the **Arctic Data Center**

Amber Budden

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Arctic Data Center Data Science Training
February 11-15, 2019
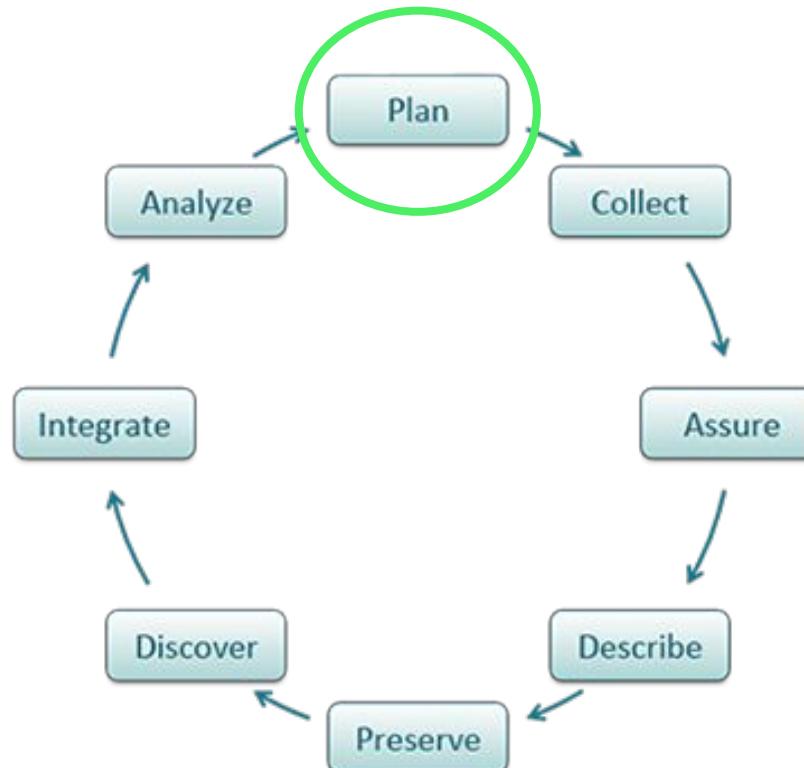
The Data Life Cycle

The Data Life Cycle

Why Plan?

Efficiency

Why Plan?

Efficiency

Engagement

Why Plan?

Efficiency

Engagement

Stay Organized

Why Plan?

Efficiency

Engagement

Stay Organized

Funder Requirement

Why Plan?

Efficiency

Engagement

Stay Organized

Funder Requirement

Share data

What's in a Data Management Plan?

- Study design
- Data (including format)
- Metadata
- Policies for access, sharing & reuse
- Long-term storage & data management
- Budget

Writing a Data Management Plan (DMP)

1. Engage your team

Writing a Data Management Plan (DMP)

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2. Plan from the start

Writing a Data Management Plan (DMP)

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3. Follow good advice
   - Arctic Data Center
   - Institutional Libraries
   - DataONE

Writing a Data Management Plan (DMP)

1. Engage your team
2. Plan from the start
3. Follow good advice
   - Arctic Data Center
   - Institutional Libraries
   - DataONE
4. Use good tools
   - DMPTool
   - DMPOnline

Writing a Data Management Plan (DMP)

1. Engage your team
2. Plan from the start
3. Follow good advice
   - Arctic Data Center
   - Institutional Libraries
   - DataONE
4. Use good tools
   - DMPTool
   - DMPOnline
5. Review and Revise

10 Simple Rules for Writing a Good DMP

Ten Simple Rules for Creating a Good Data Management Plan

William K. Michener ✉

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Ten Simple Rules
Open Data

Introduction
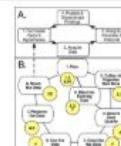
Rule 1: Determine the Research Sponsor Requirements

Rule 2: Identify the Data to Be Collected

Rule 3: Define How the Data Will Be Organized

Rule 4: Explain How the

Figures

15

10 Simple Rules for Writing a Good DMP

1. Determine the research sponsor requirements
2. Identify the data to be collected
3. Define how the data will be organized
4. Explain how the data will be documented
5. Describe how quality data will be assured
6. Present a sound storage & preservation strategy
7. Define the project's data policies
8. Describe how the data will be disseminated
9. Assign roles & responsibilities
10. Prepare a realistic budget

