



ACEAS

Australian Centre for Excellence
in Antarctic Science

ACEAS Data Management Guide

ACEAS Data Management Guide

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1 ACKNOWLEDGEMENT OF COUNTRY

We acknowledge the Traditional Owners of Country throughout Australia and their continuing connection to land, sea, and community.

We pay our respects to them and their cultures, and to their elders past and present.

2 BACKGROUND

The Australian Research Council (ARC) Australian Centre for Excellence in Antarctic Science (ACEAS) is a collaboration between Australian universities. The Centre is dedicated to delivering new knowledge of East Antarctica and the adjacent Southern Ocean, and to connecting the researchers with the community, governments, industry, and academia.

ACEAS's research is planned and conducted with a clear eye on guiding decisions made by domestic and international governments, recommendations made by policy-informing bodies, and preparations made for the impact of climate change by all sectors of society. The Centre is committed to promoting open access to public sector and publicly-funded information, including optimising the use and reuse of data. Hence, open access data collected as part of an ACEAS-funded project is the default position with exception only for reasons of sensitivity. The Centre works collaboratively with partners to extend the value of public data for the benefit of the Australian public.

Open access data follows the FAIR principles of being findable, accessible, interoperable, and reusable under licences that allow reuse. These principles increase the capacity of ACEAS to support a more collaborative, informed, and value-added approach to conducting Antarctic research, and they permit maximum benefit to arise from the outputs of the Centre's research. The application of these principles enables the Centre to take a systematic and standards-based approach to identifying, cataloguing, packaging, and presenting its research data outputs to stakeholders and to the public.

ACEAS is supported by resources and infrastructure, including:

- an ACEAS Data Officer, who works with ACEAS researchers from all partner institutions, to translate data and information into relevant outputs that align with these guidelines
- allocation of resources to support data management and data publishing
- support services: resources allocated to support metadata management.

ACEAS data management is heavily influenced by models used in several existing programs and platforms, including the Australian Ocean Data Network (AODN) and the National Marine Science Plan (NMSP). The AODN, originally established as a partnership between Commonwealth agencies, now includes a broad representation across the Government and University sectors. Organisationally, the AODN is also the data management facility of the Integrated Marine Observing System (IMOS). The IMOS/AODN and Australian Antarctic Data Centre facilities are the centralised aggregation point for all Australian Antarctic datasets described by metadata.

ACEAS researchers may wish to familiarise themselves with the *ACEAS Data Management Strategy*¹ and the Antarctic Treaty² in conjunction with this document, as both reference researchers' data management obligations.

¹ <https://antarctic.org.au/wp-content/uploads/2023/04/ACEAS-Data-Management-Strategy-2023-04-03.pdf>

² <https://www.ats.aq/e/key-documents.html>

2.1 VISION

The consequences of changes in the Antarctic and Southern Ocean - including sea-level rise, extreme weather events, alterations to rainfall patterns, and fisheries impacts - will be profoundly costly to Australia, however the speed and scale of future change remains poorly understood. The Centre will combine new field data with innovative models to revolutionise predictions of the future of the East Antarctic and the Southern Ocean.

The objectives of the Centre are:

- to undertake world-class collaborative research into the effects of climate change on the East Antarctic and the Southern Ocean, spanning ice-ocean-atmosphere-earth-ecosystems and their interactions
- to translate our research into benefit by improving projections of future climate change impacts in the Antarctic, and their effects worldwide, in order to aid critical climate change mitigation and adaptation planning decisions for the coming decades and beyond
- to conduct research in the Southern Ocean and the Australian Antarctic Territory that leverages Australia's investments in Antarctic infrastructure; and builds new infrastructure capacity in areas of research need
- to make critical first measurements in rarely- or never-visited regions of the Australian Antarctic Territory, including under ice shelves and at remote rock outcrops and parts of the ice sheet
- to train the next generation of Antarctic researchers, and to support the career development of a more diverse cohort of research leaders
- to strengthen Australia's research presence in the Antarctic and, together with our international partners, to enhance Australia's international reputation for Antarctic science excellence
- and computer model experiments to understand past changes and provide future projections.

