Earth Systems and Climate Change Hub

National Environmental Science Programme

NESP-ESCC research products metadata template

Background

In compliance with the *NESP Data Management and Accessibility Guidelines V3.0 (2017)* the NESP ESCC Hub has a requirement to develop a 'data and information' management plan for all projects approved under the annual Research Plan. The purpose of the plan is to facilitate 'successful delivery of open access research', with emphasis on ensuring discoverability, accessibility and utility/re-use of all Hub 'research products'. For the purposes of this plan, the definition of 'research products' includes:

- Raw data sets including spatial data
- Data analysis and derived data products such as GIS maps
- Models and other tools such as software created by the research process, including value-added digital products derived from off-the-shelf/open-source software (e.g. Decision Support Tools)
- Websites and apps for mobile phones, tablets etc
- All publications including journal papers, books/book chapters, reviews and all 'grey' literature (e.g. Fact Sheets, posters, technical reports etc)
- Visualised data, including images, maps, videos etc
- Unspecified emerging technology

A key requirement of this plan is for projects to routinely record, collate and communicate metadata statements for all 'research products' generated from Hub-funded research and outreach activities. The metadata statements need to be based on accepted best practice (including consistent with the National Environmental Information Infrastucture and mandatory requirements of the Australian Standard ANZLIC Metadata Profile).

For the ESCC Hub, the metadata template (this document) has been adopted from the recently completed Australian Climate Change Science Program, which was originally developed with support from CSIRO IM&T as part of the development of the CSIRO Data Access Portal linked to relevant national repositories including Australia National Data Service (ANDS) data discovery portal. Minimum requirements for metadata statements for NESP include:

- To be available online, with links to the relevant datasets and readily accessible via web search engines/discovery facilities
- Identifies attributes, methods and procedures used for determining all values within relevant datasets
- Defines or links to online definitions of all terms used in description of the datasets
- Provides contacts and access locations for the data, and
- Provides provenance for any data that are used in generating research products

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Filling in the template

Research products can be grouped into logical project 'collections' as best determined by Lead CIs, although the Hub Data Management Working Group (HDMWG) and/or the Hub Program Management Team (HPMT) are also able to assist with this determination. Please use a single form for each collection and multiple forms if necessary for each project to ensure all collections are included i.e. within any one project, these collections may be defined as a single collection at the project level across multiple deliverables/activities, or indeed multiple collections for any one project specific to single/multiple deliverables.

The first part of the form can be used to indicate which project and/or deliverables the collection relates to. If your collection used any raw data/model outputs produced by other (NESP or otherwise) sources as an input, please include a description of the input data in the 'Lineage' field and/or provide a link in the Related Materials list to ensure the source is appropriately described/acknowledged.

An example from ACCSP has been used to pre-populate the template as a guide only. Please delete this information once you are ready to complete the template for your Hub project(s).

Finally, if the collections are already publically available please just give the relevant URL(s) in the second part of the template. If they are not, please complete the rest of the template.

For any further queries

Please contact:

- HDMWG - Aurel Moise (aurel.moise@bom.gov.au)
- HPMT - Geoff Gooley (geoff.gooley@csiro.au) or Mandy Hopkins (mandy.hopkins@csiro.au)

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Project Details	
ESCC Component(s)	Component 2 – Earth Systems and Climate Hub
ESCC Project No. & Title(s)	Project 2.9 – Risk assessment of future carbon sources and sinks
ESCC Project Objective(s)	1. Develop a model-data-fusion framework to assess the vulnerability of existing carbon stocks and carbon accumulated under reforestation and climate scenarios for Australia. 2. Couple CABLE, with land use change functionality, into ACCESS to estimate global carbon-climate feedbacks of future land use and climate scenarios. 3. Develop Australian and global budgets of GHGs to track trends in carbon-climate feedbacks, and to test consistency with permissible global emissions to agreed climate stabilisation targets. 4. Develop enhanced data delivery systems to make data access and discoverability from research objectives 1 to 3 easier and more flexible to cover broader user-needs.
Project Leader(s)	Pep Canadell
Deliverable(s)	1. Australia CABLE-BIOS3 with land use change and demographics. 2. Global CABLE with land use change coupled to ACCESS. 3. Journal papers updating global carbon budgets. 4. Carbon Portal. 5. Journal papers with carbon stock vulnerability and potential of carbon sequestration with revegetation in Australia.
Data/software Manager	Peter Briggs (Data Manager)

Research Output data collection or software URLs if applicable
Data: http://hpc.csiro.au/users/70496/TRENDYv6_CABLE_Aug2017/ Documents: http://hpc.csiro.au/users/70496/TRENDYv6_CABLE_Aug2017/documents/