Determine the research sponsor requirements

Identify the data to be collected: types; sources; volume; and data and file formats

Image credits: World Meteorological Organization on Flickr

Define how the data will be organized
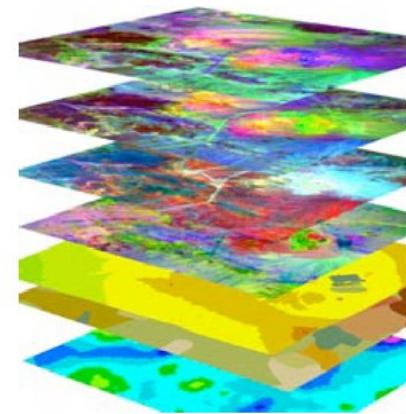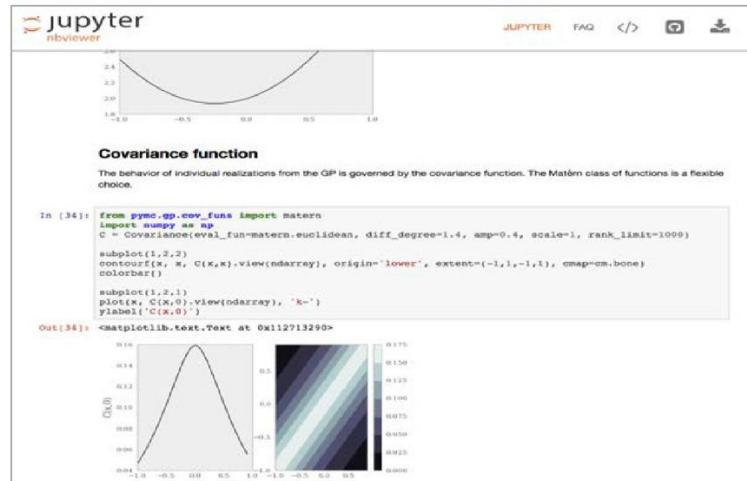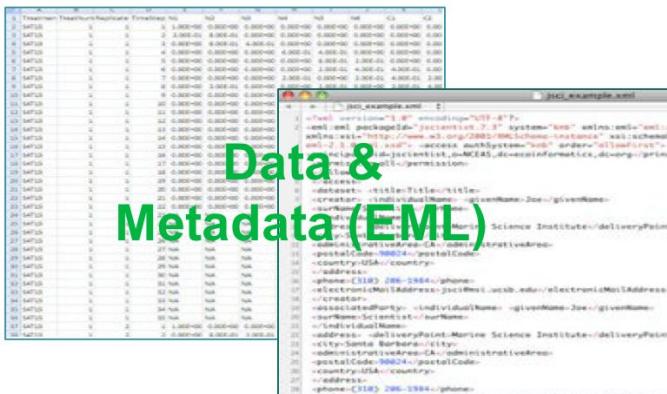
Explain how the data will be documented

- Dublin Core, ISO 19115, EML
- Morpho, metavist, readme.txt
- Electronic notebooks
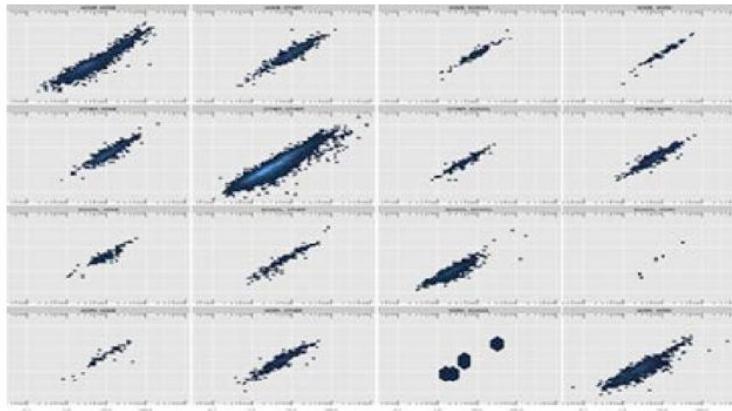
Data & Metadata (EML)

Describe how data quality will be assured

- Training activities, instrument calibration & verification tests, double-blind data entry, statistical and visualization approaches to error detection

