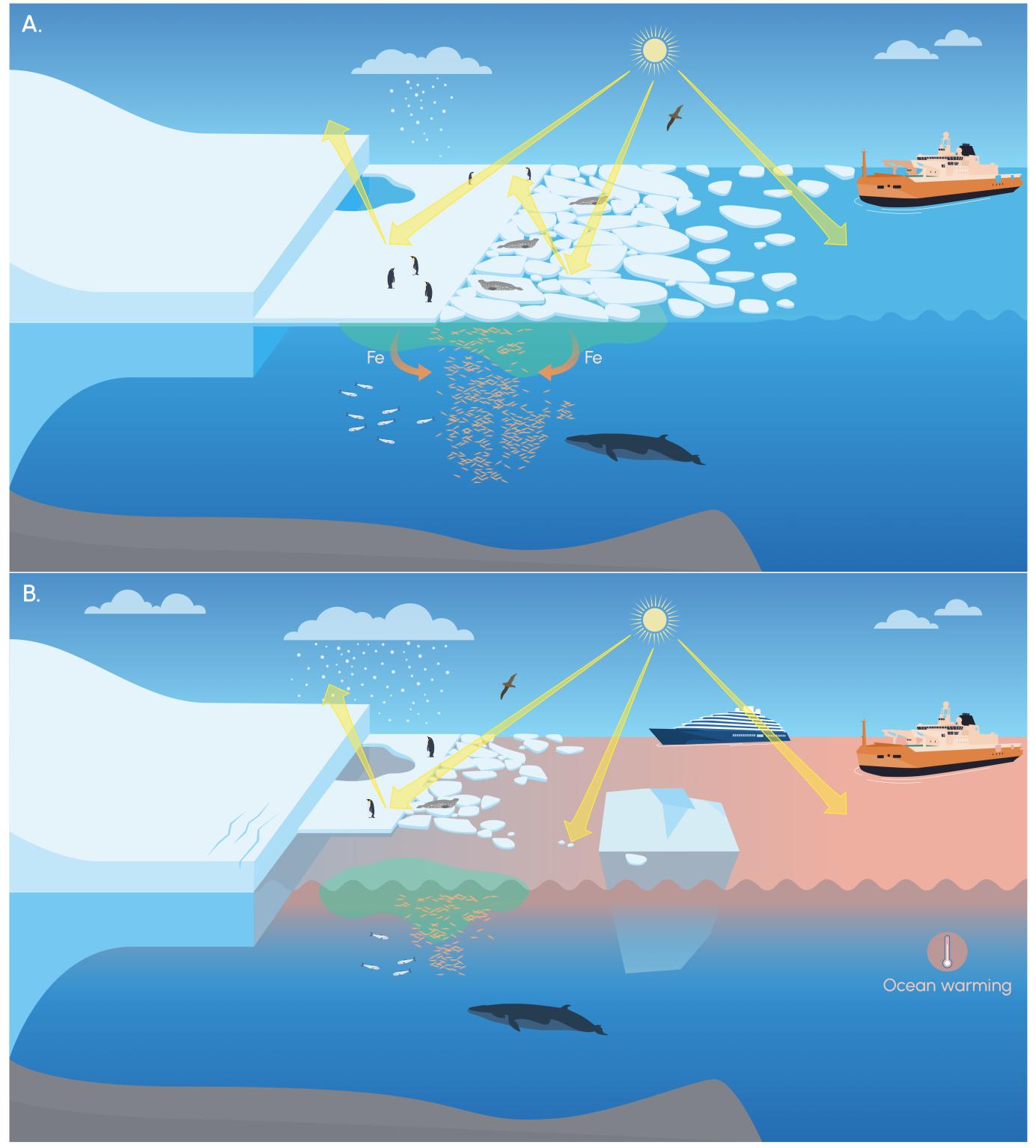
Physical and Biological Impacts of Antarctic Sea Ice Extremes

