



Climate Change

CP4CDS

WP2 report (Martin Juckes, Ruth Petrie)

Final workshop – 5th December 2019





WP2 – Data Management: Identify and provide a quality controlled subset of global climate projections from CMIP5.

- CMIP5 was large: had many models, experiments and variables.
- Seven key experiments were selected:
 - amip, historical, piControl, RCP2.6, RCP4.5, RCP6.0, RCP8.5
- A set of 50 key variables from the CMIP5 archive were selected:
 - 37 monthly surface level variables
 - 6 monthly pressure level variables
 - 7 daily surface level variables
 - Additionally a few extra variables that were requested by C3S_34a_Lot2 were also supplied.
- All models that supplied data with an unrestricted licence were included in the subset.
- Attempts to supply data that existed in at least three ensemble members was not possible as this reduced drastically the amount of available data.



Data availability matrix



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CP4CDS Data Management Tool



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Data Availability Matrix

The data availability matrix filter allows users to search the CP4CDS database for one or more variables within one or more experiments simultaneously. By specifying a minimum ensemble size, each model returned as a result of the search criteria must have at least the number of ensemble members specified by the user.

Variables	Experiments	Min Ensemble Size	
<input type="text" value="pr"/> Add variable + Select all Deselect all	<input type="text" value="historical x rcp60 x rcp85 x rcp45 x"/> Select all Deselect all	<input type="text" value="3"/>	
Variable	Table	Frequency	
tas	Amon	mon	
pr	Amon	mon	

[Get results](#) [Reset all filters](#)

<https://cp-availability.ceda.ac.uk/data-availability/>





Quality control procedure:

- Fundamental metadata conformance checks are done by the CEDA-CC tool:
 - the file name adheres to the CMIP5 file naming convention,
 - the global attributes of the NetCDF file are consistent with filename,
 - there are no omissions of required CMIP5 metadata.
- Compliance with the Climate and Forecast (CF) conventions performed by the CF-Checker
 - e.g. the variable standard name is supplied correctly and that the units specified match the variable.

Full QC documentation: https://github.com/cp4cds/qcapp/blob/master/docs/Global_climate_projections_quality_control_checks.pdf

CEDA-CC: <https://pypi.org/project/ceda-cc/>

CF-Checker: <http://cfconventions.org/>



Quality control

- A time-axis-checker is used to check the temporal dimension of the data:
 - for individual files the time dimension of the data is checked to ensure it is valid and is consistent with the temporal information in the filename,
 - where more than one file is required to generate a time-series of data, the files have been checked to ensure there are no temporal gaps or overlaps between the files.
- Where a variable for a given model was known to have a gross error, e.g. in sign, the data were omitted.

Only data that passed all stages of quality control were considered for inclusion in the CDS although data that had minor metadata errors were corrected and included in the CDS.

Data are then replicated to all three sites as per WP6.



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Search results

- CMIP5 monthly data on pressure levels
CMIP5 monthly data on pressure levels
- CMIP5 daily data on pressure levels
CMIP5 daily data on pressure levels
- CMIP5 daily data on single levels
CMIP5 daily data on single levels
- CMIP5 monthly data on single levels
CMIP5 monthly data on single levels

Experiment ?

At least one selection must be made

- AMIP Historical RCP 2.6 RCP 4.5 RCP 6.0 RCP 8.5

Variable ?

At least one selection must be made

- 10m wind speed 10m u-component of wind
 10m v-component of wind 2m temperature
 Eastward turbulent surface stress Evaporation
 Maximum 2m temperature in the last 24 hours Mean precipitation flux

Model ?

At least one selection must be made

- inmcm4 (INM, Russia) ACCESS1-0 (BoM-CSIRO, Australia)
 ACCESS1-3 (BoM-CSIRO, Australia) bcc-csm1-1 (BCC, China)
 bcc-csm1-1-m (BCC, China) BNU-ESM (BNU, China)
 cmcc-cm (CMCC, Italy) CMCC-CMS (CMCC, Italy)

Ensemble member ?

