Data Management Planning
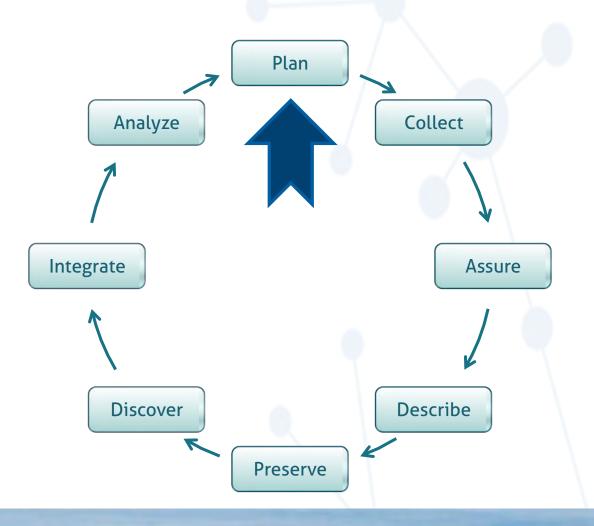
Amber Budden
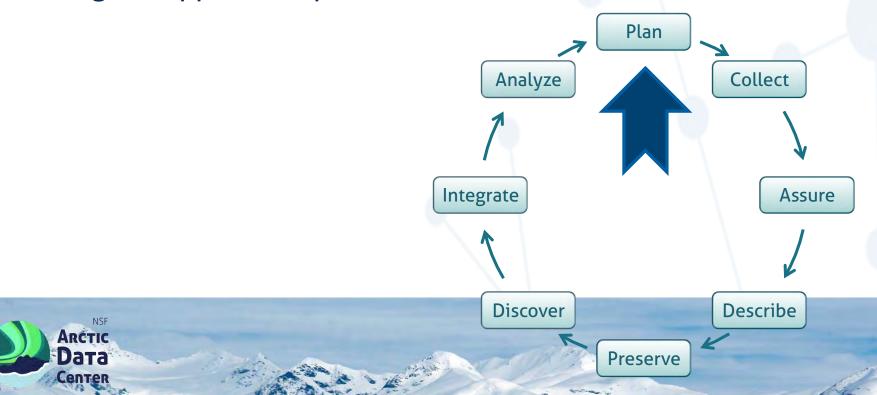
https://arcticdata.io
NSF Award #: 1546024

Data Management Planning

Why Plan?

- Ensures you and others will be able to understand and use your data now and in the future

- NSF (and most funders) require a DMP to be submitted as part of the grant application process

Data Management Planning

What's in a plan?

Information about the

- Design
- Data & data format
- Metadata
- Policies
- Long-term storage and data management
- Budget
- ....

NSF
Arctic Data Center

Writing a Good DMP
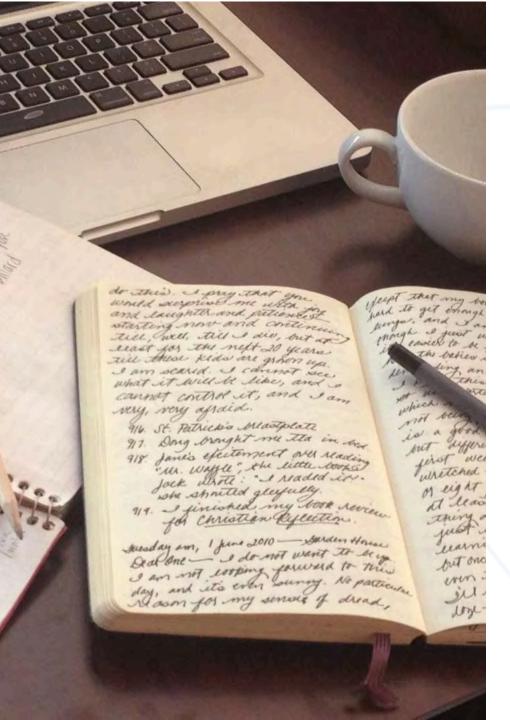
1. Engage everyone

Writing a Good DMP

1. Engage everyone
2. Plan from the start

Writing a Good DMP

1. Engage everyone
2. Plan from the start
3. Follow good advice
    - Arctic Data Center
    - Institutional Libraries
    - DataONE

Writing a Good DMP

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

Writing a Good DMP

1. Engage everyone
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

PERSPECTIVE

Ten Simple Rules for Creating a Good Data Management Plan

William K. Michener ✉

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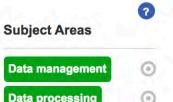
Ten Simple Rules
Open Data

ADVERTISEMENT

Figures

Subject Areas

Data management ◉

Data processing ◉

10 Simple Rules

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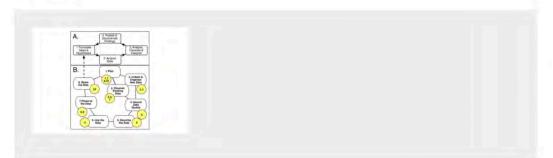3. Define how the data will be organized
4. Explain how the data will be documented
5. Describe how quality will be assured
6. Present a sound storage and preservation strategy
7. Define the project's data policies
8. Describe how the data will be disseminated
9. Assign roles and responsibilities
10.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

Determine the research sponsor requirements

- **NSF**
  - NSF 14-1 Proposal Preparation Instructions; Section j

- **NSF GEO**
  - https://www.nsf.gov/geo/geo-data-policies/

- **NSF Polar Programs**
  - NSF 16-055 Dear Colleague Letter

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DATA
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NSF DMP Requirements

Five section plan comprising information on

- ## Products of research

  Types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project.

- ## Data format and standards

  Standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies).

- ## Policies for access and sharing

  Policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements.

- ## Policies and provisions for re-use

  Policies and provisions for re-use, re-distribution, and the production of derivatives.

- ## Archiving of data

  Plans for archiving data, samples, and other research products, and for preservation of access to them.