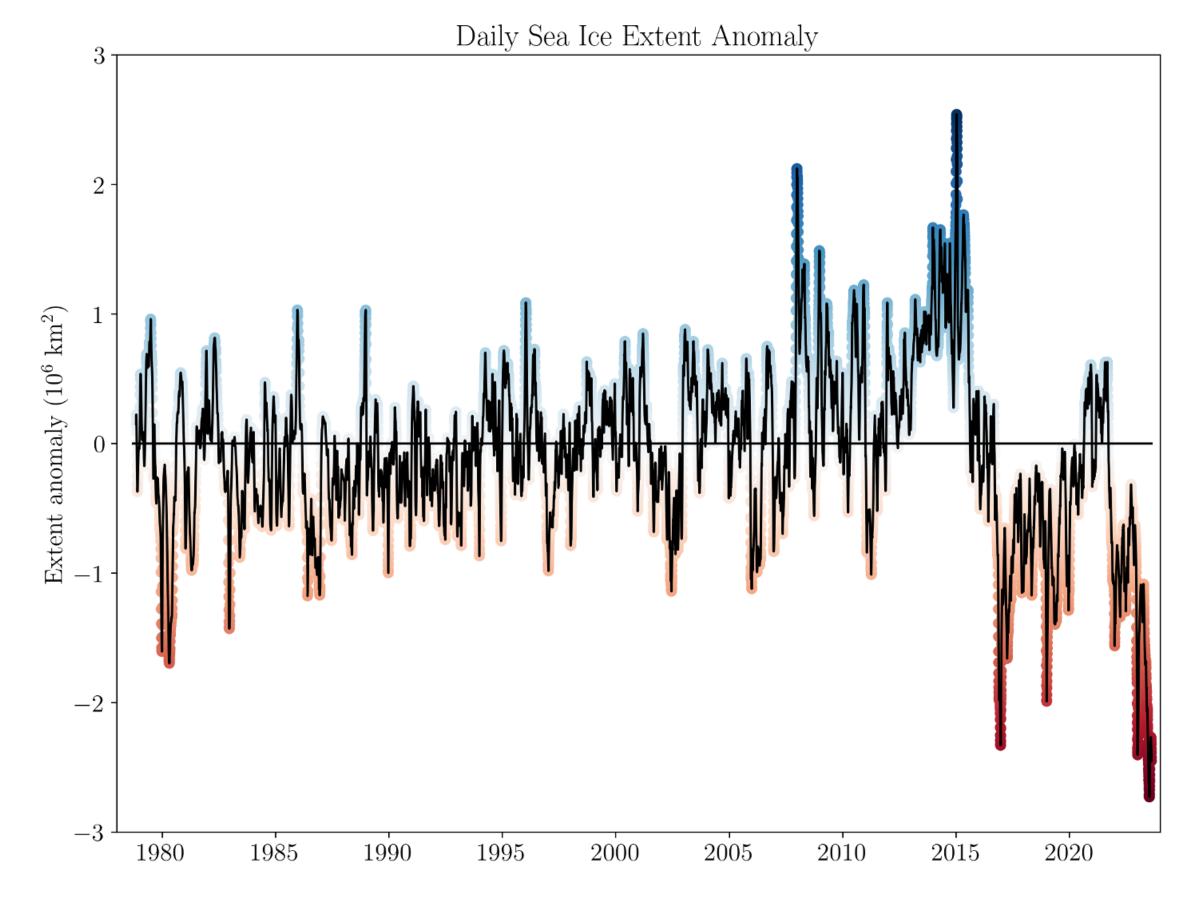
- Edward Doddridge, Matthis Auger, Sean Chua, Sue Cook, Stuart Corney, Louise Emmerson, Alexander D. Fraser, Petra Heil, Laura Herraiz-Borreguero, Will Hobbs, Nat Kelly, Xueke Li, Guillaume Liniger, Robert Massom, Amelie Meyer, Phillip Reid, Colin Southwell, Paul Spence, Anton Steketee, Kerrie M. Swadling, Nathan Teder, Barbara Weinecke, Pat Wongpan, Kaihe Yamazaki
- Record lows and highs in sea ice extent impact the physics and biology of the Southern Ocean
- Non-linear responses and multi-year memory raises the prospect of compounding events
- It's complicated, but mostly bad

System wide impacts

Sea ice extremes impact a multitude of physical, ecological, and economic systems. The upper panel shows a normal sea ice year, while the bottom panel highlights many of the changes observed in a year of extreme low sea ice coverage.