3 GUIDE AIMS

This document provides a framework for how the Australian Centre for Excellence in Antarctic Science and its researchers will achieve findable, accessible, interoperable, and reusable (FAIR) ACEAS research products. It is recognised that discipline-specific standards of data management exist, and ACEAS researchers are encouraged to apply these standards wherever possible.

The *ACEAS Data Management Guide* aims to:

1. ensure all data collected through ACEAS activities are in accordance with the FAIR data principles³ in a sustainable manner for the long term
2. make all ACEAS data and research outputs freely and openly available unless specific restrictions apply (indefinitely or for a limited time) for reasons of privacy, ethics, sensitivity, or commercial confidence
3. ensure research data outputs are presented in an accessible form that encourages reuse and maximises impact on management and policy decision making
4. ensure published data and research outputs acknowledge the Centre and associated researchers, and support appropriate acknowledgement when reused by implementing licensing, persistent identifiers, and acknowledgment guidelines
5. apply existing established research data management policies, standards, and guidelines; and to support and engage in the development of evolving standards guiding the direction of the national marine data network
6. promote collaboration and support the work of ACEAS researchers through its data management approach.

³ <https://ardc.edu.au/resources/working-with-data/fair-data/>

4 DATA AND INFORMATION MANAGEMENT APPROACH

This document provides guidance on the objectives, key steps, and resources required to ensure that ACEAS research data outputs meet the requirements of the *ACEAS Data Management Strategy*⁴ and other governing instruments (such as the Antarctic Treaty). It outlines how ACEAS researchers will manage their data before, during, and after a research project; and the role of the Data Officer to support researchers to manage their data.

This Guide describes:

- who will be responsible for data management related activities
- data management practices used
- metadata standards used
- data storage
- who owns and who can access and use ACEAS's data and products.

As outlined in both the Australian Code for the Responsible Conduct of Research⁵ (ACRCR) and in the *ACEAS Data Management Strategy*, researchers will have primary responsibility for managing their research data. Appropriate management of data is critically important for several reasons: it optimises the security and quality of the researchers' work, it ensures that funding agencies receive the best outcomes for their investment of resources, and it leads to maximum reuse of data and therefore of the societal benefits that result.

The Australian Research Data Commons⁶ (ARDC) provides an overview of data management plans and the FAIR data principles⁷. Many Australian universities have data management policies and tools⁸ available for use by researchers to create a data management plan at the start of a research project. ACEAS has prepared a data management plan template and associated user guide for use by all ACEAS researchers; both documents can be sourced from the ACEAS Data Officer or from the ACEAS staff portal.

Data that are in the process of being collected, collated, and analysed can in many instances be stored on platforms such as OneDrive, Dropbox, Teams, or other facilities specific to, and endorsed by, individual ACEAS partner institutions. If local computer, USB, or similar drives are used to store preliminary data it is essential that the data are also regularly backed up to an appropriate secure platform.

Researchers dealing with larger volumes of working data should contact either their institutional data managers (see *Section 11: Key Contact Information*, below) or the ACEAS Data Officer and discuss alternative arrangements if the platforms mentioned above are not suitable for interim storage.

Metadata and finalised data collected or collated by ACEAS will be published in publicly accessible data repositories complying with FAIR data principles. Some data may be subject to restricted access based on its classification under privacy legislation or for ethical, commercial or sensitivity reasons: for further advice see *Appendix 1: Exceptions to the Open Data Policy* below.

⁴ <https://antarctic.org.au/staff-portal/>

⁵ <https://www.nhmrc.gov.au/about-us/publications/australian-code-responsible-conduct-research-2018>

⁶ <https://ardc.edu.au/resources/working-with-data/datamanagement/data-management-plans/>

⁷ <https://ardc.edu.au/resource/fair-data/>

⁸ <https://sites.google.com/ardc.edu.au/rdmcommunity/resources/institutional-policy>

In accordance with the *ACEAS Data Management Strategy* record metadata should be compliant with the ISO 19115 standard⁹ and be published in a supported metadata repository that can be harvested by, and aggregated to, the AODN Metadata Catalogue and/or the AADC. Metadata records should contain links to any related publications.

