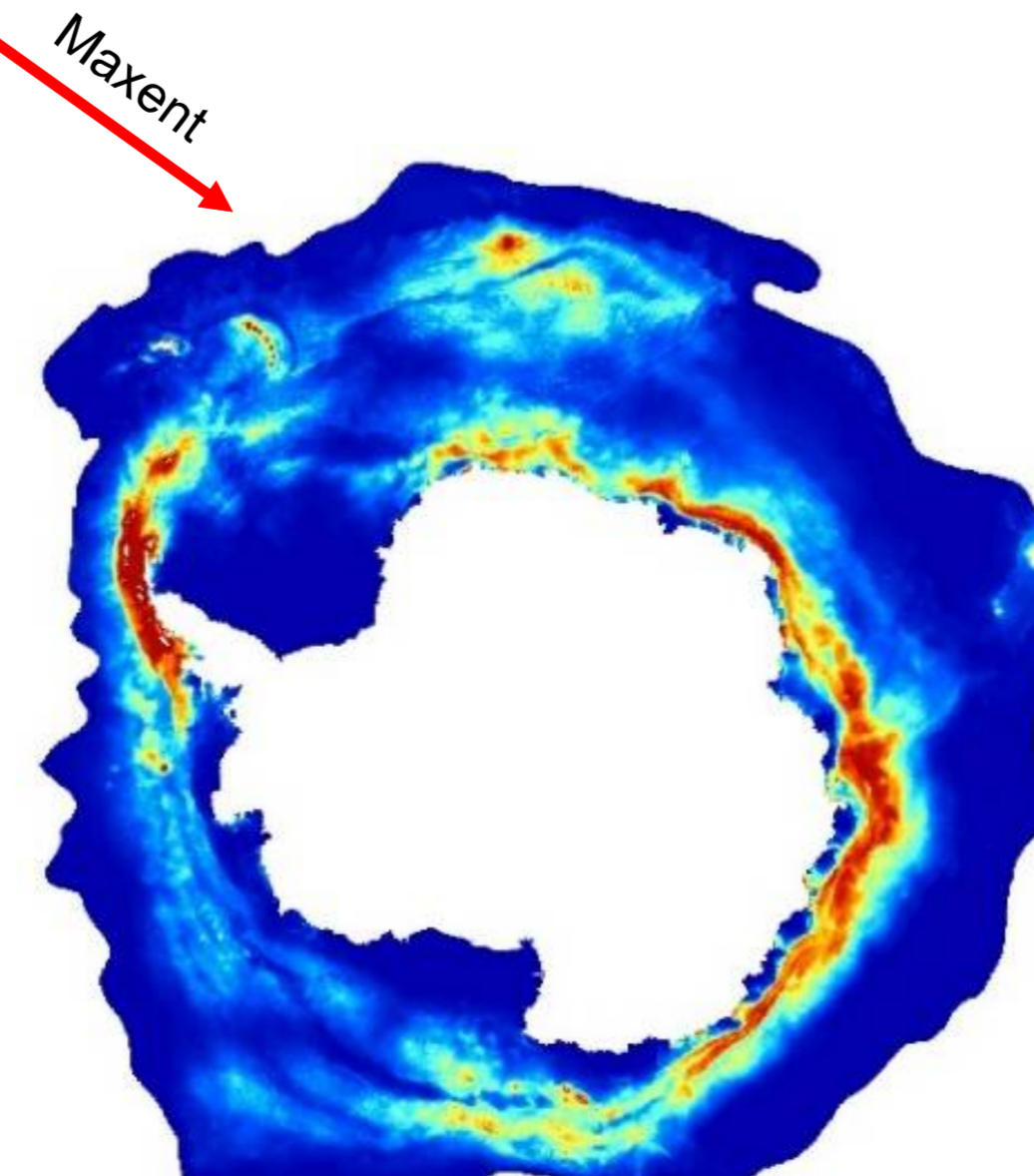
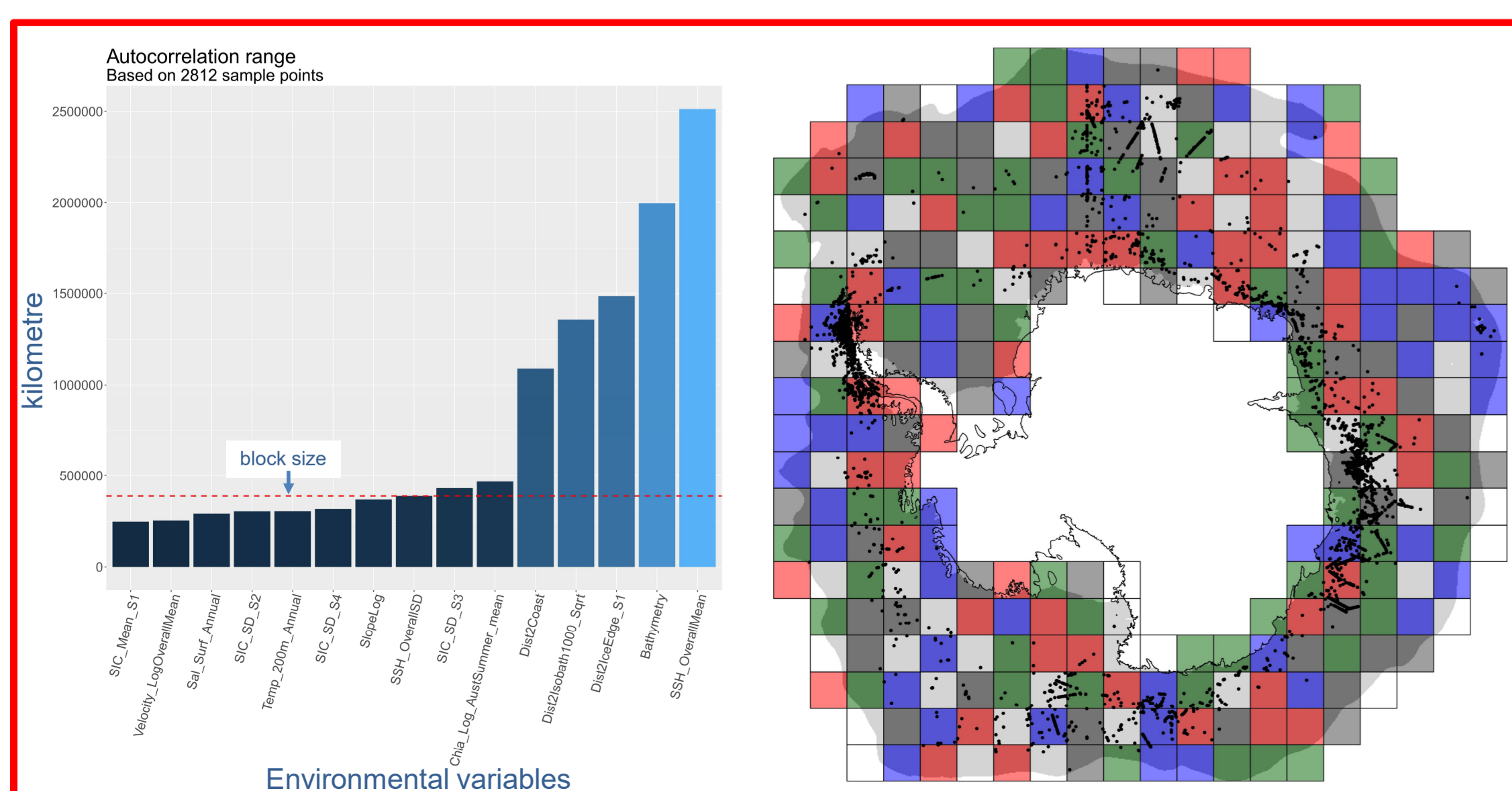
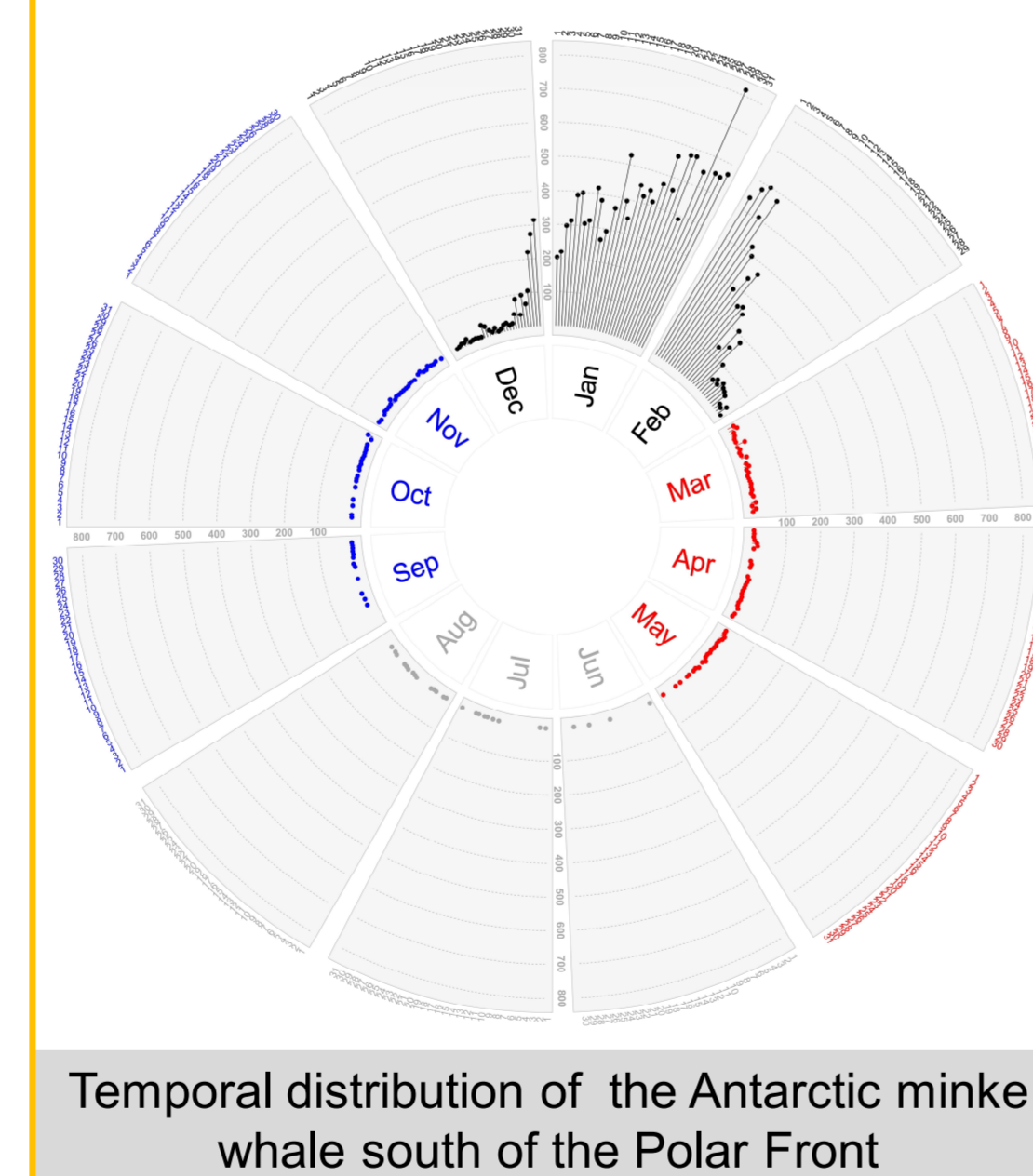
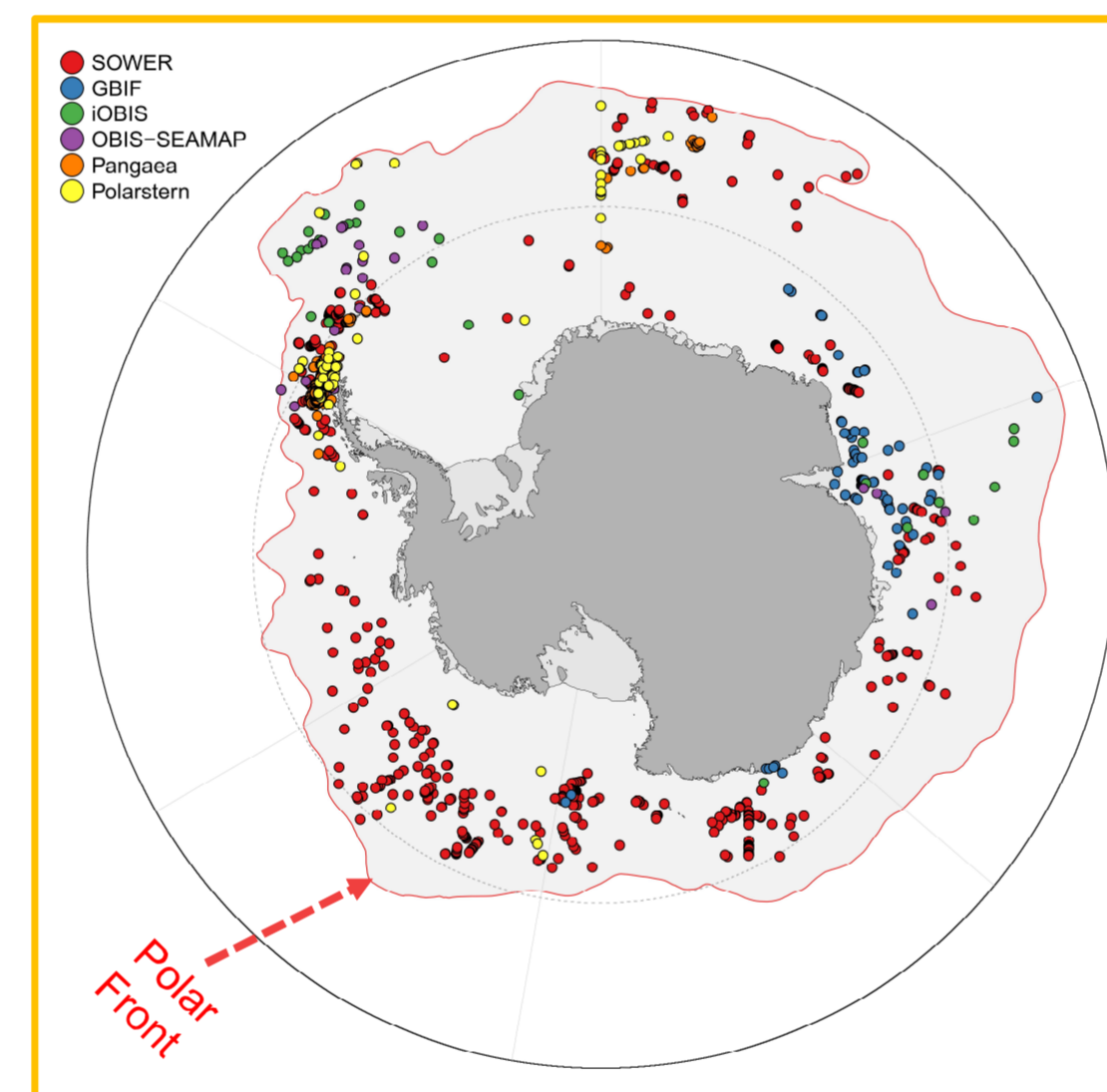


Background

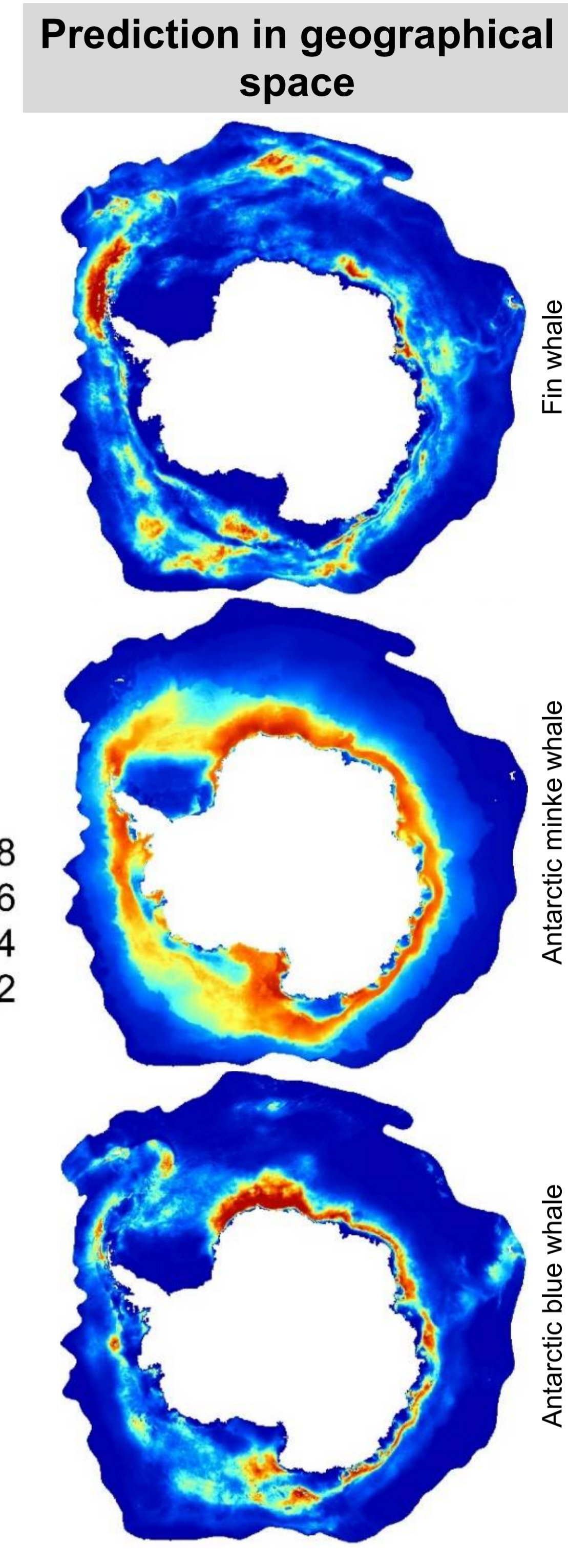
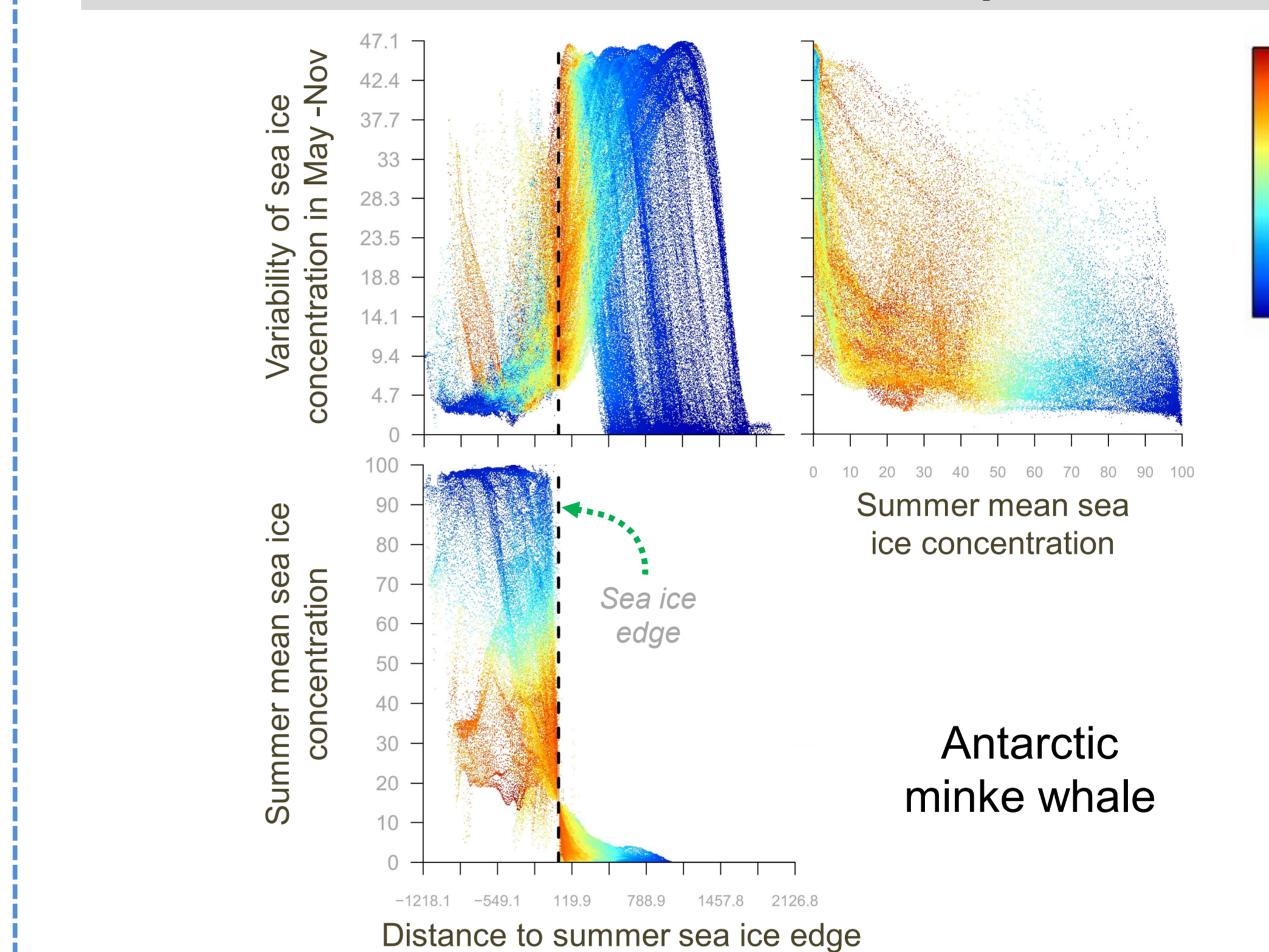
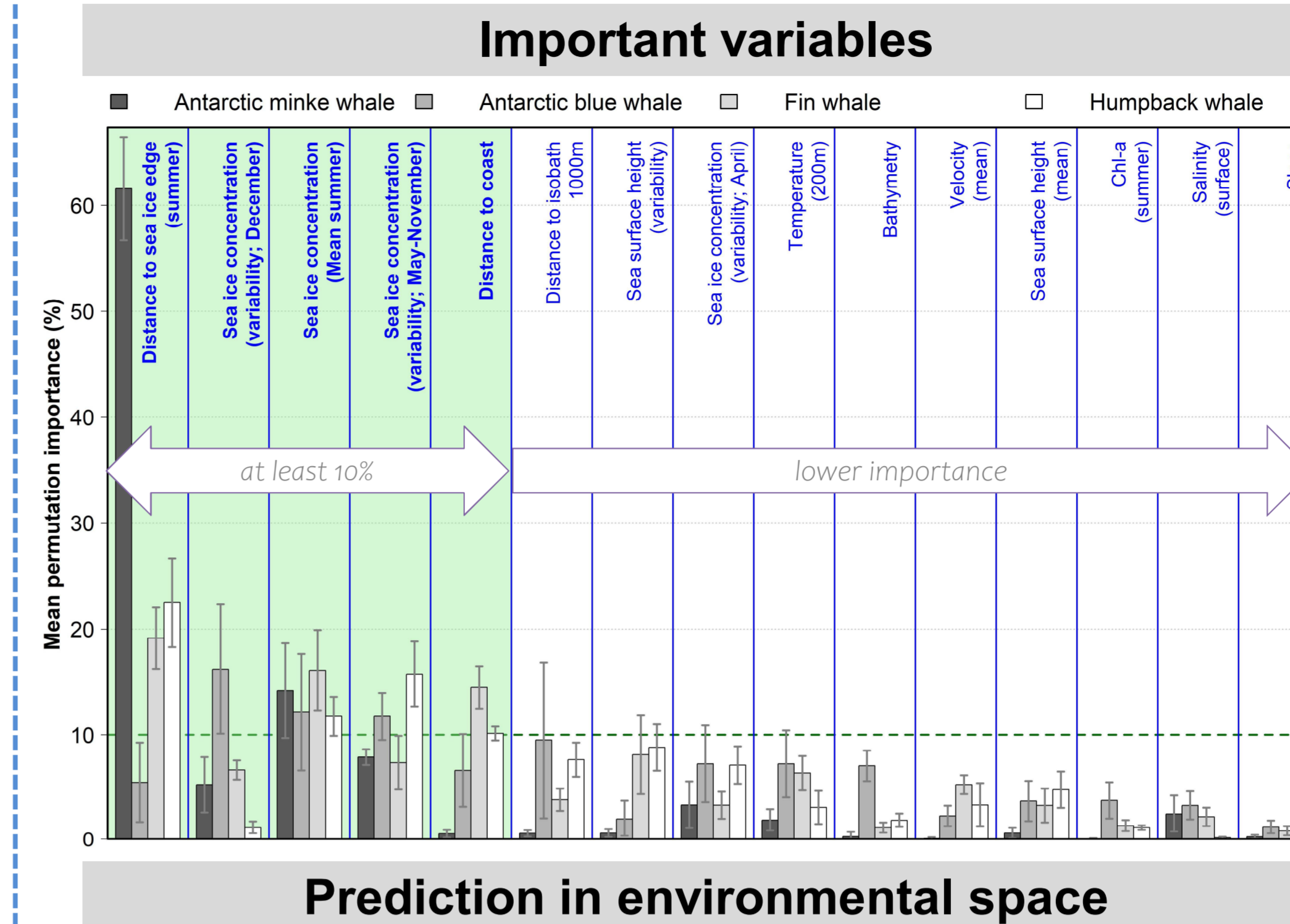
- # The Southern Ocean provides a key habitat to many whales.