Division of Polar Programs

- Metadata files, full data sets, and derived data products, must be deposited in a long-lived and publicly accessible archive

- All data and derived data products must be provided to a data center within two years of collection or by the end of the award, whichever comes first
  - AON data must be quality controlled and must be deposited in a long-lived and publicly accessible archive within 6 months of collection
  - Arctic Social Science Program (ASSP) research data must be deposited in a long-lived and publicly accessible archive within 5 years of the award date

- Metadata for all Arctic supported data sets must be submitted to the NSF Arctic Data Center

https://arcticdata.io/data-plans/

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DATA
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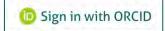
Data Management Plans

General Guidelines

A data management plan describes the data that will be authored and how the data will be managed and made accessible throughout its lifetime. The contents of the data management plan should include:

- the types of data to be authored;
- the standards that would be applied, for example format and metadata content;
- provisions for archiving and preservation;
- access policies and provisions; and
- plans for eventual transition or termination of the data collection in the long-term future.

In January 2011 NSF added the requirement for a data management plan (DMP) to be included within proposals. Below are some links to relevant pages on the NSF website that highlight data management requirements:

- NSF Grant Proposal Guide
- NSF Data Management FAQ
- NSF Dissemination of Research Results
- NSF Geo Data Policies
- NSF Dear Colleague Letter regarding data reporting requirements for the Division of Polar Programs

NSF Arctic Data Center Guidelines

The NSF Arctic Data Center is collaborating with the DMPTool to integrate DMP requirements for Arctic data into their online tool. In the interim we have adapted the documentation previously available via ACADIS. This template is available here.

DMP Template

NSF Arctic Data Center

Data Management Plan:
NSF Arctic Data Center guidance for creating your DMP*

This document is a guide to help you write the required Data Management Plan (DMP) for NSF proposals to the Arctic directorate of the Division of Polar Programs (PLR). NSF requires your Data Management Plan to be **no longer than 2 pages**, single-spaced. All underlined areas in the sample text should be replaced with information that is accurate for your proposal. **Do not simply insert this document into your proposal**. If the NSF Arctic Data Center team can be of service, please email support@arcticdata.io.

1. Products of Research

THIS SECTION REQUIRES THE FOLLOWING:
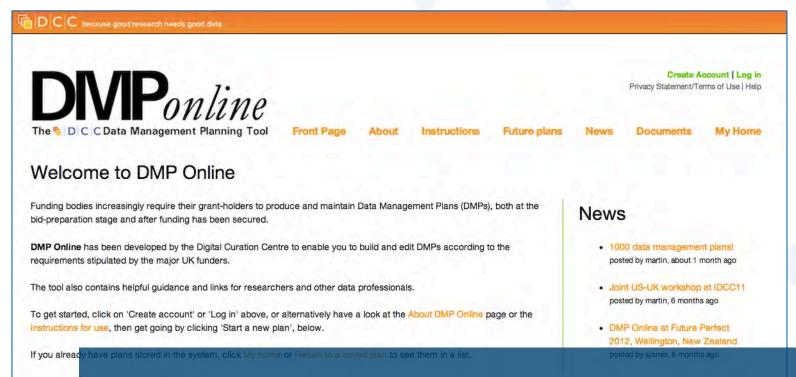
https://arcticdata.io/data-plans/

Current DMP Tools

DMPonline

Step-by-step wizard for generating a DMP

Create | edit | re-use | share | save | generate

Open to community

Data Management Planning Tool

Create, review, and share data management plans that meet institutional and funder requirements.

Get Started

📊 PUBLIC DMPS

List of sample data management plans provided by DMPTool users.

» **CAREER: Parietal Cortex and the Transformation of Spatial Cognition into Action**
» **: Biosignature Suites: Using Connections between Microbes and Minerals to understand Biogenic Carbonates**
» **A unified approach to preserving cultural software objects and their development histories**

View All
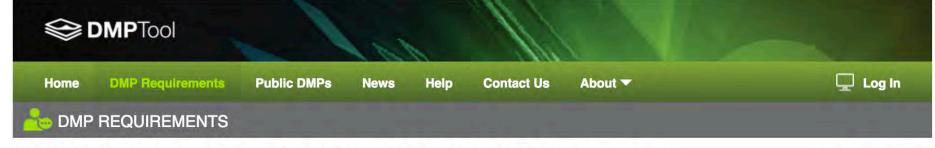
📰 DMPTOOL NEWS

Latest information about data management and the DMPTool.

» **US Dept of Energy data management requi...**
» **We need API use cases!**
» **DMPTool downtime this Saturday 7/12/14**
» **Misc Stats for DMPTool2**
» **DMPTool workshop at DataONE Users Group...**

More News

❓ DMPTOOL HELP

Overview of how to use the tool, plus resources and guidance on data management.

» **Frequently Asked Questions**
» **Create a DMP**
» **Administer the DMPTool**
» **Data management guidance**
» **Community resources**

View All

👥💬 DMP REQUIREMENTS

Use the A-Z links below to narrow down the list by institution or use the search box to search for specific DMP Templates. Sample plans are not necessarily from the funder.

🔍 [   ]   **Search**

(A - F)   (G - L)   (M - S)   (T - Z)   (**All**)

Template	Funder	Funder Links	Sample Plans ❓ (if available)
Alfred P. Sloan Foundation 📄	Alfred P. Sloan Foundation	Alfred P. Sloan Foundation	
BCO-DMO NSF OCE: Biological and Chemical Oceanography 📄	National Science Foundation	NSF OCE Sample and Data Policy, May 2011 (PDF) NSF GEO Data Policies	
Department of Energy: Generic 📄	Department of Energy (DOE)	Policy for Digital Research Data Management	
Department of Energy: Office of Science 📄	Department of Energy (DOE)	DOE Statement on digital data management	
Department of Transportation 📄	Department of Transportation (DOT)	Official DOT Public Access Plan	
DMP Template from DCC 📄	University of California, Office of the President	Information on DCC website	
GoMRI Research Consortia DMP Template 2015 📄	Gulf of Mexico Research Initiative		
Gordon and Betty Moore Foundation 📄	Gordon and Betty Moore Foundation	Guidelines	GBMF: Sample Plan #1 📄 GBMF: Sample Plan #2 📄 GBMF: Sample Plan #3 📄
IMLS (2014-): Digital Content 📄	Institute of Museum and Library Services	Institute of Museum and Library Services (IMLS)	

Data Management Planning Tool

Create, review, and share data management plans that meet institutional and funder requirements.

