Metadata

Dataset Name	CMIP6 Hudson Bay Sea Ice Thickness Phenology
Dataset General Type	Climate Model
Dataset Type	Dataset
Dataset Level	2
Program Website	https://umanitoba.ca/earth-observation-science/julienne-stroeve-project-page
Keyword Vocabulary	
Keyword Vocabulary URL	
Theme	
Title	Cryosphere
URL	https://canwin-datahub.ad.umanitoba.ca/data/en/group/cryosphere
Dataset Status	Complete
Maintenance and Update Frequency	Not planned
Dataset Last Revision Date	2024-08-26
Dataset DOI	
Metadata Creation Date	2024
Publisher	CanWIN

Dataset Authors

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Dataset Collection Start Date

1920-01-01

Dataset Collection End Date

2100-01-01

Sample Collection

Sample Collection 1

Sampling Instrument Name

Standardized Sampling Instrument Name

Sample Collection Method Name

Comment

Method Link

Method Summary

Method Description Type Methods

Activity Collection Type

Preferred citation

Analytical Instrument

Analytical Instrument 1

Analytical Instrument Name

Standardized Analytical Instrument Name

Analytical Instrument Identifier Id

Analytical Instrument Title Type Alternative Title

Analytical Instrument Identifier Type

Analytical Method

Analytical Method 1

Analytical Method Name

Method Link

Method Summary

Laboratory

Comments

Variables Measured

License Name

Creative Commons Attribution 4.0 International

Licence Type

Open

Embargo Date

Licence URL

https://spdx.org/licenses

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Awards

Awards 1

Award Title

Website

Funder Name

Funder Identifier Code

Funder Identifier Type

Funder Identifier Scheme

Grant Number

Related Resources

Related Resources 1

Related Resource Name

Resource Code

Identifier Type

Relationship To This Dataset

Resource Type Online Resource

Type

Series Name

Publications

Publications 1

Publication Name

Identifier Code

Identifier Type

Relationship to this dataset

Resource Type Online Resource

Publication Type

Spatial regions

northern-hemisphere

Spatial extent West Bound Longitude	
Spatial extent East Bound Longitude	
Spatial extent South Bound Latitude	
Spatial extent North Bound Latitude	

Data and Resources

URL	https://canwin-datahub.ad.umanitoba.ca/data/dataset/66847fce-c9ca-429f-979b-effc44202997/resource/93f78046-d2bc-480f-b4c8-87ac860fc9cd/download/cmip6_biascorrected-and-weightedmean_historical-ssp585_1920-2099.csv
Name	Multi-Model Means of Hudson Bay Sea Ice Thickness Phenology
Description	Multi-model means from 1920-2099 for continuous ice-free period (IFP), last retreat day (LRD) and first advance day (FAD) using either a delta-shift bias correction (BC) or weighted mean (WM). Three regions are used: Hudson Bay (including James Bay, but excluding Hudson Strait and Foxe Basin), western Hudson Bay, and southern Hudson Bay. The latter two regions are commonly used for dividing the polar bear population in Hudson Bay. (e.g., https://polarbearagreement.org/polar-bear-biology/population-distribution-and-trends) The bias correction is conducted by comparing the observational average of sea ice phenology from the 1979-2021 passive microwave record to the years in each model for which the temperature anomaly relative to 1850-1900 is in the same range as recorded by the Berkeley Earth surface temperature dataset. For each model simulation, the difference in average IFP, LRD, and FAD for those years sharing the same temperature anomaly range is considered the bias, and this bias is subtracted from all years of data before calculating a multi-model mean from the first ensemble member (replicate) of each model. The weighted mean has two factors. First, a model simulation receives more weight if it shows better performance (relative to the passive microwave record for sea ice phenology and the Berkeley Earth surface temperature record) for that same period 1979-2021. Second, model simulations that show more independence from other simulations also receive more weight. In this way, it is possible to use multiple simulations (up to 7) from each participating model. The bias-corrected mean uses 20 simulations total, whereas the weighted mean uses 49.
Format	CSV
Resource Category	data

URL	https://canwin-datahub.ad.umanitoba.ca/data/dataset/66847fce-c9ca-429f-979b-effc44202997/resource/686b471d-d0e7-467b-bbee-84bf9d7cc5e1/download/cmip6_biascorrected-and-weightedse_historical-ssp585_1920-2099.csv
Name	Standard Error for Hudson Bay Sea Ice Thickness Phenology
Description	Standard error for multi-model means from 1920-2099 for continuous ice-free period (IFP), last retreat day (LRD) and first advance day (FAD) using either a delta-shift bias correction (BC) or weighted mean (WM). Three regions are used: Hudson Bay (including James Bay, but excluding Hudson Strait and Foxe Basin), western Hudson Bay, and southern Hudson Bay. The latter two regions are commonly used for dividing the polar bear population in Hudson Bay. (e.g., https://polarbearagreement.org/polar-bear-biology/population-distribution-and-trends) The bias correction is conducted by comparing the observational average of sea ice phenology from the 1979-2021 passive microwave record to the years in each model for which the temperature anomaly relative to 1850-1900 is in the same range as recorded by the Berkeley Earth surface temperature dataset. For each model simulation, the difference in average IFP, LRD, and FAD for those years sharing the same temperature anomaly range is considered the bias, and this bias is subtracted from all years of data before calculating a multi-model mean from the first ensemble member (replicate) of each model. The weighted mean has two factors. First, a model simulation receives more weight if it shows better performance (relative to the passive microwave record for sea ice phenology and the Berkeley Earth surface temperature record) for that same period 1979-2021. Second, model simulations that show more independence from other simulations also receive more weight. In this way, it is possible to use multiple simulations (up to 7) from each participating model. The bias-corrected mean uses 20 simulations total, whereas the weighted mean uses 49.
Format	CSV
Resource Category	data

