Metadata Guidance

The UK Polar Data Centre (PDC) will use the metadata you provide to us to issue a Digital Object Identifier (DOI) to a dataset and make the dataset available via data catalogues such as the PDC Discovery Metadata System (DMS).

Please ensure you provide enough information to enable future users to find, understand and re-use the data. All acronyms or abbreviations should be explained and all units and parameters described. Filenames should be meaningful, unique and consistent. Please note it may still be necessary to provide supporting documentation with your data files.

Key Metadata Fields

1. Title

   This should describe the dataset, not the project/activity which produced it. You might consider a title that answers the questions 'what, where, when'.

   MetUM and HIRHAM5 simulations of summer near-surface temperatures over Antarctica from 1979 to 2019

2. Abstract

   The abstract should summarise the dataset, allowing the reader to determine the scope and relevance of the resource. It is recommended that the abstract is organised following the 'what, where, when, how, why, who' structure.

   High-resolution hindcasts (1979-2019) of summer climate over Antarctica using the UK Met Office Unified Model (MetUM) and HIRHAM5 were conducted at the British Antarctic Survey and Danish Meteorological Institute, respectively. The hindcasts are conducted for summer 1979-2018, i.e., from December 1979 to February 2019, for December, January, February (DJF). This dataset consists of near-surface temperature output from these hindcasts at a temporal resolution of every 3 hrs. The hindcasts are contributions to the COordinated Regional Downscaling EXperiment (CORDEX) project. Both models are run over Antarctic CORDEX domains, which encompass all of Antarctica and some of the surrounding ocean, at a horizontal grid spacing of around 12 km. The near-surface temperatures are used to estimate regional surface melt "potential" over Antarctic ice shelves as a function of summertime temperature extremes and identify regions of potentially enhanced "hotspots" of melt potential based on the occurrence (and magnitude) of various temperatures.

3. Funding source

   Please be as specific as possible and include a reference number where available e.g. NERC standard grant NE/J012345/1.

   Funding was provided by the European Union's Horizon 2020 research and innovation framework programme under Grant agreement no. 101003590 (PolarRES)

4. Keywords

   Pick a number of keywords (~5) which will help others discover your dataset when searching our DMS.

HIRHAM5, MetUM, Polar CORDEX, high-resolution atmospheric modelling, hindcast

5. Personnel

List all those involved in producing this dataset. For each person, you must include: their full name, role(s) (see below for info), ORCID number (or state if they do not have one) and organisation. Personnel must be listed with priority ordering.
Roles: As a minimum, you must include the roles of the dataset creator(s) and a contact person for the data. Common other roles include researcher, project leader, project member, and project manager. All roles are defined here on pages 13, 34-38.
NB (1): Only dataset creators are used in the citation, but all personnel will be listed in the metadata – this is standard practice.
NB (2): The personnel information you provide will be used in the DOI metadata as specified; the DMS metadata may differ (i.e. priority ordering and role titles) due to current software limitations.

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Data Manager, Distributor, Hosting Institution

6. Lineage/methodology

Describe how the data was gathered and how it was processed, in enough detail to allow the reader to understand and re-use the data. If this data was collected on a cruise, please also state the cruise number. Metadata pertaining to model output should include the name and version of the model, the conditions of the calculation and the nature of its output.

The UK Met Office Unified Model (known as MetUM) uses the GA6 (Global Atmosphere 6.0; Walters et al., 2017) configuration of version 11.1, which is suitable for grid scales of 10 km or coarser. The HIRHAM5 model combines the physics of the ECHAM5 general circulation model and the hydrostatic dynamical core of the HIRLAM7 numerical weather prediction model (Christensen et al., 2007). The MetUM (HIRHAM5) uses 70 (31) vertical levels in the atmosphere. The ice mask used by both models is derived from Advanced Very High-Resolution Radiometer (AVHRR) data from the period 1992 to 1993 at a resolution of 1 km.

Both models are run over Antarctic CORDEX domains from December 1979 to February 2019 at grid spacing of around 12 km, with the MetUM (HIRHAM5) grid consisting of 392 x 504 (406 x 542) grid points. Initial and boundary conditions for both models are supplied by ERA-Interim reanalysis data. The MetUM hindcast uses a frequent re-initialization approach, consisting of twice-daily 24 hr forecasts. Output at T+12, T+15, T+18, and T+21 hr from each of the forecasts is concatenated together to form a seamless series of 3-hourly model

outputs, with the earlier output discarded as spin-up. The HIRHAM5 hindcast uses a long-term continuous integration approach, with no nudging.

Christensen, O. B., M. Drews, J. H. Christensen, K. Dethloff, K. Ketelsen, I. Hebestadt, and A. Rinke, 2007: The HIRHAM regional climate model, Version 5 (beta), Danish Climate Centre, Danish Meteorological Institute, Danish Meteorological Institute, Technical Report. ISSN 1399-1388

Walters, D., I. Boutle, M. Brooks, T. Melvin, R. Stratton, S. Vosper, H. Wells, K. Williams, N. Wood, T. Allen, A. Bushell, D. Copsey, P. Earnshaw, J. Edwards, M. Gross, S. Hardiman, C. Harris, J. Heming, N. Klingaman, R. Levine, J. Manners, G. Martin, S. Milton, M. Mittermaier, C. Morcrette, T. Riddick, M. Roberts, C. Sanchez, P. Selwood, A. Stirling, C. Smith, D. Suri, W. Tennant, P. L. Vidale, J. Wilkinson, M. Willett, S. Woolnough, and P. Xavier, 2017: The Met Office Unified Model Global Atmosphere 6.0/6.1 and JULES Global Land 6.0/6.1 configurations. Geosci. Model. Dev., 10, 1487-1520, https://doi.org/10.5194/gmd-10-1487-2017.