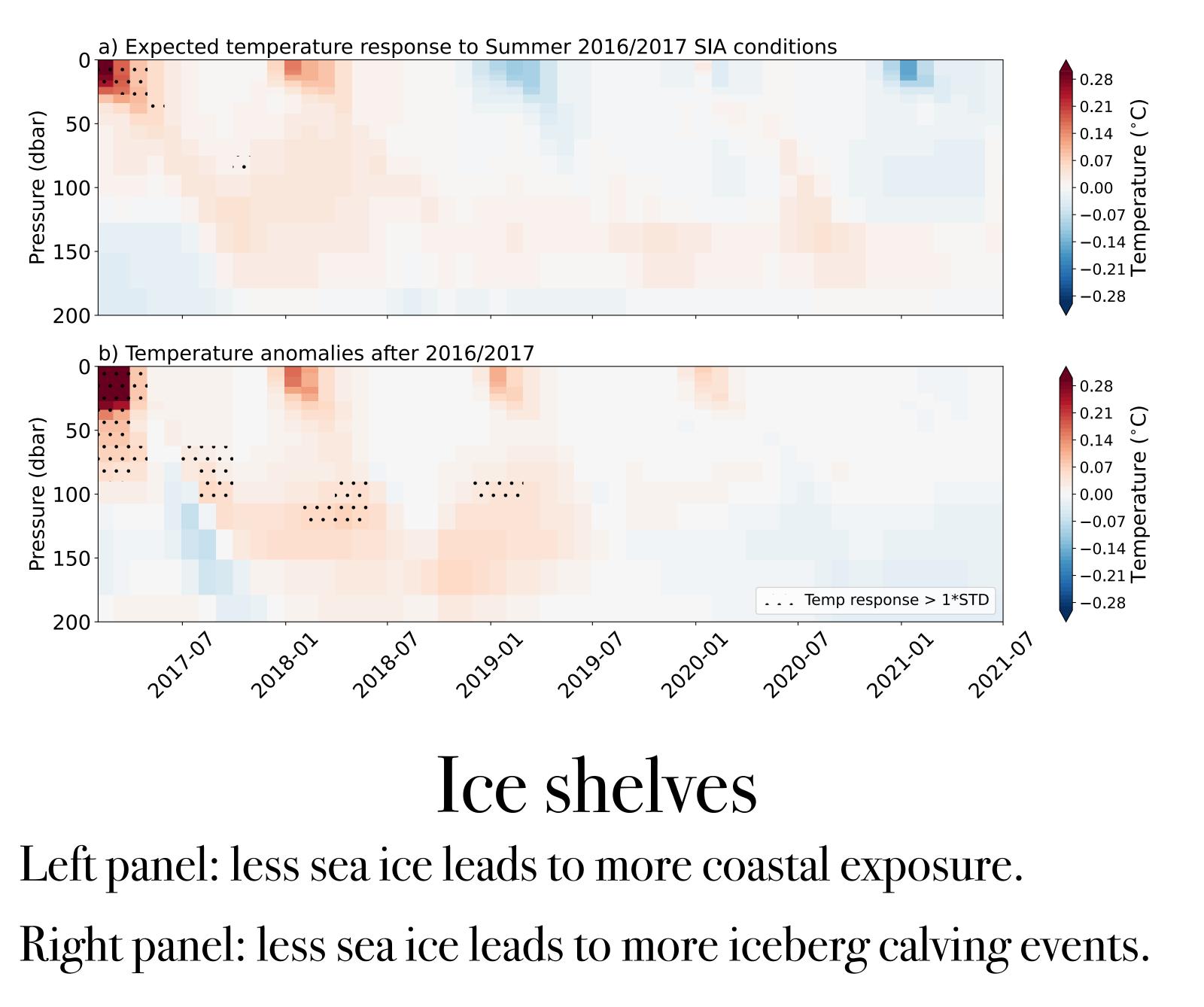
Record highs and lows Record high in 2014. Record low minima in 2017, 2022, and 2023.



The oceanic response

Top panel: ocean temperature response to 2016/17 sea ice minimum predicted by linear regression analysis.

Bottom panel: ocean temperature response from perturbation ACCESS-OM2 simulation. Note multiyear memory!



Higher trophic levels Sea ice plays a central role in the life cycle of many Antarctic species. Sea ice extremes upset these delicately balanced ecosystems leading to multifaceted and interconnected impacts.