URL	https://canwin-datahub.ad.umanitoba.ca/data/dataset/66847fce-c9ca-429f-979b-effc44202997/resource/3a46d32d-71eb-44dc-b573-686aaf732cd8/download/cmip6_thicknessphenology_10cm_regional-reghb3_historical.zip
Name	Hudson Bay Sea Ice Thickness Phenology - Historical
Description	Regional averages from 1920-2013 (Historical experiment from CMIP6) for continuous ice-free period (IFP), last retreat day (LRD) and first advance day (FAD) using either a delta-shift bias correction (BC) or weighted mean (WM). Three regions are used: Hudson Bay (including James Bay, but excluding Hudson Strait and Foxe Basin), western Hudson Bay, and southern Hudson Bay. The latter two regions are commonly used for dividing the polar bear population in Hudson Bay. (e.g., https://polarbearagreement.org/polar-bear-biology/population-distribution-and-trends)
Format	ZIP
Resource Category	data

URL	https://canwin-datahub.ad.umanitoba.ca/data/dataset/66847fce-c9ca-429f-979b-effc44202997/resource/fe336342-b180-4293-b6d1-014da62ccf95/download/cmip6_thicknessphenology_10cm_regional-reghb3_ssp585.zip
Name	Hudson Bay Sea Ice Thickness Phenology - SSP585

Description	Regional averages from 2015-2099 (SSP585 experiment of CMIP6) for continuous ice-free period (IFP), last retreat day (LRD) and first advance day (FAD) using either a delta-shift bias correction (BC) or weighted mean (WM). Three regions are used: Hudson Bay (including James Bay, but excluding Hudson Strait and Foxe Basin), western Hudson Bay, and southern Hudson Bay. The latter two regions are commonly used for dividing the polar bear population in Hudson Bay. (e.g., https://polarbearagreement.org/polar-bear-biology/population-distribution-and-trends).
Format	ZIP
Resource Category	data

URL	https://canwin-datahub.ad.umanitoba.ca/data/dataset/66847fce-c9ca-429f-979b-effc44202997/resource/29d654cf-b0d6-4e39-845d-3c6a3521d16d/download/cmip6_bias-corrected-by-t2mamly_historical-ssp585_baselineyears_1979-2021_multimodelmean.nc
Name	Bias-corrected Multi-Model Average Grids
Description	The continuous ice-covered period (cip), advance day (fad), and retreat day (lrd) are defined using a sea ice thickness threshold of 10 cm. Each "year" is from September 1, Year 1 to August 31, Year 2 and dates are given as units of "days starting January 1 of Year 1". Original data source is 20 simulations from the historical and shared socioeconomic pathway 5-8.5 (ssp585) experiments from the Coupled Model Intercomparison Project version 6 (CMIP6). This thickness phenology for each model simulation (one simulation per model) was bias-corrected relative to average phenology derived from Bootstrap and NASA Team algorithms applied to passive microwave data for the period 1979-2021. For each model, the average modelled ice-covered period for years in which the temperature anomaly relative to 1850-1900 fell within the range observed in the Berkeley Earth Surface Temperature record for 1979-2021 was compared to the satellite observations. The difference was used as a bias adjustment, applied to all years. Next, an equally weighted multi-model mean was calculated for each 0.5°C global temperature anomaly bin (i.e., tanom = "1°C" means 0.5°C ≤ T' < 1.5°C).
Format	NetCDF
Resource Category	data

URL	https://canwin-datahub.ad.umanitoba.ca/data/dataset/66847fce-c9ca-429f-979b-effc44202997/resource/74953700-730b-4b28-a35d-67224f508708/download/cmip6_weighted-average-by-t2mamly_historical-ssp585_baselineyears_1979-2021.nc
Name	Weighted Multi-Model Average Grids
Description	The continuous ice-covered period (cip), advance day (fad), and retreat day (lrd) are defined using a sea ice thickness threshold of 10 cm. Each "year" is from September 1, Year 1 to August 31, Year 2 and dates are given as units of "days starting January 1 of Year 1". Original data source is 49 simulations from the historical and shared socioeconomic pathway 5-8.5 (ssp585) experiments from the 20 models participating in the Coupled Model Intercomparison Project version 6 (CMIP6). A weighted average of the simulations was calculated for each 0.5°C global temperature anomaly bin (i.e., tanom = "1°C" means 0.5°C ≤ T' < 1.5°C). Weights were determined using a balance of model performance and independence, following the general framework of Knutti et al. (2017; https://doi.org/10.1002/2016gl072012). "Performance" was assessed by comparing modelled sea ice and temperature variables to observed values. More specifically, the compared variables were the averages and trends of sea ice retreat and advance, the ice-free period, and regional 2-m air temperature over western and southern sectors of Hudson Bay for the period 1979-2021. For sea ice, the observational reference was the average phenology derived from Bootstrap and NASA Team algorithms applied to passive microwave data. For temperature, the Berkeley Earth Surface Temperature dataset was used. The weighting parameters were sigma_D = 0.49 and sigma_S = 0.50.

Format	NetCDF
Resource Category	data

Related Publications

Title	Ice-free period too long for Southern and Western Hudson Bay polar bear populations if global warming exceeds 1.6 to 2.6 °C
URL	https://canwin-datahub.ad.umanitoba.ca/data/en/publication/hudson-bay-polar-bear-projections-2024