ACEAS data may be published using partner repositories or discipline-specific repositories where available. Selection of data repositories will generally follow project leadership affiliations or can be otherwise guided by the ACEAS Data Officer. Where no appropriate partner repository exists, ACEAS data will be published through the University of Tasmania (using the Institute for Marine and Antarctic Studies (IMAS) data repository¹⁰). IMAS will provide tools and workflows to support publication of ACEAS data.

Researchers must provide the ACEAS Data Officer with links to metadata records created including DOIs where relevant.

ACEAS partner institutions managing data repositories will work with the Data Officer to ensure data are FAIR, secure, and sustainability managed. Partners intending to act in this capacity will provide researchers with working storage and adequate resources and infrastructure to ensure appropriate access and backup security.

In some instances, finalised data may be derived by or stored in a discipline-specific data portal. For example:

- processed bathymetry data will be stored in AusSeabed
- benthic habitat data will be aggregated or stored in Seamap Australia
- AUV and other imagery will be aggregated, and annotation data will be derived, in UMI (Understanding Marine Imagery).

Ownership of data should be clearly stated. Issues pertaining to ownership are considered in greater detail in *Section 7: Ownership and Intellectual Property Rights*, below.

Examples of well-completed metadata records are linked in Appendix 2.

⁹ <https://www.iso.org/obp/ui/#iso%3Astd%3Aiso%3A19115%3A-1%3Aed-1%3Av1%3Aen>

¹⁰ <https://metadata.imas.utas.edu.au/>

5 ACEAS ROLES AND RESPONSIBILITIES

The following sections provide a brief description of each of ACEAS's key roles in data and information management.

5.1 ACEAS DATA OFFICER ROLE

The Data Officer's activities include working with ACEAS researchers and postgraduate students, and with other stakeholders, to translate data and information into relevant data products and tools; and to help integrate research data outputs into national information repositories, digital systems and decision support tools. This includes ensuring data management aligns with the FAIR data principles to maximise the use and reuse of public data. The Data Officer is responsible for coordinating and conducting data discussions with research projects investigators, providing guidance to projects on best practice data management, reviewing project data management plans, tracking data management milestones, and the review of final datasets.

The Data Officer will also work with other ACEAS staff, including the Chief Operating Officer and Communications Officer, researchers, and other stakeholders; to maximise the utility of ACEAS data.

5.2 RESEARCHER ROLE

It is the researcher's role to develop a project-specific data management plan in conjunction with project team members and the ACEAS Data Officer, and in accordance with the *ACEAS Data Management Strategy*¹¹ (refer to sections 5.2, 8, and 14 of the *Strategy*).

Researchers will have primary responsibility for managing their research data and must comply with agreed data management and publication milestones as outlined in their project plan.

Researchers are responsible for ensuring Intellectual Property requirements in the use of third-party data are appropriately managed so as to not restrict access to ACEAS-funded research outputs.

5.3 ACEAS DIRECTOR ROLE

It is the ACEAS Director's responsibility to provide oversight of data management activities and access to related infrastructure for ACEAS researchers and management of exceptions to these guidelines.

5.4 PARTNER DATA SPECIALISTS

Where partner institutions provide access to data management infrastructure or other specialised data management roles, they must comply with the relevant sections in this document. Partner Data Specialists will work with the ACEAS Data Officer to ensure these standards are adequately met for ACEAS data.

A contact list of ACEAS partner institutions' Data Specialists is provided in *Section 11: Key Contact Information*, below.

¹¹ <https://antarctic.org.au/staff-portal/>

6 TYPES OF RESEARCH PRODUCTS AND DATA

A wide range of research data products is expected to be generated throughout the life of the program by ACEAS researchers. These products can be broadly categorised as written outputs or data outputs and may include (but not be restricted to) the following:

- raw datasets, including spatial data
- analysis and data products such as geographic information system-derived maps
- images, maps, photos, videos, sound files, and animations
- computer models and code, software (including for decision support), and similar tools
- questionnaires, surveys, and transcripts.

7 OWNERSHIP AND INTELLECTUAL PROPERTY RIGHTS

At the commencement of each project, a clear understanding of the ownership of data, including any intellectual property rights associated with each acquired or generated research dataset and any contractual constraints, must be documented in accordance with the *ACEAS Data Management Strategy*¹².