Get Started

Library of public DMPs

PUBLIC DMPS

List of sample data management plans provided by DMPTool users.

» **American University**
» **George Mason University**
» **North Carolina State University**
» **Smithsonian Institution**
» **University of Arizona**

View All

DMPTOOL NEWS

Latest information about data management and the DMPTool.

» **DMPTool2 Release Schedule Update**
» **DMPTool 2 Feature Highlight: Guidance a...**
» **DMPTool 2 Feature Highlight: Co-Ownersh...**
» **Call for Example Data Management Plans**
» **What are your burning questions about t...**

More News

DMPTOOL HELP

Overview of how to use the tool, plus resources and guidance on data management.

» **Frequently Asked Questions**
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Create, review, and share data management plans that meet institutional and funder requirements.

Get Started

Data management resources

PUBLIC DMPS

List of sample data management plans provided by DMPTool users.

- » American University
- » George Mason University
- » North Carolina State University
- » Smithsonian Institution
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DMPTool

Log in ➡

Data Management Planning Tool

Create, review, and share data management plans that meet institutional and funder requirements.

Get Started

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» American University
» George Mason University
» North Carolina State University
» Smithsonian Institution
» University of Arizona

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More News

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» Frequently Asked Questions
» Create a DMP
» Administer the DMPTool
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» Community resources

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🖥 LOG IN

Log in through your institution

Select your institution below and you will be directed to your institutional log in page.

Select your institution   Select Institution

Next

If you do not see your institution in the list,
please select **"None of the above"** and click **Next**.

DMPTool

LOG IN

Log in through your institution

Select your institution below and you will be directed to your institutional log in page.

Select your institution

Your institution not listed?
Select "Non-partner"

Next

If you do not see your institution in the list, please select **"None of the above"** and click **Next**.

DMPTool

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💻 LOG IN

Log in through your institution

Select your institution below and you will be directed to your institutional log in page.

[Select your institution]

Next

If you do not see your institution in the list, please select **"None of the above"** and click **Next**

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Your institution not listed?
Select "Non-partner"

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💻 LOG IN

Log in to DMPTool through:
NonPartner Institution

Username

[   ]

Password

[   ]

☐ Remember My Password

Login

Forgot your username?
Forgot your password?

Is the institution shown incorrect?
Select a different institution

Don't have a DMPTool account yet?

Create An Account

Then create an account
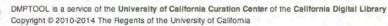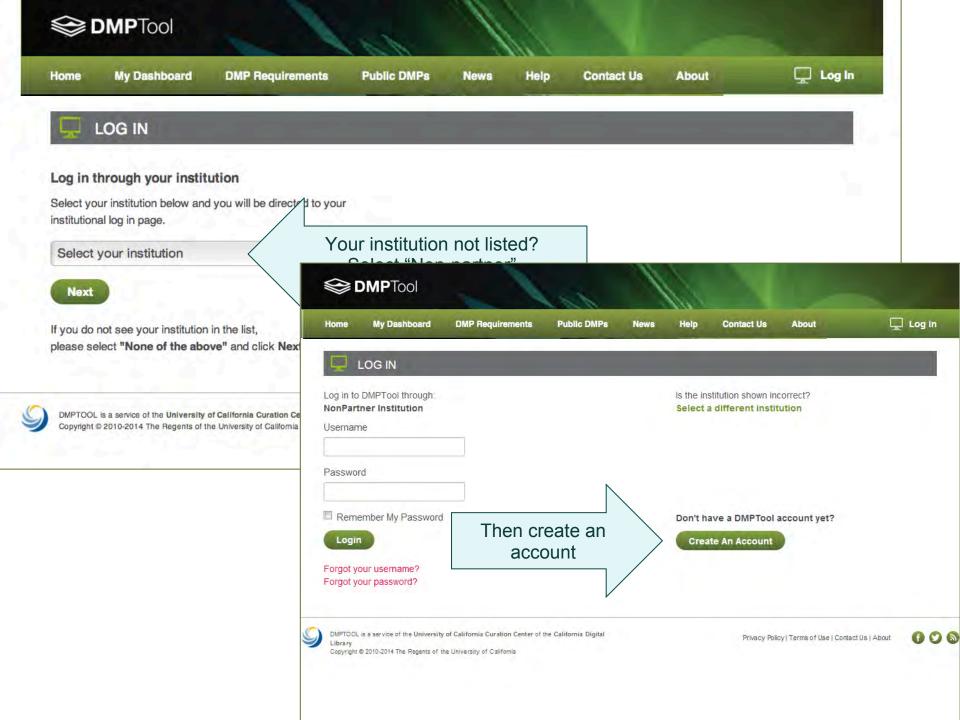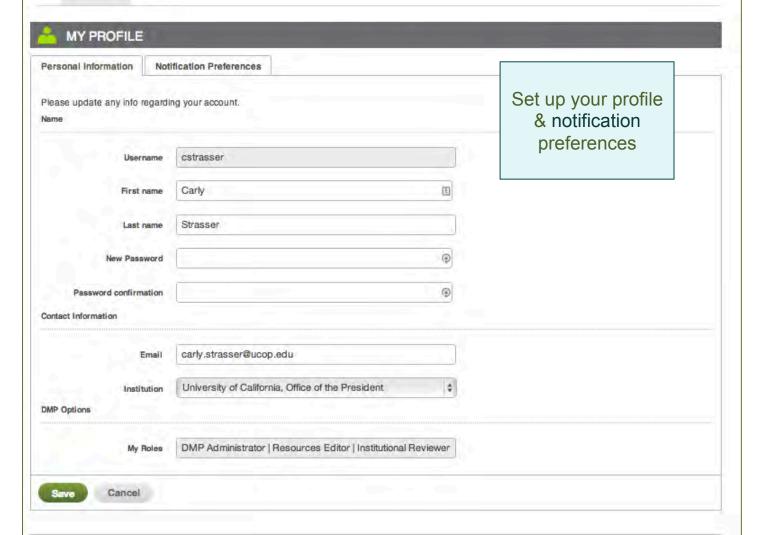
Dashboard overview of DMPs

DMPTool

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University of California Curation Center of the California Digital Library

www.domainname.edu

Contact Institution Administration

My Dashboard | My DMPs   **Create New DMP**   Review DMPs | DMP Templates | Resources | Institution Profile | My Profile

DMP Template   DMP Overview   DMP Details   DMP Preview

CREATE NEW DMP

Start with a DMP Template

To create a new DMP, select a funder or institutional template.

