Metadata

Field	Value
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/fr/group/cryosphere
Dataset Status	Complete
Maintenance and Update Frequency	Not planned
Dataset Last Revision Date	2024-08-26
Dataset DOI	

Field	Value
Metadata Creation Date	2026
Publisher	CanWIN
Dataset Authors	
Dataset Authors 1	
Name	Crawford, Alex
Type of Name	Personal
Email	alex.crawford@umanitoba.ca
Affiliation	Centre for Earth Observation Science - University of Manitoba
ORCID ID	0000-0003-1561-290X
	ORCID
	http://orcid.org/
Contributors	
Contributors 1	
Name	Stroeve, Julienne
Role	ProjectLeader

Field	Value
Email	julienne.stroeve@umanitoba.ca
Affiliation	Centre for Earth Observation Science - University of Manitoba
ORCID ID	0000-0001-7316-8320
	ORCID
	http://orcid.org/
Project Data Curator	Crawford, Alex
Project Data Curator email	alex.crawford@umanitoba.ca
Project Data Curator Affiliation	Centre for Earth Observation Science - University of Manitoba
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	

Field	Value
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	

Field	Value
Licence Name or Copyright Statement	Creative Commons Attribution 4.0 International
Copyright Statement	
Licence Type	Open
Embargo Date	
Licence URL	https://spdx.org/licenses
Terms of Access	CanWIN datasets are licensed individually, however most are licensed under the Creative Commons Attribution 4.0 International (CC BY 4.0) Public License. Details for the licence applied can be found using the Licence URL link provided with each dataset. By using data and information provided on this site you accept the terms and conditions of the License. Unless otherwise specified, the license grants the rights to the public to use and share the data and results derived therefrom as long as the proper acknowledgment is given to the data licensor (citation), that any alteration to the data is clearly indicated, and that a link to the original data and the license is made available.
Terms of Use	By accessing this data you agree to [CanWIN's Terms of Use](/data/publication/canwin-data-statement/resource/5b942a87-ef4e-466e-8319-f588844e89c0).
Awards	
Awards 1	
Award Title	
Website	
Funder Name	
Funder Identifier Code	

Field	Value
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

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

Data and Resources

Field	Value
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

Field	Value
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

Field	Value
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

Field	Value
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

Field	Value
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

Field	Value
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

Field	Value
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/fr/publication/hudson-bay-polar-bear-projections-2024