ACEAS researchers will ensure, through standard contractual arrangements at the commencement of each project, that the ownership of rights invested in the project, including any intellectual property rights associated with each acquired or generated research dataset and any contractual constraints, will be in accordance with the *ACEAS Data Management Strategy*.

This document does not seek to alter existing intellectual property ownership rights defined or assigned under agreement, including the ACEAS Grant Agreement with the ARC, the ACEAS Multi-Institutional Agreement, and agreements between ACEAS staff or students and their respective partner institutions.

In general:

- Intellectual Property ownership of data collected in the execution of ACEAS-funded projects will remain with the party or partner carrying out the project, and may be governed by employment conditions or other agreements
- owners of Intellectual Property vested in data and research products generated in the execution of ACEAS-funded projects will be required to make their data and products freely and openly available in such a way that complies with FAIR data principles and these guidelines
- researchers will be required to prepare a data management plan for all ACEAS-funded projects which will include details of Intellectual Property ownership and the licensing for data generated as part of a project, or introduced as background Intellectual Property.

¹² <https://antarctic.org.au/staff-portal/>

8 DATA LICENSING

All ACEAS research data are required to be made available through an appropriate data repository under an appropriate Creative Commons¹³ or Open Source Initiative approved¹⁴ (software) license to enable flexible public reuse, unless specifically exempt under the *Exceptions to the Open Data Policy* in Appendix 1. Note that ACEAS encourages the use of an Attribution 4.0 International (CC BY 4.0).

Third-party material collated by, or supplied for use in, ACEAS research activities is also subject to these guidelines unless data use agreements between third-party data providers and ACEAS researchers (or organisations) explicitly prohibit this.

9 RESEARCH IDENTIFIERS

9.1 DIGITAL OBJECT IDENTIFIERS (DOI)

A DOI is a type of persistent identifier that indicates a research product is static in nature (allowing replication of research analysis) and that is permanently accessible. It has become routine for publishers to assign DOIs to journal articles and for authors to include them in article citations, and this practice is now extending to datasets attached to publications as supplementary information.

Assigning a DOI to finalised data and other research outputs facilitates increased citation and is considered best practice. All published ACEAS data should include a DOI. Non-IMAS ACEAS staff can speak to their home institutions' data managers about minting DOIs for their data records; IMAS and other ACEAS staff who use the IMAS repository for the data records will have DOIs minted by the ACEAS Data Officer.

9.2 OPEN RESEARCHER AND CONTRIBUTOR ID (ORCID)

An ORCID is a unique, persistent identifier for researchers that is available free of charge. ORCIDs are curated by the researchers themselves, and they are well recognised as researcher identification around the world. This allows researchers to be reliably and unambiguously identified.

ORCID use is mandated for completing metadata records in the IMAS Data Portal, and they are strongly advised for use in all research output publications. Most other ACEAS partner institutions also mandate the use of ORCIDs. Researchers who do not have an ORCID can register at <https://orcid.org/signin>.

¹³ <https://creativecommons.org/licenses/>

¹⁴ <https://opensource.org/licenses>

10 ROADMAP OF DATA MANAGEMENT PROCESSES

10.1 DATA MANAGEMENT PLANNING

Data management in any research project starts with the preparation of a data management plan (DMP). Data management plans allow researchers to map their data collection, storage, analysis, and archiving/deposition requirements, and they assist data managers in anticipating hardware requirements and data record creation timelines.

A template¹⁵ for an ACEAS data management plan and a guide¹⁶ to using the template are available via the ACEAS staff portal.¹⁷ Alternatively, both documents may be obtained from the ACEAS Data Officer.¹⁸

10.2 PUBLISHING OF RESEARCH DATA AND METADATA

10.2.1 IMAS repository

After completion of the collection, collation, and analyses of research data, IMAS staff should submit to the IMAS repository their data and the metadata describing their research data. These data and metadata will be used for the creation of publicly-accessible records.