Select Template >>

Copy an Existing DMP
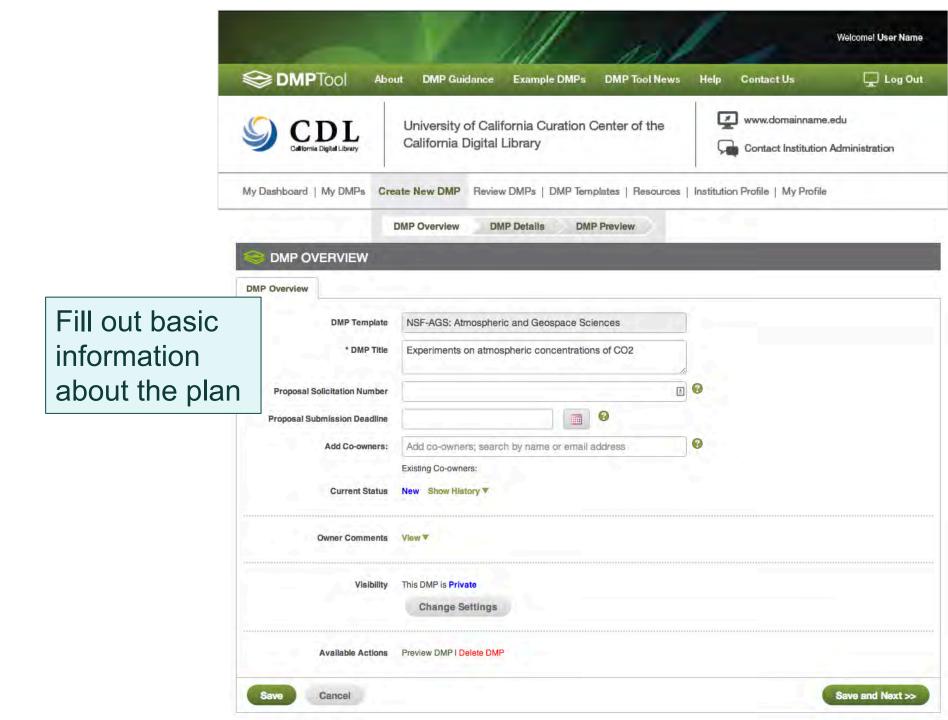
The existing DMPs in this list are either publicly shared by any user, shared within your institution by other DMP creators, or are plans that you have previously created.
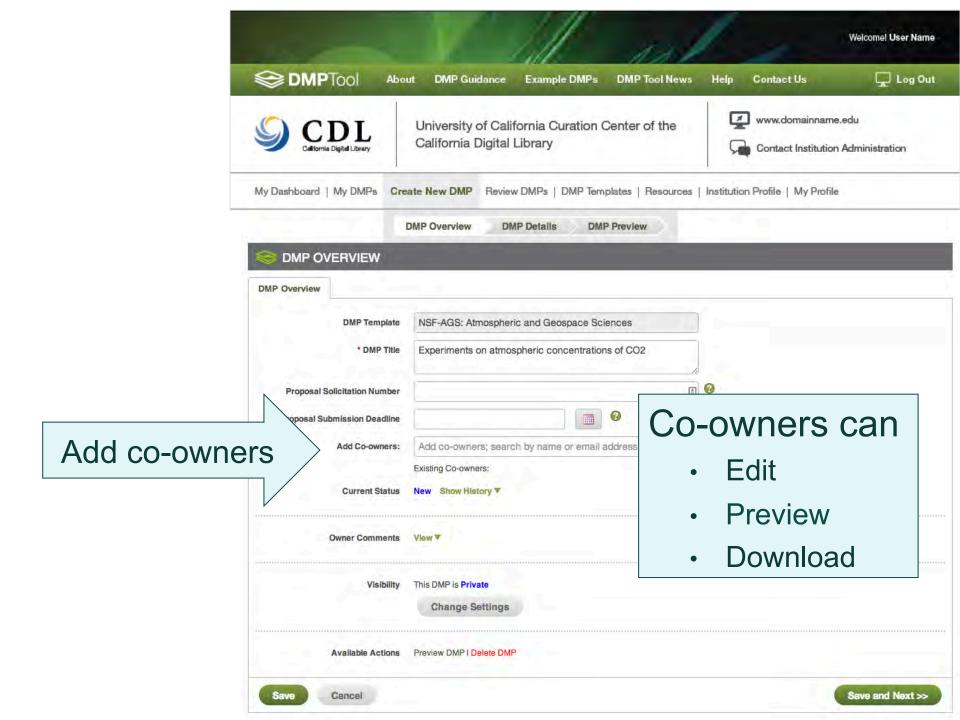
Select an existing DMP below and add text to the template.
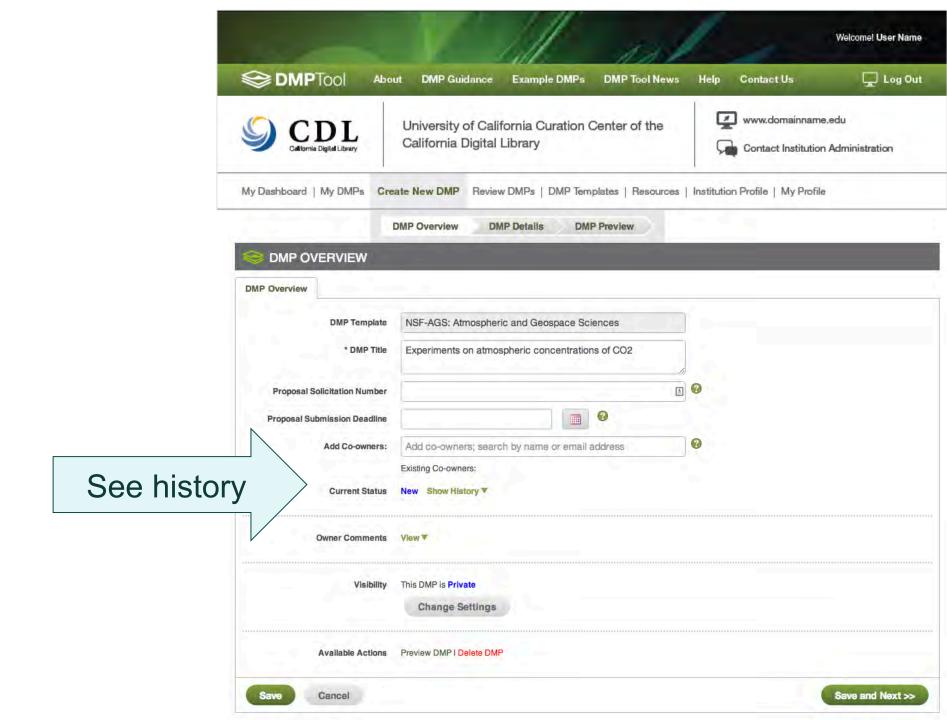
	Name	Owner
○	Alternatives to the effects of temperature and salinity on population growth of the estuarine copepod, Eurytemora affinis	Tracy Seneca
○	NSF BIO -- generic	Trisha Cruse
○	DataShare	Trisha Cruse
○	export error for neh	Marisa Strong
⊙	Test Plan 2	Admin 123