- | | | | | | |
|--------------------------------|---|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| <input type="radio"/> r1i1p1 | <input checked="" type="radio"/> r1i1p1 | <input type="radio"/> r1i1p121 | <input type="radio"/> r1i1p124 | <input type="radio"/> r1i1p125 | <input type="radio"/> r1i1p126 |
| <input type="radio"/> r1i1p127 | <input type="radio"/> r1i1p128 | <input type="radio"/> r1i1p2 | <input type="radio"/> r1i1p3 | <input type="radio"/> r2i1p1 | <input type="radio"/> r2i1p2 |
| <input type="radio"/> r2i1p3 | <input type="radio"/> r3i1p1 | <input type="radio"/> r3i1p2 | <input type="radio"/> r3i1p3 | <input type="radio"/> r4i1p1 | <input type="radio"/> r4i1p2 |
| <input type="radio"/> r4i1p3 | <input type="radio"/> r5i1p1 | <input type="radio"/> r5i1p2 | <input type="radio"/> r5i1p3 | <input type="radio"/> r6i1p1 | <input type="radio"/> r6i1p2 |
| <input type="radio"/> r6i1p3 | <input type="radio"/> r7i1p1 | <input type="radio"/> r8i1p1 | <input type="radio"/> r9i1p1 | | |



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CMIP5 documentation

Overview of global climate projections

Created by Ruth Petrie, last modified on Jul 19, 2019

- [What are global climate projections?](#)
- [The Climate Model Intercomparison Project \(CMIP\)](#)
 - [CMIP5](#)
 - [CMIP6](#)

Climate projections in the Climate Data Store

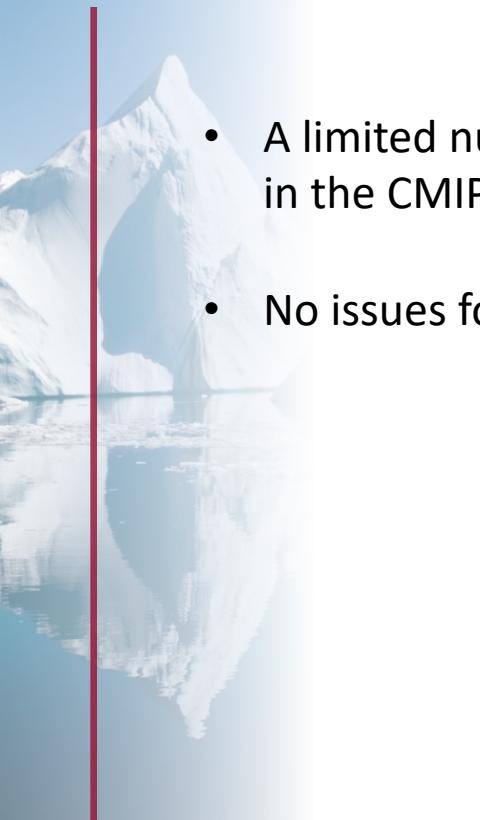
Created by Ruth Petrie, last modified on Jul 19, 2019

- [Global climate projections in the CDS](#)
- [Data Format](#)
- [Quality control of the CDS-CMIP5 subset](#)
- [Models, grids and pressure levels](#)
 - [Models](#)
 - [Pressure levels](#)
- [Experiments](#)
- [Ensembles](#)
- [File naming conventions](#)



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CMIP5 continuation



- A limited number of additional variables will be quality controlled and included in the CMIP5 subset
- No issues foreseen



Potential Issues for CMIP6

- Evolving data:
 - CMIP5 was a stable complete set of data
 - CMIP6 is still evolving, data are still subject to retraction and republication
 - Regular update of manifest files is not feasible
- Data volumes
 - CMIP6 model resolutions are, in general, much greater than in CMIP5 and so the same subset would much greater. Three additional copies of the data is not a good use of space – perhaps need a better solution.
- Documentation
 - Not all documentation is available for all the models etc for CMIP6.



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Thank you, any questions?

