

1 **Supplement 3**

2 **Table S3.1.** List of environmental covariates that were included in the model, including details regarding spatio-temporal accuracy and data sources.

Environmental covariate	Unit	Spatial resolution	Temporal resolution	Data Source and URL
<i>Measured covariates:</i>				
Sea ice concentration	%	6.25 km	daily	<a href="https://seaice.uni-bremen.de/sea-ice-concentration/">https://seaice.uni-bremen.de/sea-ice-concentration/</a>
Sea surface height (SSH)	cm	0.25°	3-5 hours	<a href="http://www.aviso.oceanobs.com/en/data/products/sea-surface-height-products/global/index.html">http://www.aviso.oceanobs.com/en/data/products/sea-surface-height-products/global/index.html</a>
Sea surface temperature (SST)	°C	0.011°	daily	High Resolution Sea Surface Temperature (GHRSSST) Level 4 Multiscale ultrahigh Resolution (MUR) Global Foundation SST v4.1; <a href="https://podaac.jpl.nasa.gov/Multi-scale_Ultra-high_Resolution_MUR-SST">https://podaac.jpl.nasa.gov/Multi-scale_Ultra-high_Resolution_MUR-SST</a>
Wind speed	cm/s	10 km	4-hourly	Gridded forecast data from the AMPS-WRF model available every 4 hours (d2-data): <a href="http://www2.mmm.ucar.edu/rt/amps/wrf_grib/">http://www2.mmm.ucar.edu/rt/amps/wrf_grib/</a>
Bathymetry	m	0.05°	na	GEBCO_2014 General Bathymetric Chart of the Oceans Grid, version 20150318; <a href="https://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_30_second_grid/">https://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_30_second_grid/</a>
Chlorophyll a concentration (summer)*	mg/m3	9 km	daily	Near-surface chl-a summer climatology from MODIS Aqua Level-3 binned data; <a href="http://oceancolor.gsfc.nasa.gov/">http://oceancolor.gsfc.nasa.gov/</a>
<i>Derived covariates:</i>				
Distance to sea ice	km	25 km	daily	Derived based on sea ice data from: <a href="https://nsidc.org/data/nsidc-0051">https://nsidc.org/data/nsidc-0051</a> ; documentation: <a href="https://data.aad.gov.au/metadata/records/Polar_Environmental_Data">https://data.aad.gov.au/metadata/records/Polar_Environmental_Data</a>
Distance to shelf break	km	0.05°	na	Derived based on ETOPO1 bathymetry data; documentation: <a href="https://data.aad.gov.au/metadata/records/Polar_Environmental_Data">https://data.aad.gov.au/metadata/records/Polar_Environmental_Data</a>
Time since/to melt of sea ice	days	25 km	daily	Derived based on sea ice data from: <a href="https://nsidc.org/data/nsidc-0051">https://nsidc.org/data/nsidc-0051</a> ; documentation: <a href="https://data.aad.gov.au/metadata/records/Polar_Environmental_Data">https://data.aad.gov.au/metadata/records/Polar_Environmental_Data</a>
Sea ice concentration - seasonal average**	%	6.25 km	daily	Original data: <a href="https://seaice.uni-bremen.de/sea-ice-concentration/">https://seaice.uni-bremen.de/sea-ice-concentration/</a>
Sea surface temperature - seasonal average**	°C	0.011°	daily	Original data: <a href="https://podaac.jpl.nasa.gov/Multi-scale_Ultra-high_Resolution_MUR-SST">https://podaac.jpl.nasa.gov/Multi-scale_Ultra-high_Resolution_MUR-SST</a>
Sea ice concentration - spatial gradient	%	6.25 km	daily	Original data: <a href="https://seaice.uni-bremen.de/sea-ice-concentration/">https://seaice.uni-bremen.de/sea-ice-concentration/</a>
Sea surface temperature - spatial gradient	°C	0.011°	daily	Original data: <a href="https://podaac.jpl.nasa.gov/Multi-scale_Ultra-high_Resolution_MUR-SST">https://podaac.jpl.nasa.gov/Multi-scale_Ultra-high_Resolution_MUR-SST</a>
Bathymetry - spatial gradient	m	0.05°	na	Original data: <a href="https://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_30_second_grid/">https://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_30_second_grid/</a>

\* Summer chlorophyll: average of the 2002/03 to 2009/10 austral summer seasons

\*\* Seasonal average = 1<sup>st</sup> of December 2015 to 31<sup>st</sup> of March 2016