Present a sound data storage & preservation strategy

- How long will the data be accessible?
- How will data be stored & protected during the project?
- How will data be preserved & made available for future use?
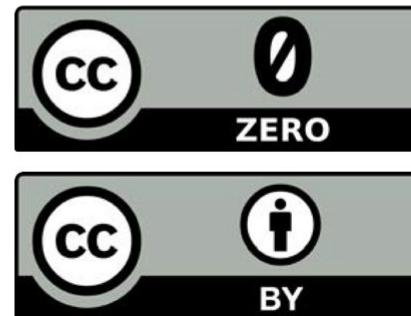
Define the project's data policies
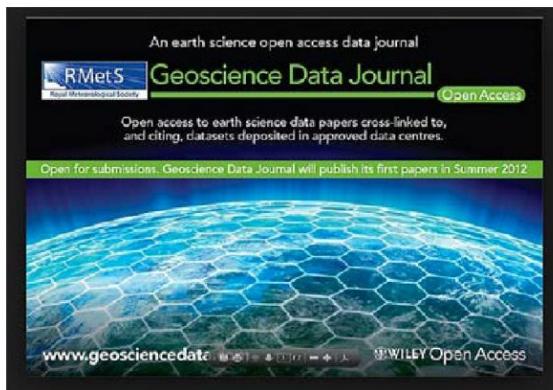
- Licensing and data sharing arrangements
- Human subject and other sensitive data

Describe how the data will be disseminated

- Active, robust and preferred approaches
    - Publishing data in open repository or archive
    - Submitting the data as appendices or supplements to journal articles
    - Publishing the data, metadata, and relevant code as a "data paper"

Assign roles and responsibilities

- Roles may include
    - Data collection, data entry, QA/QC, metadata creation and management, backup data preparation and submission to an archive, system administration

Prepare a realistic budget

- Review your plan and make sure that there are lines in the budget to support the people that manage the data as well as pay for the requisite hardware & software

Find Research Funder Requirements

- NSF
  - NSF 14-1, Grantee Standards, Section j
    (https://www.nsf.gov/pubs/policydocs/pappguide/nsf14001/gpg_2.jsp#IIC2j)
- NSF GEO
  - Directorate for Geosciences - Data Policies
    (https://www.nsf.gov/geo/geo-data-policies/)
- NSF Polar Programs
  - NSF 16-055 Dear Colleague Letter
    (https://www.nsf.gov/pubs/2016/nsf16055/nsf16055.jsp)
- Check your funder for specific requirements

NSF Division of Polar Programs

- NSF requires submission to the Arctic Data Center within 2 years
    - AON program requires submission within 6 months
- Need to document your data well enough for reuse
- There are exceptions for sensitive data
    - Social sciences, endangered species

NSF DMP Requirements: 5 Sections

- Products of research
  - *Types of data, samples, physical collections, software, curriculum materials, other materials produced during project*

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- Data formats and standards
  - *Standards to be used for data and metadata format and content (for initial data collection, as well as subsequent storage and processing)*

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  - *Including re-distribution and the production of derivatives*

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  - *Including re-distribution and the production of derivatives*

- Archiving of data
  - *Plans for archiving data, samples, research products and for preservation of access*

DMP Tools & Resources Online

https://dmptool.org/

https://dmponline.dcc.ac.uk/

Hands-On: Create a DMP

❖ Login or create a DMPTool account (https://dmptool.org/)

❖ Draft your own Data Management Plan

DMPTool

Build your Data Management Plan

Sign in options

Option 1: If your institution is affiliated with DMPTool.

Your institution

- or -

Option 2: If your institution is not affiliated with DMPTool.

Email address

- or -

Option 3: If not affiliated and you need an account.

Create account with email address

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DMPTool

DMPTool

Build your Data Management Plan

Look up your institution here ✕

| university of | ⊗ |

American University of Beirut (AUB)

City University of New York (CUNY)

Missouri University of Science and Technology (MST)

National University of Singapore (NUS)

University of Alabama

University of Alabama at Birmingham (UAB)

University of Arizona

University of California, Berkeley (UCB)

University of California, Davis (UCD)

University of California, Irvine (UCI)

University of California, Los Angeles (UCLA)

University of California, Merced (UCM)

University of California, Office of the President (UCOP)

University of California, Riverside (UCR)

University of California, San Diego (UCSD)

University of California, San Francisco (UCSF)

University of California, Santa Barbara (UCSB)

University of California, Santa Cruz (UCSC)

University of Campinas (UNICAMP)

University of Central Florida (UCF)

University of Chicago

DMPTool

DMPTool

Build your Data Management Plan

Look up your institution here ✕

Finland ⊗

Natural Resources Institute Finland (LUKE)

University of Helsinki, Finland

~~See the full list of participating institutions~~

Institution not in the list? Create an account with any email address

Your institution

- or -

Option 2: If your institution is not affiliated with DMPTool.