1 2 3 4 5 ... Next › Last »

Copy this DMP >>

Either copy an existing DMP or select a template

DMPTool

Welcome! **Admin123 UCSD Admin**

Log Out
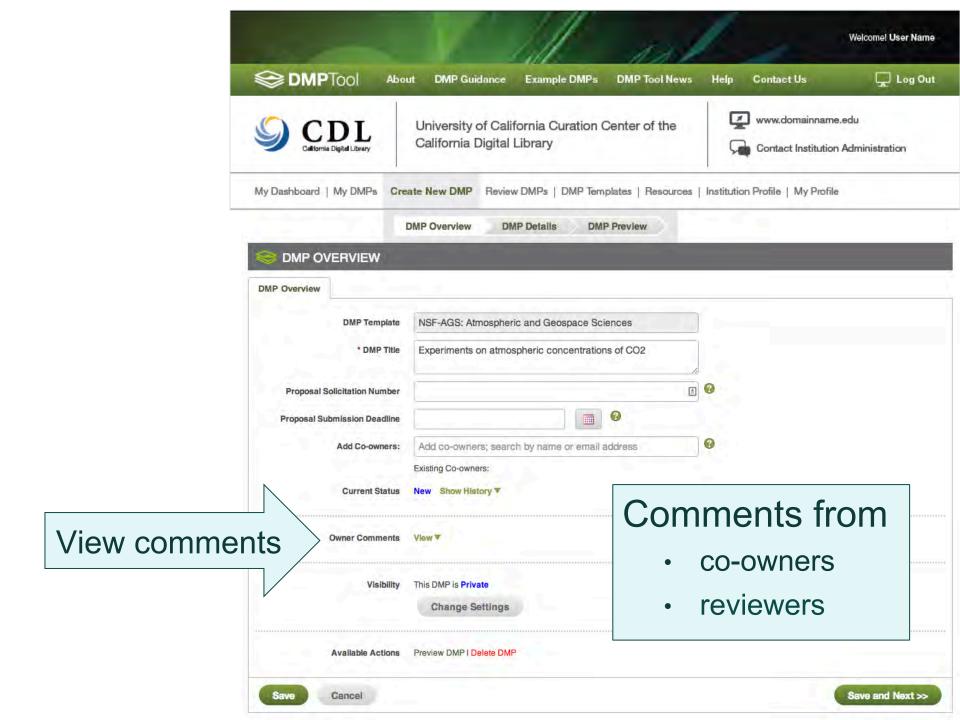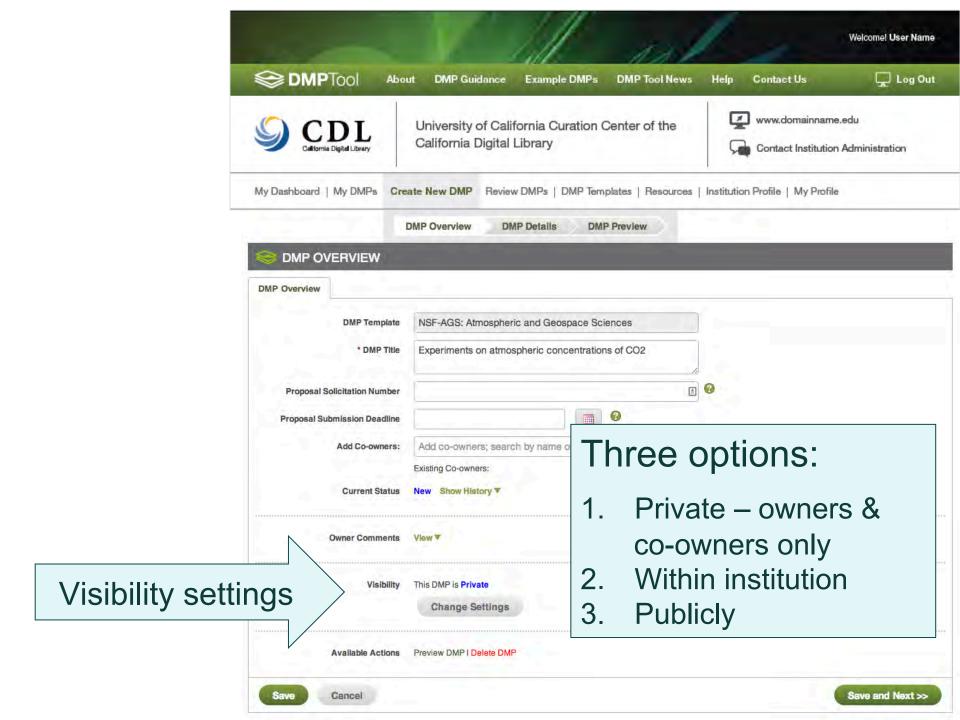
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🌐 SELECT DMP TEMPLATE

Select one of the funder DMP Templates listed to proceed to the next step. The type of template chosen can affect what information you will need to provide in the following steps.