Non-IMAS ACEAS staff should provide to their home institutions the metadata and files as may be required by their institutional mandates. For ACEAS reporting purposes, if the data are held in their home institutions' repositories then non-IMAS staff should email to the ACEAS Data Officer a link to their home institutions' records.

If their home repositories are **not** ISO 19115-3 compliant or are **not** indexed by the AODN Metadata Catalogue and/or by the AADC, as stipulated by the ACEAS Data Management Strategy,¹⁹ non-IMAS staff may submit their data and metadata to the IMAS repository in order to fulfil this mandate.

The submission tool for the IMAS repository can be accessed at:

<https://data.imas.utas.edu.au/submit>

First-time users can find a registration page and a help file via links at the top of the page.

10.2.2 External repositories

In some instances research data are usually submitted to a specialist repository; for example, a genetic sequence database or an international oceanographic database. In such cases only the metadata and a link to the external repository's record need to be submitted to the IMAS repository.

10.2.3 Archiving in the IMAS repository

Where records are not intended for public access but the metadata and files may need to be stored, the records can be archived using the 'Archive' button next to the 'Save' button at the top right of the submission tool's web page.

¹⁵ <https://antarctic.org.au/wp-content/uploads/2024/04/ACEAS-Data-Management-Plan-template-20240417.docx>

¹⁶ <https://antarctic.org.au/wp-content/uploads/2024/04/ACEAS-Data-Management-Planning-Guidance-20240417.pdf>

¹⁷ <https://antarctic.org.au/staff-portal/>

¹⁸ harko.werkman@utas.edu.au

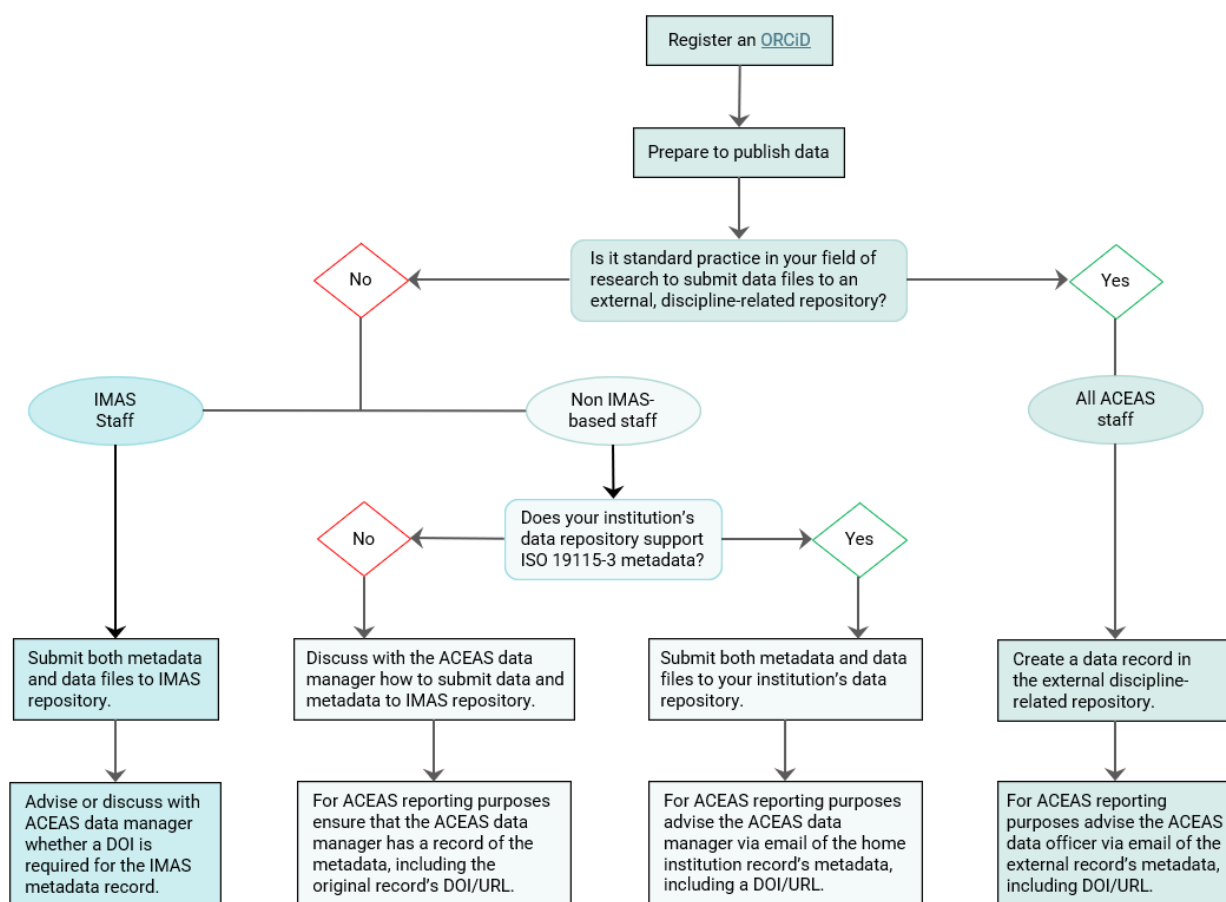
¹⁹ <https://antarctic.org.au/wp-content/uploads/2023/04/ACEAS-Data-Management-Strategy-2023-04-03.pdf>