- # Sampling effort there is generally suboptimal, which hinders the availability of sufficient good-quality data.
- # Information on marine mammals distribution in the Southern Ocean is patchy and spatio-temporally biased.
- # Our aim is to model the circumpolar distribution of four baleen whale species (Antarctic minke whale, Antarctic blue whale, Fin whale, and Humpback whale) in the Southern Ocean using presence-only occurrences & static models.

Methods

- # Presence-only occurrences (after 1980), compiled from different repositories; e.g. GBIF, iOBIS, SOWER, and RV Polarstern
- # Models were trained south of the Southern Ocean Polar Front [1] using Maxent [2-3]
- # 15 environmental variables summarizing long-term environmental conditions
 - 1980s → now
 - mean and variability (standard deviation) of environmental conditions
 - 10 × 10 km equal-area pixels
- # Species-specific spatial-block cross-validation[4]
 - 1) independent model evaluation [5]
 - 2) ↓ spatial autocorrelation
 - 3) tuning Maxent's parameters[6] (feature classes & regularization multiplier): ↑ testing AUC
- # Mean cross-validated potential distribution
- # Habitat suitability in environmental space
- # Identify important environmental variables



Results



Conclusion

- # We used comprehensive presence-only data to predict the circumpolar distribution of baleen whales in the Southern Ocean and identified the most important variables affecting their apparent distribution.
- # However, data is inevitably opportunistic and biased.
- # Although we used environmental variables representing the long-term environmental variability, the current models are static and only show one artificial manifestation of the distribution in time and space.
- # Static models use environmental conditions that may not be concomitant to species presence. They ignore extreme conditions which may affect species distribution.
- # Dynamic models that consider the dynamic nature of the environment and the migratory behaviour of whales are highly required. Data integration of visual observations and other data types (e.g. passive acoustic monitoring 'PAM') into dynamic models can improve our understanding of the ecology of whales in the Southern Ocean.

References:

¹ Orsi *et al.* 1995; ² Phillips *et al.* 2006; ³ Phillips *et al.* 2017; ⁴ Valavi *et al.* 2019; ⁵ Roberts *et al.* 2017; ⁶ Muscarella *et al.* 2014