Email address

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Option 3: If not affiliated and you need an account.

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DMPTool

DMPTool
Build your Data Management Plan

Sign in | **Create account** ✕

* **First name**

* **Last name**

* **Email**

* **Password**

☐ Show password

☐ * I accept the terms and conditions

Create account

Create account with email address

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DMPTool

DMPTool
Build your Data Management Plan

My dashboard   Create plan

My dashboard

[Create plan]

Welcome

You are now ready to create your first data management plan.
Click the 'Create plan' button to begin.

There are no records associated

DMPTool

DMPTool
Build your Data Management Plan

My dashboard   **Create plan**

✓ Notice: Welcome! You have signed up successfully.

My dashboard

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DMPTool

Funder Requirements

Public Plans

Participating institutions

FAQ

For researchers
    Quick start guide
    Data management general guidance

For Administrators ↗

    Promote the DMPTool

DMPTool
Build your Data Management Plan

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DMPTool

Learn ▾ | Kathryn Meyer ▾

DMPTool
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My dashboard   Create plan

Funder Requirements   For researchers
                              Quick start guide
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Participating institutions   For Administrators ⌤
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Build your Data Management Plan

My dashboard   Create plan

Create a new plan

Before you get started, we need some information about your research project to set you up with the best DMP template for your needs.

What research project are you planning?

☐ Mock project for testing, practice, or educational purposes

Select the primary research organization

Begin typing to see a filtered list

- or - ☐ My research organisation is not on the list *or* no research organisation is associated with this plan

Select the primary funding organization

Begin typing to see a filtered list

- or - ☐ No funder associated with this plan

Create plan   Cancel

DMPTool

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Build your Data Management Plan

My dashboard   Create plan

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[   ]   ⟵ *If applying for funding, state the project title exactly as in the proposal.*   educational purposes

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[Begin typing to see a filtered list   ]   **- or -**   ☐ My research organisation is not on the list *or* no research organisation is associated with this plan

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[Create plan] [Cancel]

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Arctic Data Center DMP Demo

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Select the primary funding organization

National Science Foundation (NSF) ⊗

- or - ☐ No funder associated with this plan

Which template would you like to use?

Arctic Data Center: NSF Polar Programs [DRAFT] ⬍

We found multiple templates corresponding to your funder.

Create plan Cancel

Project details | Plan overview | Write plan | Share | Download

* Project title

Arctic Data Center DMP Demo

☐ mock project for testing, practice, or educational purposes

Funder

National Science Foundation (NSF)

Grant number

Project abstract

B *I* ☰▾ ☰▾ 🔗 ▦▾

Principal Investigator

Name

Kathryn Meyer

ORCID iD

Email

meyer@nceas.ucsb.edu

Data contact person

☑ Same as Principal Investigator

Submit **Cancel**

Plan guidance configuration

To help you write your plan, DMPTool can show you guidance from a variety of organizations.

Select up to 6 organizations to see their guidance.

☑ DMPTool

Find guidance from additional organizations below

See the full list

Submit

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Briefly summarize your research project to help others understand the purposes for which the data are being collected or created.

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Submit   Cancel

58

Project details | **Plan overview** | **Write plan** | **Share** | **Download**

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Submit

Arctic Data Center DMP Demo

Arctic Data Center: NSF Polar Programs [DRAFT]

This plan is based on the "Arctic Data Center: NSF Polar Programs [DRAFT]" template provided by National Science Foundation (NSF).

Instructions

Write plan

Types of data produced

- What types of data, samples, collections, software, materials, etc. will be produced during your project?

- What will be the approximate number and size of data files that will be produced during your project?

- What type of metadata (information others might need to use your data) will be collected during your project?

  Note: if you plan to submit data to the Arctic Data Center please refer to the guidance in the panel on the right.

Data and metadata formats

- What format(s) will data and metadata be collected, processed, and stored in?

  Note: if you plan to submit data to the Arctic Data Center please refer to the guidance in the panel on the right.