10.2.4 Data and metadata Publication Decision Tree

The *ACEAS Data Management Strategy*²⁰ stipulates that:

“Researchers will take all reasonable steps to create high-quality metadata records for all data resulting from ACEAS funding... All metadata created will conform to the ISO19115-3 standard **and be published in a supported metadata repository** that can be harvested by, and aggregated to, the AODN Metadata Catalogue and/or the AADC.”

If a researcher’s home institution data repository does not support ISO 19115-3 compliant metadata, they may use the IMAS data repository to publish their data. The IMAS repository is ISO 19115-3 compliant and is harvested by and aggregated to both the AODN Metadata Catalogue and the AADC. If in doubt, contact the ACEAS Data Manager to discuss choice of repository for data deposition.



10.3 ACKNOWLEDGEMENT OF ACEAS

Support from the Australian Research Council must be acknowledged in all outputs in the following form: “*This research was supported by the Australian Research Council Special Research Initiative, Australian Centre for Excellence in Antarctic Science (Project Number SR200100008).*”

²⁰ <https://antarctic.org.au/wp-content/uploads/2023/04/ACEAS-Data-Management-Strategy-2023-04-03.pdf>

11 KEY CONTACT INFORMATION

Partner	Contact	Role (in ACEAS context)
UTAS	Matt King matt.king@utas.edu.au (03) 6226 1974	ACEAS Centre Director
UTAS	Carl Bennet carl.bennett@utas.edu.au 0427 807 353	ACEAS Business Manager
UTAS	Jane Richards jane.richards@utas.edu.au (03) 6226 7707	ACEAS Centre Project Officer
UTAS	Harko Werkman harko.werkman@utas.edu.au (03) 6226 6242	ACEAS Data Officer
ANU	Erin LeNevez Erin.LeNevez@anu.edu.au (02) 6125 9729	Manager, Digital Scholarship Australian National University
Curtin	Janice Chan Janice.Chan@curtin.edu.au (08) 9266 4203	Research & Copyright Manager Curtin University
UniMelb	Ailie Smith ailie.smith@unimelb.edu.au (03) 8344 4647	Manager, Digital Stewardship (Research) University of Melbourne
UNSW	Gerry Devine gerry.devine@unsw.edu.au	Senior Research Data Librarian University of NSW
UWA	Kate Croker kate.croker@uwa.edu.au (08) 6488 4705	Library Manager (Research Publication & Data Services) University of Western Australia

12 RELATED MATERIALS

IMAS repository access and help:

<https://data.imas.utas.edu.au/submit>

https://data.imas.utas.edu.au/submit/media/guide/IMAS-DaST-UserGuide_EEEej3.pdf

Australian Research Data Commons Data Management policies and standards:

<https://ardc.edu.au/resources/working-with-data/>

<https://ardc.edu.au/resource/ardc-persistent-identifiers-policy/>

<https://ardc.edu.au/resource/fair-data/>

<https://ardc.edu.au/resource/fair-data-self-assessment-tool/>

<https://ardc.edu.au/resource/research-data-management-framework-for-institutions/>

