

# **BPS Space Biology Research Proposers Open Science Data Management Plan (OS-DMP) Guide and Template**

## **OVERVIEW**

To plan and coordinate submission and future distribution of research data in a useable form, it is essential to begin this planning at the proposal stage with the Data Management Plan (DMP), now called the Open Science and Data Management Plan (OS-DMP). Science investigators are required to submit data generated from Space Biology funded research to the NASA Open Science Data Repository (OSDR). ROSES proposals require an OS-DMP that address how publications, science presentations, research data, metadata, and software will be made publicly available. If an OS-DMP is not provided with your proposal, an explanation of why one is not necessary may be required.

For those program elements that require an OS-DMP, its quality and completeness will be evaluated as part of the proposal's intrinsic merit and thus will have a bearing on whether the proposal is selected.

This document is a set of guidelines and a template for the development of the OS-DMP for your proposal.

## **OS-DMP Elements and Requirements**

The OS-DMP describes how data generated through the course of the proposed research will be collected, managed, and delivered, and includes a top-level data inventory and timeframe for delivery.

Unless otherwise stated, the descriptive text of the OS-DMP will be limited to 2 pages. Proposers will also be expected to include a data deliverables table, (limited to 4 pages), and should be included in the Proposal PDF immediately following the text of the OS-DMP. The combined six-page limit of the full OS-DMP will not count against the page limit for the S/T/M Section. See <https://science.nasa.gov/researchers/sara/faqs/OSDMP>.

NASA understands that in some cases certain types of data/information cannot be shared or made publicly available, due to its sensitive or proprietary nature. In cases such as this, NASA expects that this will be addressed in the OS-DMP with an explanation as to why such data cannot be shared. ROSES Program Elements and other funding opportunities that do not conform to this default approach for OS-DMPs described here will say so explicitly.

Space Biology Program evaluates proposals using dual-anonymous peer review (DAPR). Under this system, not only are proposers unaware of the identity of the members on the review panel, but the reviewers are not told the identities of the

proposers until after the evaluation and rating of all proposals is complete. The objective of dual-anonymous peer review is to minimize the impact of implicit or unconscious bias in the evaluation of the merit of a proposal. OS-DMP must be anonymized, omitting names of team members or their institutions as well as any other individually identifying information.

The OS-DMP must contain the following elements:

1. Name(s) of designated data repositories (i.e. OSDR) and any others that the investigator intends to submit research data to throughout the course of the investigation.
2. Descriptions of the measurements; types, volumes, data file formats, and any applicable standards of the data or associated metadata (See Appendix A for example statement). This information will appear in the data deliverables table.
3. Anticipated measurements (or assays) from the research being proposed, including experimental design (e.g., will vary 2 factors: Growth medium and growth time).
4. Number of subjects or samples that will be involved in the experiment (includes control group samples and biological replicates)
5. Timeline for Research Data submission and Public Release (e.g., Experiment Start Date for Specific Aim 1 (ESD\_SA1); ESD + 6 months, or Grant End Date (GED); GED - 1 month). This information will appear in the data deliverables table.
6. Description of data that are subject to laws, regulations, or policies that exempt them from data sharing.
7. Statement of the data use license that will govern it's use upon public release. Your data must be released with an open, permissive license. The recommended license for science data is Creative Commons Zero (<https://science.data.nasa.gov/license/>).
8. A discussion of roles and responsibilities of team members in accomplishing the OS-DMP deliverables. Resources required for data management activities should be covered in the normal budget and budget justification sections of the proposal. This section must be anonymized. Please do not use team member names or institutions. Only use roles such as PI, Co-PI, Graduate student, Post-Doc, Collaborator, etc. {There is also a separate document that is a total budget that is non-anonymized and uploaded separately. Both have budget narratives}

9. Plans for how software needed for reproducing results will be made available. Investigation tools or products developed with BPS funding, such as scripts, computer programs and 3-D printer instructions, either in source or object code, that provide users some degree of scientific utility, produce a scientific result or service, or are otherwise required to reproduce results. Example types of BPS research software include data transformation, mining, simulation, modeling, analytic, and visualization software and must be made available at the time of publication. Software should be released with an open, permissive license such as Apache 2.0 (<https://www.apache.org/licenses/LICENSE-2.0>) , BSD 3-Clause “Revised” License (<https://choosealicense.com/licenses/bsd-3-clause/>) , or MIT License (<https://opensource.org/license/mit>) . Any limitations to sharing the software should be described as part of the OS-DMP. Commercial or proprietary software needed to validate the scientific conclusions of a peer-reviewed publication resulting from an award must be identified.
  