Roles and responsibilities

- 1. What parties and individuals will be involved with data management in this project?
  2. What will be the roles and responsibilities of each party and or individual with respect to management of the data
  3. Who will be the lead or primary person responsible for ultimately ensuring compliance with the Data Management Plan?

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Policies for access and sharing

- Will any of the data and/or related materials produced need provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements? If so describe them and detail any requested exceptions from the archiving requirements set for Arctic Sciences research.

- How will data be accessed and shared during the course of the project?

Arctic Data Center DMP Demo

Project details | **Plan overview** | **Write plan** | **Share** | **Download**

Arctic Data Center: NSF Polar Programs [DRAFT]

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DMPTool
Build your Data Management Plan

Arctic Data Center DMP Demo

Project details | **Plan overview** | Write plan | **Share** | **Download**

expand all | collapse all

0/12 answered

+ Types of data produced (0 / 3)

+ Data and metadata formats (0 / 1)

+ Roles and responsibilities (0 / 1)

+ Policies for access and sharing (0 / 4)

+ Policies for re-use and re-distribution (0 / 2)

+ Plans for archiving and preservation (0 / 1)

Arctic Data Center DMP Demo

Project details	Plan overview	Write plan	Share	Download

expand all | collapse all   0/12 answered

+ Types of data produced (0 / 3)

+ Data and metadata formats (0 / 1)

+ Roles and responsibilities (0 / 1)

+ Policies for access and sharing (0 / 4)

+ Policies for re-use and re-distribution (0 / 2)

+ Plans for archiving and preservation (0 / 1)

▬ Types of data produced (0 / 3)

What types of data, samples, collections, software, materials, etc. will be produced during your project?

B	*I*	☰ ▾	☱ ▾	🔗	⊞ ▾

NSF | DMPTool

Guidance

Save

NSF example answer

The researchers will collect and record _____. (Enter data types here. Examples are conductivity, temperature, and depth (CTD) data, gas flux data, aerial photos, modeled atmospheric data, etc.)

These data will include the variables _____. (Enter data variables here. Examples are water temperature, water salinity, photosynthetically active radiation, methane flux, soil albedo, etc.)

Additional data products that will be made available include _____. (Enter additional products here. Examples are atmospheric model codes, educational materials, etc.)

What will be the approximate number and size of data files that will be produced during your project?

− Types of data produced (0 / 3)

What types of data, samples, collections, software, materials, etc. will be produced during your project?

B	I	☰ ▾	☰ ▾	🔗	⊞ ▾

Save

NSF example answer

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Guidance	**Comments**

NSF	**DMPTool**
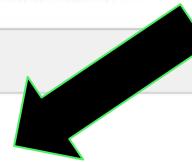
Guidance

Guidance	**Comments**

− Data and metadata formats (0 / 1)

What format(s) will data and metadata be collected, processed, and stored in?

Note: if you plan to submit data to the Arctic Data Center please refer to the guidance in the panel on the right.

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Save

_____ data will be collected in _____ . (Examples are handwritten lab notebooks, Microsoft Excel files, CSV files, R scripts, etc. Make sure to specify the collection format for each type of data detailed in your description of data.)

All data will be transferred into the following formats for processing and storage: _____ . (Examples are CSV files, NetCDF files, etc.)

Metadata will be collected in _____ . (Examples are handwritten lab notebooks, Microsoft Word files, etc.)

All metadata will be transformed from text into EML files by the Arctic Data Center online submission tool when submitting to the Arctic Data Center.

| Guidance | **Comments** |

NSF   **DMPTool**

Guidance
Arctic Data Center Data Format Policy: The Arctic Data Center primarily supports the upload of open-source, ubiquitous, and easy-to-read data formats. Examples of such formats are Comma Separated Values (CSV) files, text (TXT) files, PNG, JPEG or TIFF image files, and NetCDF files among many others. If you plan to submit to the Arctic Data Center, include your planned methods to create open-source, ubiquitous, and easy-to-read data. If you plan to work with any proprietary data formats such as Excel workbooks or MATLAB files, please include a plan to transform all data stored in these formats into an open-source format before submission to the Arctic Data Center. If you anticipate any data will not be able to be transformed into an open-source format, please provide your reasoning.

— Data and metadata formats (0 / 1)

What format(s) will data and metadata be collected, processed, and stored in?