Description (complete for data and software)	
Title	CABLE simulations for TRENDY-v6 2017
Description	These data are the submission of CABLE results to the 'Trends in net land-atmosphere carbon exchange' (TRENDY) global terrestrial biosphere simulation experiment. Following the TRENDY protocol, results are from four simulations (S0-S4) over the 1860-2016 period with one or more of changing CO2, climate and land use as follows: S0: No forcing change (needed to diagnose any issues / drift) S1: CO2 only (with time-invariant "pre-industrial" land use mask) S2: CO2 and climate (with time-invariant "pre-industrial" land use mask) S3: CO2, climate and land use (Using updated annual LULCC maps to 2016). The full TRENDY-v6 protocol is here: http://hpc.csiro.au/users/70496/TRENDYv6_CABLE_Aug2017/documents/GlobalCarbonBudget_protocol_2017%20(006).SECURE.pdf A table of the full suite of TRENDY output variables is given here:

	http://hpc.csiro.au/users/70496/TRENDYv6_CABLE_Aug2017/documents/TRENDY_variables_160817.pdf In this table, green cells are available CABLE outputs, red cells were not supplied.
Lineage	The CABLE model forcing for these experiments was: • 6-hourly CRU-NCEP v8 meteorology supplied by Nicolas Viovy, aggregated to daily. • Hurtt et al. LUH2 v2h (3/8/2017) historical land use/land cover change dataset for 850-2015. • Global annual CO2 concentration from NOAA.
Credit	Author: V. Haverd, B. Smith, L. Nieradzik, P.R. Briggs, C.M. Trudinger, J.G. Canadell
Keywords	Carbon cycle, earth system science, climate change
ABS Fields of Research Category / Subcategory*	04 Earth Sciences 0401 Atmospheric sciences

*These are listed in http://www.abs.gov.au/ausstats/abs@.nsf/0/4AE1B46AE2048A28CA25741800044242?opendocument

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Attribution/IP(complete for data and software)	
Owning Organisation	CSIRO
Collaborating Organisations	Lund University, Sweden
Primary contact for this data	Peter Briggs peter.briggs@csiro.au
Lead Researcher	Vanessa Haverd vanessa.haverd@csiro.au
Contributors	Cathy Trudinger (cathy.trudinger@csiro.au), Pep Canadell (pep.canadell@csiro.au), Will Woodgate (will.woodgate@csiro.au), Ben Smith (Lund University), Lars Nieradzik (Lund University)
Access	This software is a research product, and is not for public release. For enquiries refer to primary contact.
Licencing	N/A

Related Materials. Publications, tools, websites, related input data. Please provide full citations for publications, data and software.	
Details	**URL**
Journal Paper (in review): Haverd V, Smith B, Nieradzik L, Briggs PR, Woodgate W, Trudinger CM, Canadell JG. 2018. A new version of the CABLE land surface model (Subversion revision r4546), incorporating land use and land cover change, woody vegetation demography and a novel optimisation-based approach to plant coordination of electron transport and carboxylation capacity-limited photosynthesis. Geoscientific Model Development. https://doi.org/10.5194/gmd-2017-265. (Currently in review)	https://www.geosci-model-dev-discuss.net/gmd-2017-265/
Meteorology forcing: CRU-NCEP-v8, 6-hourly, 0.5x0.5° CRU+NCEP historical forcing, 1901-2016, prepared by Nicolas Viovy, aggregated to daily by Peter Briggs. References: Harris, I., Jones, P. D., Osborn, T. J. & Lister, D. H. Updated high-resolution grids of monthly climatic observations—the CRU TS3.10 dataset. Int. J. Climatol. 34, 623–642 (2014). Wei, Y. et al. The north american carbon program multi-scale synthesis and terrestrial model intercomparison project—Part 2: environmental driver data. Geosci. Model Dev. 7, 2875–2893 (2014).	http://forge.ipsl.jussieu.fr/orchidee/wiki/Documentation/Forcings#a1.1CRU-NCEP
Land-use/Land cover change: Hurtt et al. LUH2 v2h (3/8/2017) historical land use/land cover change dataset for 850-2015. References: Hurtt, G., Chini, L. P., Frolking, S., Betts, R., Feddema, J., Fischer, G., Fisk, J., Hibbard, K., Houghton, R., and Janetos, A.: Harmonization of land-use scenarios for the period 1500–2100: 600 years of global gridded annual land-use transitions, wood harvest, and resulting secondary lands, Climatic Change, 109, 117–161, 2011. Lawrence, David & C. Hurtt, George & Arneth, Almut & Brovkin, Victor & V. Calvin, Kate & D. Jones, Andrew & Jones, Chris & Lawrence, Peter & de NOBLET, Nathalie & Pongratz, Julia & Seneviratne, Sonia & Shevliakova, Elena. (2016). The Land Use Model Intercomparison Project (LUMIP) contribution to CMIP6: Rationale and experimental design. Geoscientific Model Development. 9. 2973-2998. 10.5194/gmd-9-2973-2016.	http://luh.umd.edu/

CO2 forcing: Global annual CO2 concentration (ppm). Prepared on behalf of C. Le Quere for the Global Carbon Project. Data from March 1958 are monthly average from MLO and SPO provided by NOAA's Earth System Research Laboratory http://www.esrl.noaa.gov/gmd/ccgg/trends/. When no SPO data are available, SPO is constructed from the 1976-2014 average, MLO-SPO trend and average monthly departure. Data for 2015-2016 are preliminary values. The data from 1980 through 2006 were reprocessed in 2011 to bring them into the WMO X2007 scale. This affected slightly the entire time series from 1958. Data prior to March 1958 are estimated with a cubic spline fit to ice core data from Joos and Spahni 2008 Rates of change in natural and anthropogenic radiative forcing over the past 20,000 years PNAS.	http://www.esrl.noaa.gov/gmd/ccgg/trends/

Technical Details	
For data: Total Size of this data collection	98 GB
For data: Total Number of Files	223 data files (plus documentation)
Current location of files (data or software)	CSIRO
Format(s)	NetCDF files, gzipped
Associated tool(s)/ Dependencies	N/A
Proposed publication host	N/A