🔍 [   ]   **Search**

A – F   **G – L**   M – S   T – Z   View All

Name
Gordon and Betty Moore Foundation
Gulf of Mexico Research Initiative
National Institutes of Health
National Oceanic and Atmospheric Administration
▾ 📁 **National Science Foundation**
NSF-AGS: Atmospheric and Geospace Sciences
NSF-AST: Astronomical Sciences
NSF-BIO: Biological Sciences
NSF-CHE: Chemistry Division
NSF-CISE: Computer and Information Science and Engineering

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Select
Funder

Fill out basic information about the plan

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DMP Overview   DMP Details   DMP Preview

DMP OVERVIEW

DMP Overview

DMP Template NSF-AGS: Atmospheric and Geospace Sciences

* DMP Title Experiments on atmospheric concentrations of CO2

Proposal Solicitation Number

Proposal Submission Deadline

Add Co-owners: Add co-owners; search by name o

Existing Co-owners:

Current Status New Show History ▼

Owner Comments View ▼

Visibility This DMP is **Private**

Change Settings

Available Actions Preview DMP | Delete DMP

Save   Cancel   Save and Next >>

Visibility settings

Three options:

1. Private – owners &
   co-owners only
2. Within institution
3. Publicly

DMP Overview DMP Details DMP Preview

DMP DETAILS

NSF-AGS: Atmospheric and Geospace Sciences

Click on a section below to edit it at any time.

✓ = Complete

* = Mandatory

Template Outline

📄 **Products of research**

📄 Data format

📄 Access to data, and data sharing practices and policies

📄 Policies and provisions for re-use, re-distribution and production of derivatives

📄 Archiving of data

Instructions **Links**

Describe the types of data and products that will be generated in the research space and/or time-dependent information on chemical and physical process intermediate numerical results, theoretical formalisms, computational strategie materials.

Instructions & help

Guidance box size: small | medium | full

Describe what data or other research products you will generate in the course of your project. Include the size or amount of data produced, the type of data files that will be generated, and where and when the data will be produced. Examples of research products include observational data, results from models, data generated from previous observations or models, physical samples.

B *I* U S x₂ x²

Answer questions

Cancel Changes **Save Response** **Save and Next**

<< Back **DMP Preview >>**

DMP Overview → DMP Details → DMP Preview

🔍 DMP DETAILS

NSF-AGS: Atmospheric and Geospace Sciences

Click on a section below to edit it at any time.

✅ = Complete

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Template Outline

📄 **Products of research**

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📄 Archiving of data

Instructions	**Links**

Describe the types of data and products that will be generated in the research, such as physical samples, space and/or time-dependent information on chemical and physical processes, images, spectra, final or intermediate numerical results, theoretical formalisms, computational strategies, software, and curriculum materials.

Guidance   box size: small | medium | full

Describe what data or other research products you will generate in the course of your project. Include the size or amount of data produced, the type of data files that will be generated, and where and when the data will be produced. Examples of research products include observational data, results from models, data generated from previous observations or models, physical samples,

B *I* U S x₂ x²   ≣ ≣ ≣ ≣ ≣   ✂ ▢ ▢ ▢ ▢ ← → 🔍

Cancel Changes   Save Response   Save and Next

<< Back   DMP Preview >>

DMP Overview   DMP Details   DMP Preview

DMP DETAILS

NSF-AGS: Atmospheric and Geospace Sciences

Click on a section below to edit it at any time.

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Template Outline

....

📄 **Products of research**

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📄 Archiving of data

| Instructions | **Links** |

General Resources

NSF Data Management FAQ

NSF - Dissemination of results

NSF BIO guidance (PDF)