Note: if you plan to submit data to the Arctic Data Center please refer to the guidance in the panel on the right.

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NSF example answer

_____ data will be collected in _____ . (Examples are handwritten lab notebooks, Microsoft Excel files, CSV files, R scripts, etc. Make sure to specify the collection format for each type of data detailed in your description of data.)

All data will be transferred into the following formats for processing and storage: _____ . (Examples are CSV files, NetCDF files, etc.)

Metadata will be collected in _____ . (Examples are handwritten lab notebooks, Microsoft Word files, etc.)

All metadata will be transformed from text into EML files by the Arctic Data Center online submission tool when submitting to the Arctic Data Center.

NSF | **DMPTool**

Guidance
Arctic Data Center Data Format Policy: The Arctic Data Center primarily supports the upload of open-source, ubiquitous, and easy-to-read data formats. Examples of such formats are Comma Separated Values (CSV) files, text (TXT) files, PNG, JPEG or TIFF image files, and NetCDF files among many others. If you plan to submit to the Arctic Data Center, include your planned methods to create open-source, ubiquitous, and easy-to-read data. If you plan to work with any proprietary data formats such as Excel workbooks or MATLAB files, please include a plan to transform all data stored in these formats into an open-source format before submission to the Arctic Data Center. If you anticipate any data will not be able to be transformed into an open-source format, please provide your reasoning.

Roles and responsibilities (0 / 1)

1. What parties and individuals will be involved with data management in this project?
2. What will be the roles and responsibilities of each party and or individual with respect to management of the data
3. Who will be the lead or primary person responsible for ultimately ensuring compliance with the Data Management Plan?

Note: if you plan to submit data to the Arctic Data Center please refer to the guidance in the panel on the right.

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NSF example answer

The following organizations and individuals will be involved with data management in this project:
_____.

_____ will be responsible for _____. (Examples are collecting data, maintaining data storage and backup systems, interfacing with data repository personnel, etc. Make sure to specify the responsibilities for each organization/individual detailed above.)

The NSF Arctic Data Center will provide data archival, preservation, access and metadata authoring services for the project.

Guidance | Comments

NSF | **DMPTool**

Guidance
Arctic Data Center Identification Policy:
The Arctic Data Center utilizes ORCiDs
(https://orcid.org/) to identify individuals
associated with each dataset. An ORCiD
will be required for the primary contact of
each dataset. ORCiDs are not required
for all associated parties but are
encouraged so that proper identification
and attribution can be given. Please plan
on creating (when necessary) and
recording ORCiDs for each individual
involved with your project before
submitting to the Arctic Data Center.

Policies for access and sharing (0 / 4)

Will any of the data and/or related materials produced need provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements? If so describe them and detail any requested exceptions from the archiving requirements set for Arctic Sciences research.

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_____ data are expected to need provisions for _____. (Examples are appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements. Make sure to specify all the types of data that are expected to need provisions.)

_____ data are expected to need provisions due to _____. (Examples are ethical restrictions, release of indigenous knowledge, etc. Make sure to specify explanations for all expected provisions detailed above.)

Because of these expected provisions, it is expected that _____ data will need to be exempted from the archiving requirements set for Arctic Sciences research.

How do you anticipate the data for this project will be used? Consider the following:

1. Which bodies/groups are likely to be interested in the data?
2. What and who are the intended or foreseeable uses/users of the data?

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NSF example answer

_____ data are expected to be used by _____. (Examples are academic researchers, government agencies, non-profit organizations, etc. Make sure to specify usage expectations for each type of data detailed in your description of data.)

Other groups that may be interested in _____ data are _____. (Examples are academic researchers, government agencies, non-profit organizations, etc. Make sure to specify interest expectations for each type of data detailed in your description of data.)

| Guidance | Comments |

| NSF | DMPTool |

Guidance

Will any permission restrictions need to be placed on the data? Consider the following:

What is the long-term strategy for maintaining, curating, and archiving the data?

Note: The Office of Polar Programs policy requires that metadata files, full data sets, and derived data products be deposited in a long-lived and publicly accessible archive.