7. Instrumentation

List the instrumentation and software (including the version number) used in sample collection, analysis and processing.

See lineage for model and version used.

8. Quality

Information about the accuracy of the data and any quality control procedures followed e.g. instrument calibrations, factors affecting the data, use of replicates and standards. Include information on losses of data and any cleaning of the data. Any missing values or unexplained characters (e.g. N/A) must be explained.

Summer daily maximum temperatures derived from both the MetUM and HIRHAM5 hindcasts were compared in a statistical analysis with observations from twenty weather stations situated either on or close to Antarctic ice shelves. This comparison showed that the MetUM simulated temperatures were characterised by a) a cold bias for fifteen out of the twenty stations, which for ten of the stations was less than 1 K, b) a root-mean-square-error of 2-3 K, and c) a correlation from 0.62-0.91. The HIRHAM5 summer daily maximum temperatures typically have a larger cold bias, larger root-mean-square-error, and lower correlation than the MetUM results. The relatively good performance of the MetUM (and to a lesser extent HIRHAM5) suggests that daily maximum temperatures over Antarctic ice shelves derived from these model outputs are broadly representative of actual conditions.

9. Related datasets

Is this data part of a larger project or associated with any other datasets you are submitting? If you are depositing model output, you should include a link to the model code here (preferably from GitHub).

N/A

10. Related URLs

If you have a project page or online reports, for example, this can be linked.

N/A

11. Temporal coverage

Provide a start date and end date for the data collection (as yyyy-mm-dd). If you collected data over multiple seasons please provide the dates for each season, or if the data are continuous please provide an overall date range. For modelling data, please include the dates you ran the model and the output date range.

Start date 1979-12-01
End date 2019-02-28

12. Spatial coverage

Include all relevant spatial coverage information from the following: latitude (southernmost and northernmost); longitude (westernmost and easternmost) – in decimal degrees; altitude (min and max); and depth (min and max).

Southernmost -68.245
Northernmost -53.374
Westernmost -180
Easternmost 180

Altitude min/max 2m

Depth N/A

AND

Southermost -68.96
Northernmost -55.141
Westernmost -180
Easternmost 180

Altitude min/max 1.5m

Depth N/A

13. Resolution

State if your data has a specific horizontal, vertical or spatial resolution.

Long./lat. resolution 0.11 degrees (~12 km)

14. Location

Please provide place names – a broad region and associated localities – using a recognised source, e.g. The SCAR Composite Gazetteer of Antarctica.

Antarctica

15. References

Reference any publications/articles made from this data, to be listed against this dataset. If there is a paper or report that describes the methodology in detail, please provide the reference.

Orr, A., P. Deb, K. Clem, E. Gilbert, F. Boberg, D. Bromwich, S. Colwell, N. Hansen, M. Lazzara, P. Mooney, R. Mottram, M. Niwano, T. Phillips, D. Pishniak, C. Reijmer, W. J. van de Berg, Stuart Webster, and X. Zou, Summer air temperature extremes over Antarctic ice shelves and potential "hotspots" of surface melting, Journal of Climate, in press.

16. Data structure and data format

How many files are there, what format are they in and what are their approximate volume? The data should be in an open format (e.g. csv instead of Microsoft Excel) unless otherwise agreed.

14GB netCDF

The data are held as CF-compliant netCDF files, structured so that each netCDF file contains data for one model for one month. For each model this data set contains 120 files (one for each of December, January and February for 40 summers).

In addition to near-surface temperature data with CF-compliant spatiotemporal coordinates (on the relevant rotated latitude-longitude coordinate system), each netCDF file also contains auxiliary coordinates giving the true latitude and longitude coordinates for each point in the grid.

The HIRHAM5 data files are held in the "HIRHAM5" directory and are named: DMI-HIRHAM5_AT6_Near-Surface_Air_Temperature_[YYYYMM].nc (where YYYY identifies the year and MM is the 2-digit month number). The total size of the HIRHAM5 data is 6450 MB.

The MetUM data files are held in the "MetUM" directory and are named: Antarctic_CORDEX_MetUM_0p11deg_3-hourly_air_temperature_at_1.5_m_[YYYYMM].nc (where YYYY identifies the year and MM is the 2-digit month number). The total size of the MetUM data is 7537 MB.

17. Access constraints

State if there are any restrictions on accessing the data, e.g. if the data are under embargo and when it will be made freely available. State if a log in for reviewers to access an embargoed dataset is needed.

None

18. Use constraints

State if there are any restrictions on the use of the dataset once accessed. For NERC-funded data, the Open Government Licence is generally used.

Data supplied under Open Government Licence v3.0
http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/.

19. Final version

State whether this is this the final version of the dataset, or whether you think changes may arise following review of any related publications?

Final version