NSF Grant Proposal Guide on DMPs

DataONE Best Practice: Identify and Use Relevant Metadata Standards

DataONE Best Practice: Define Expected Data Outcomes and Types

DataONE Best Practice: Document and Store Data Using Stable File Formats

DataONE Best Practice: Define the Data Model

B *I* U S x₂ x² | ≔ ⋮≡ ≡ ⫤ ⫣ | ✂ ⎘ ⎗ ⎗ ⎗ | ↶ ↷ 🔍 🔤

Cancel Changes   Save Response   Save and Next

<< Back   DMP Preview >>

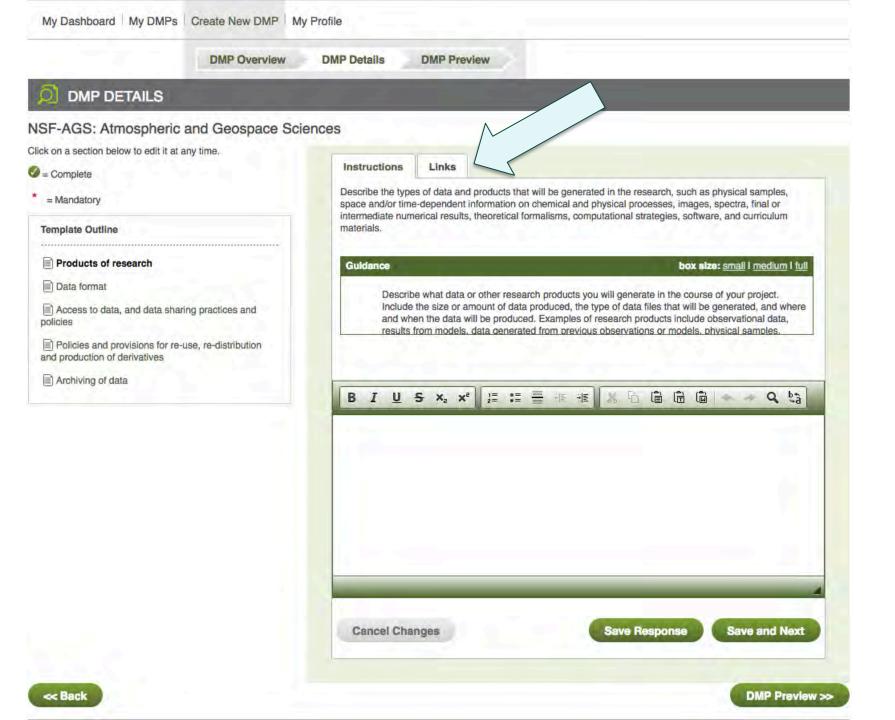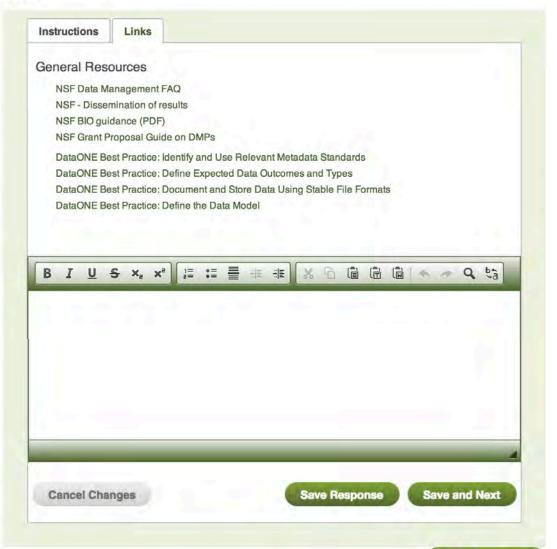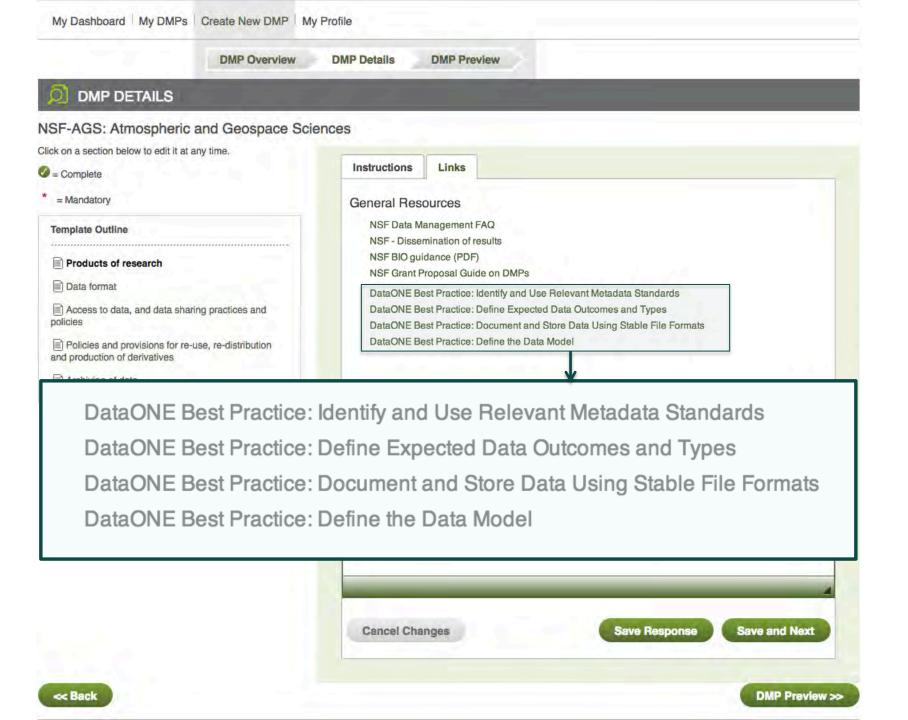DMP Overview   DMP Details   DMP Preview

DMP DETAILS

NSF-AGS: Atmospheric and Geospace Sciences

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✓ = Complete

* = Mandatory

Template Outline

📄 **Products of research**

📄 Data format

📄 Access to data, and data sharing practices and policies

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📄 Archiving of data

Instructions   **Links**

General Resources

NSF Data Management FAQ
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DataONE Best Practice: Identify and Use Relevant Metadata Standards

DataONE Best Practice: Define Expected Data Outcomes and Types

DataONE Best Practice: Document and Store Data Using Stable File Formats

DataONE Best Practice: Define the Data Model

Cancel Changes   Save Response   Save and Next

<< Back   DMP Preview >>

DMP Overview DMP Details DMP Preview

DMP PREVIEW

Export as PDF **Export as DOCX** 🖨 **Print**

Export plan
.pdf, .docx, .html

DMP Name:	Copy of Making Data Count: Developing a Data Metrics Pilo		
DMP Template:	NSF-GEN: Generic	**Last Modified Date:**	April 21, 2016
Owner:	Stephanie Simms	**Co-owner[s]:**	
Institution:	University of California, Office of the President	**Solicitation Number:**	Early Concept Grants for Exploratory Research (EAGER)

Preview plan

...uced or exploited in the course of this project.

...in the form of quantitative and qualitative survey results collected as part of Unit One. Given that these surveys will involve human subjects, we will ensure ...Institutional Review Board policies and receive prior approval before conducting the surveys. These data will be collected via paper and electronic means. Paper survey results will be digitized by hand, and originals will be kept for the duration of the project.

The second is dataset usage metrics harvested from the DataONE network through mechanisms developed in Unit Two. Individual DataONE member nodes collect raw web log usage statistics. Since this data potentially could be used to identify individual data consumers it is anonymized before being aggregated by the DataONE coordinating nodes that will be harvested by the DLM tool.

The third consists of software produced or modified as part of the project. The new DLM software created by PLOS will be maintained in a community Github repository during and after the project. Extensions to DataONE code will be maintained in the public DataONE Subversion repository. Fenner will be responsible for code related to the DLM tools.

The fourth is dataset citation data harvested by the DLM tool from traditional and alternative (e.g., blogs, Twitter, etc.) channels of scholarly communication as part of Unit Three activities.

The fifth consists of all other research products (e.g., additional end-user tools developed in Unit Four, analysis results from Unit Five, community feedback, and project status communications) that will be made publicly available via either peer-reviewed journal articles or the project's website, which will be maintained by California by Strasser.

Data and metadata standards
The DLM software produced by the project will conform to accepted community best practices, including version control (using git) with tagging of major releases, a permissive open-source license (Apache 2), public availability in a community repository (Github), inline comments, reference and tutorial documentation with download and installation instructions that is available from within the software and from a community website, and extensive test coverage.