Note: if you plan to submit data to the Arctic Data Center please refer to the guidance in the panel on the right.

| Guidance | Comments |

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NSF example answer

The data manager will follow the NSF Arctic Data Center guidelines to provide accurate and complete documentation for data preservation. The NSF Arctic Data Center will ensure that the data are curated in a relevant long-term archive and ensure data will be available after project funding has ended.

| NSF | DMPTool |

Guidance

Arctic Data Center Data Preservation Policy: The Arctic Data Center ensures the long-term preservation of the data entrusted to the repository. The guiding principles for the preservation plan follow:

1. Preserve the bits
2. Open science, open standards
3. Replicate data and metadata
4. Strong versioning
5. Frequent auditing
6. A wind down plan

Arctic Data Center DMP Demo

Project details | **Plan overview** | **Write plan** | **Share** | **Download**

Set plan visibility

Public or organizational visibility is intended for finished plans. You must answer at least 50% of the questions to enable these options. Note: test plans are set to private visibility by default.

- ⦿ Private: visible to me, specified collaborators and administrators at my organization
- ○ Organizational: anyone at my organization can view
- ○ Public: anyone can view

Manage collaborators

Invite specific people to read, edit, or administer your plan. Invitees will receive an email notification that they have access to this plan.

Email address	Permissions
meyer@nceas.ucsb.edu	Owner

Invite collaborators

* Email

[   ]

* Permissions

- ○ Co-owner: can edit project details, change visibility, and add collaborators
- ○ Editor: can comment and make changes
- ○ Read only: can view and comment, but not make changes

Send invitation

Arctic Data Center DMP Demo

Project details | **Plan overview** | **Write plan** | **Share** | Download

Download settings

Optional plan components

- ☐ project details coversheet
- ☑ question text and section headings
- ☑ unanswered questions

Format

pdf ⬍

PDF formatting

Font

Face

Arial, Helvetica, Sans-Serif ⬍

Size (pt)

10 ⬍

Margin (mm)

Top	Bottom	Left	Right
25 ⬍	20 ⬍	12 ⬍	12 ⬍

Download plan

DMPTool
Build your Data Management Plan

Public Plans

Public plans are plans created using the DMPTool service and shared publicly by their owners. They are not vetted for quality, completeness, or adherence to funder guidelines.

🔍 [search box] **Search**

Project title ⇕	Template ⇕	Organization	Owner	Download
UNDERSTANDING THE ROLE OF PHYSICIAN INTEGRATION WITHIN NURSING HOMES IN POST-ACUTE CARE OUTCOMES	NIH-GEN: Generic	University of Pennsylvania (UPenn)	Kira Ryskina	PDF
"A Microgravity-Themed Collaborative Intervention Promoting Student Selection of a STEM Career Pathway"	NSF-EHR: Education and Human Resources	Baylor University	Stacey Smith	PDF
A Framework for Adaptive Sampling of Social Science Research Data Using the Twitter API: Understanding Social Media Communication During Crisis Events	NSF-SBE: Social, Behavioral, Economic Sciences	University of California, Davis (UCD)	Carl Stahmer	PDF
A Political Ecology of Value: A Cohort-Based Ethnography of the Environmental Turn in Nicaraguan Urban Social Policy	NSF-SBE: Social, Behavioral, Economic Sciences	Non Partner Institution	Josh Fisher	PDF
A unified approach to preserving cultural software objects and their development histories	NEH-ODH: Office of Digital Humanities	University of California, Office of the President (UCOP)	DMP dmpcurator	PDF
A unified approach to preserving cultural software objects and their development histories	NEH-ODH: Office of Digital Humanities	University of California, Los Angeles (UCLA)	Christopher Cabrera Thompson	PDF
Additive Manufacturing for Spare Parts Supply Chain	NSF-ENG: Engineering	University of Tennessee, Knoxville	Nawei Liu	PDF
analysis of Brazilian financial investment funds CVM - Escola Politécnica - PPGEE - PCS	Department of Energy (DOE): Generic	Non Partner Institution	Antonio Newton Licciardi Jr	PDF
AR or HAI Data Management Plan	NSF-EAR: Earth Sciences	Emory University	Scott Fridkin	PDF
Arthropod responses to grassland nutrient limitation	NSF-GEN: Generic	University of California, Office of the President (UCOP)	DMP dmpcurator	PDF

View all

1 2 3 4 5 ... Next Last

DMPTool Community Resources

Summary

- Good data management plans will save you time and effort overall
- Data management plans are not static - revise as you do your research project

- Take advantage of DMP resources to create your plan
- The Arctic Data Center is available to assist with your DMP development

https://arcticdata.io