<https://ardc.edu.au/resources/working-with-data/datamanagement/data-management-plans/>

Antarctic Treaty:

<https://www.ats.aq/e/key-documents.html>

https://documents.ats.aq/keydocs/vol_1/vol1_2_AT_Antarctic_Treaty_e.pdf

ARC policies on responsibilities in the conduct of research:

<https://www.arc.gov.au/about-arc/program-policies/research-integrity/australian-code-responsible-conduct-research-2018>

<https://www.arc.gov.au/sites/default/files/2023-05/Management-of-Data-and-Information-in-Research.pdf>

Other related links:

Data.gov.au User Guide:

<https://toolkit.data.gov.au/>

Australian Government public data policy statement:

<https://apo.org.au/node/61042>

Australian Ocean Data Network

<https://portal.aodn.org.au/>

Geographic information metadata: ISO 19115-1 and ISO 19115-3:

<https://www.iso.org/obp/ui/#iso%3Astd%3Aiso%3A19115%3A-1%3Aed-1%3Av1%3Aen>

<https://www.iso.org/obp/ui/#iso:std:iso:19115:-3:ed-1:v1:en>

Open Geospatial Consortium:

<http://www.opengeospatial.org/>

Web Content Accessibility Guidelines (WCAG) 2.1:

<http://www.w3.org/TR/WCAG21/>

APPENDIX 1: EXCEPTIONS TO THE OPEN DATA POLICY

There may be instances where open access to information may not be suitable when information is culturally, environmentally, commercially, or socially sensitive, or where it could contravene privacy or contract laws. Decisions to restrict access to sensitive research products must be justified and made by those closest to the source (for example, the researcher). In cases where restricted access applies, an enduring copy of the unaltered data must be kept, and metadata record(s) made publicly available that describe the data and why it has not been released. Publishing metadata that flags the existence of restricted data ensures that ACEAS's research outputs are comprehensively catalogued in the public domain.

Sensitive data may include, but is not limited to:

- location information for highly desirable or collectable species
- location information for protected, endangered, or threatened species
- data derived from commercial activities, e.g. commercial fishing
- culturally significant site data
- social data restricted by privacy law or considerations
- other heritage or sensitive Indigenous matters
- commercially sensitive information.

ACEAS data management plans will be required to identify potentially sensitive data and information that will be generated during the project, and should trigger discussions in that regard (e.g. PhD theses and publications). These plans must also contain strategies for how exceptions to the open data policy will be managed to ensure adequate security of the information and meet any legislative or other requirements. Scheduled data management discussions between research projects and the Data Officer will provide additional opportunities to identify and document potential exceptions to these guidelines.

It is the researcher's responsibility to communicate and justify requests for exceptions to the open data policy to the Data Officer. The Data Officer will collate instances of requested exceptions and provide them to the ACEAS Chief Operating Officer. Exceptions to the open data policy must be approved by the ACEAS Centre Director. The ACEAS Chief Operating Officer, in conjunction with the Project Leader, will be responsible for reporting these in Annual Progress Reports.

The Data Officer will work with Project Leaders to seek strategies that enable publication of reduced or less sensitive portions of the data wherever possible, with particular consideration to assisting decision-making by the ARC.

APPENDIX 2: EXAMPLES OF COMPLETED METADATA RECORDS

Some good examples of well-completed data records are linked below. These can be visited to view the metadata content and styling, and to interact with the data files.

- <https://metadata.imas.utas.edu.au/geonetwork/srv/eng/catalog.search#/metadata/1d15540b-8b80-45ac-808b-814c19872117>
- <https://metadata.imas.utas.edu.au/geonetwork/srv/eng/catalog.search#/metadata/e2b60954-29ba-4b9b-89a3-e06377f111ed>

Note that the IMAS data repository can be searched using either the Open Access to Marine Data²¹ (OAMD) interface or the IMAS Metadata Catalogue²² interface. For ease of use the IMAS Metadata Catalogue is recommended.

²¹ <https://data.imas.utas.edu.au/portal/search>

²² <https://metadata.imas.utas.edu.au/geonetwork/srv/eng/catalog.search#/search>