As part of this project the DataONE development team will evaluate the utility and level of effort necessary to report data usage statistics in a form that is consistent with COUNTER standards. This would permit meaningful comparisons between metrics for data usage and other types of online resources, including traditional serial and monographic publications.

Policies for access and sharing
All five major data categories, as enumerated in Section 1, will be publicly available for review, evaluation, and use as they are generated during the project and after its completion. Announcements about software and data availability will be made using a variety of channels (e.g., blogs, Twitter, email lists) targeting all interested stakeholder communities.

As part of this project the DataONE development team will evaluate the utility and level of effort necessary to report data usage statistics in a form that is consistent with COUNTER standards. This would permit meaningful comparisons between metrics for data usage and other types of online resources, including traditional serial and monographic publications.

Policies for re-use, redistribution
Similarly, all software products resulting from this project will be re-usable and redistributable both during the project and after its completion. The only restriction placed on redistribution of the software is that the copyright and license statement be kept intact as required by the Apache open source license. This software is expected to be of interest to publishers, data centers and repositories, individual researchers, and institutional administrators.

As part of this project the DataONE development team will evaluate the utility and level of effort necessary to report data usage statistics in a form that is consistent with COUNTER standards. This would permit meaningful comparisons between metrics for data usage and other types of online resources, including traditional serial and monographic publications.

Plans for archiving and preservation

This DMP is **Private** **Change Settings** Note: when visibility is set to "Public", your DMP will appear on the Public DMPs page of this site and it will be downloadable and copy-able.

💻 PUBLIC DMPS

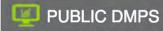Use the search box or the A-Z links below to narrow down the list by plan title. Public DMPs are plans created using the DMPTool and shared publicly by their owners. They are not vetted for quality, completeness, or adherence to funder guidelines.

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Plan Title	Funder Template	Institution	Owner	Download
Making Data Count: Developing a Data Metrics Pilot	NSF-GEN: Generic	University of California, Office of the President	Carly Strasser	📄
Collaboration as a means of retention	Institute of Education Sciences (US Dept of Education)	Non Partner Institution	luis meza	📄
Meteorological Measurements of Surface Conditions in East Antarctica in 2015	NSF-AGS: Atmospheric and Geospace Sciences	University of Colorado Boulder	Shelley Knuth	📄
Project 1 Data Management	NSF-SBE: Social, Behavioral, Economic Sciences	University of Washington	Ryan Scott	📄
Doctoral Dissertation Research: An Agent-Based Model of Population Changes in a Vulnerable Coastal Environment	NSF-SBE: Social, Behavioral, Economic Sciences	Louisiana State University	Kenan Li	📄
REU Site: A Multidisciplinary Research Experience in Engineered Bioactive Interfaces and Devices	NSF-GEN: Generic	University of Kentucky	Kimberly Anderson	📄
Inquiring into Engineering Faculty Assumptions about Students: A Profound Human Systems Intervention	NSF-ENG: Engineering	California Polytechnic State University-San Luis Obispo	Lizabeth Schlemer	📄
CERTAIN STEM	NSF-EHR: Education and Human Resources	Utah State University	Louis Nadelson	📄
UNM OILS Student Recruitment	NSF-CISE: Computer and Information Science and Engineering	University of New Mexico	Kathy Dorcas	📄

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Plan Title	Funder Template	Institution	Owner	Download
Meteorological Measurements of Surface Conditions in East Antarctica in 2015	NSF-AGS: Atmospheric and Geospace Sciences	University of Colorado Boulder	Shelley Knuth	📄
Late Season Productivity, Carbon, and Nutrient Dynamics in a Changing Arctic	NSF-EAR: Earth Sciences	Oregon State University	Miguel Goni	📄

View All

Late Season Productivity, Carbon, and Nutrient Dynamics in a Changing Arctic

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Types of data

Our project will yield extensive data sets of water chemistry as well as a large number of water/filter samples. Underway and hydrographic cast data include salinity, temperature, location, water depth, optical properties collected by sensors (e.g. chlorophyll fluorescence, CDOM, beam-attenuation). Analyses of waters samples will yield data on dissolved gases (O_2, Ar, CO_2), dissolved nutrients, dissolved inorganic carbon, total alkalinity, particulate and dissolved organic carbon, stable carbon isotopes and pigments. All water/filter samples will be given an ISGN number for tracking. All compositional data will be new and will be collected in spreadsheets.

Data and metadata standards

Metadata will include date/time of collection, location (latitude, longitude, water depth) and description (e.g., type sample). The metadata will allow users to identify the location and collection history of each sample and provide the tools to map them.

Policies for access and sharing

Data collected will be archived using the archival services provided by the Oregon State University Libraries. The OSU Libraries Research Data Services group is housed within the Center for Digital Scholarship and Services and provides guidance and support for all aspects of the data lifecycle, from planning data management strategy through preserving data at the conclusion of the project. Services are free of charge, and if funded we will partner with OSU Research Data services to archive our data and make it publically accessible before the end of the award or two years after collection, whichever comes first.
We plan to use OSU's digital repository (or "institutional repository") ScholarsArchive@OSU (SA@OSU) as a suitable archive and sharing mechanism for data. All items deposited into SA@OSU receive a persistent identifier (DOI or ARK), are freely available to anyone, and are full-text searchable, making them discoverable through Google, Google Scholar and other large search engines. We will work closely with OSU Resarch Data services to insure this process includes appropriate documentation and requirments for data integrity. Regarding the latter, we will follow the recommendations of the OSU Research Data services group and archive the final version of the datasets using open, non-proprietary formats such as text-based formats (e.g., ASCII), HDF and NetCDF) and multimedia formats such as JPEG 2000, MNG and PNG.
In addition, final data products from this project will be published in peer-reviewed scientific papers by the PIs, associated researchers, and the students involved with this project. Preliminary results will be presented at relevant national and international meetings as posters and/or talks. Data will be distributed to a variety of national databases including, the Advance Cooperative Arctic Data and Information Service (ACADIS) gateway (http://www.aoncadis.org/home.htm) to archive and preserve hydrographic and water sample data.