10. Plans for how publications will be shared. Starting with awards that result from ROSES-2023, the as-accepted manuscript or the version of record of peer-reviewed publications must be made publicly available at the time of publication. This requirement may be satisfied by either publishing in a journal that makes the accepted manuscript or the official version of record openly available at the time of publication or manuscripts must be uploaded to [NASA PubSpace](#) prior to the publication date. The cost for publishing open access must be included in the proposal budget. This applies only to peer-reviewed manuscripts.
  
11. Plans for making publicly available BPS funded presentations to public meetings/conferences, including slide decks, poster presentations, and any other publications produced for the event. This requirement does not apply to restricted-access information, nor does it apply to laboratory notebooks, preliminary analyses, drafts of scientific papers or preprints, plans for future research, peer review reports, or communications with colleagues. NASA PI presentations are submitted to STRIVES and non-NASA presentation material should be uploaded and shared through Task Book at any time but no later than end of grant. *To reduce duplication and storage space, we recommend uploading a consolidated deck of presentations or materials at the end of each year or grant period.*

**PPENDIX A: OS-DMP Template with Examples – NOTE: This template recommends language and a table format to be used for your proposal, it is meant as a helpful tool and not a requirement.**

## Open Science Data Management Plan for << *title of investigation* >>

In keeping with the goals of NASA to ensure open-access and FAIR (Findable, Accessible, Interoperable, Reusable) data, PI will make the data and metadata derived from this study publicly accessible as described below.

The goal of the proposed research is to <<*insert the goal of your research*>>. The objectives for reaching the goal are as follows: <<*Research Objectives a., b., c., etc.*>>.

<<*Role (e.g. PI, Co-PI)*>> will be responsible for the collection and delivery of data and metadata generated through awarded research to NASA OSDR. <<*Discussion of roles and responsibilities of team members in accomplishing the OS-DMP (Roles only, no identifiable information)*>>

1. Data will be collected on a secure, access-controlled system <<*description of system*>> to ensure integrity and completeness and a copy of all data will be submitted to the *Open Science Data Repository (OSDR)* for secure and private storage as soon as the data is collected, and as will be specified in the Research Data Submission Agreement (RDSA) with the OSDR upon proposal award.
  - a. Dataset links (e.g. DOI) will be referenced in publications.
  - b. All descriptive information (metadata) needed to understand and reuse these data will be included e.g., a data dictionary with column and row header definitions and any other necessary information.
  - c. A CC0 license for the data will be issued. (CC BY-SA is also an option)
2. Upon any publication of results from this investigation <<*Role (e.g. PI)*>> will authorize the OSDR to release to the public all data related to the publication.
3. Any data collected as part of this investigation that is not supportive of any published results will be submitted for public release no later than grant closeout.
4. <<*Role (e.g. PI, Co-PI, Post-doc, etc)*>> will upload as-accepted manuscript versions of peer-reviewed publications into NASA Pub Space.
5. Software and other deliverables:
  - a. <<*Enter software description, and repository.* >> will be used. This software will be released with an Apache 2.0 license.  
OR No software or data models are planned for development with this funding.  
AND/OR Commercial software <<*Enter software name and version planned for use.*>>

- b. <<Enter anticipated conference presentation(s)>> (e.g. One presentation showing progress of the experiment is anticipated for ASGSR Fall YYYY and that presentation will be made available on Task Book)
- 6. Posters and presentations made at public events will be submitted to Task Book and then released to public no later than end of grant.

**Data Deliverables**

\*Submission Timeline. Experiment Start Date (ESD) or Grant End Date (GED) expressed in months.

\*Factors (dimension) = the independent variable(s) studied in the experiment (state the number of experimental groups per variable)

Specific Aim (SA)	Measurement Type	Submission Timeline (months)*	Sample Type	Factors*	# of points/factors	# of replicates	Total Number of Samples
<b>Plant example</b>							
1_1	bulkRNAseq (60M Read, paired-end)	ESD+3	root	Growth medium	2		
				Treatment exposure time	3		
				<b>Total # of conditions</b>	<b>6</b>	<b>5</b>	<b>30</b>
1_2	Immunohistochemistry Light microscopy (21 slices Z stack, 4 channels – 4 images/sample – 4x100MB/sample)	ESD+6	leaf	Growth medium	2		
				Treatment exposure time	3		
				<b>Total # of conditions</b>	<b>6</b>	<b>5</b>	<b>30</b>
<b>Animal Example</b>							

1_1	Western Blot (7 antibodies per tissue, BioRad ChemiDoc gel and imaging)	ESD+8	Soleus muscle (Mus musculus)	Hindlimb Unloading, Genotype (SERCA knockdown or WT)	2	2	80 (2 replicates, 10 animals per group, 4 treatment groups)
				<b>Total # of conditions</b>	<b>4</b>	<b>2</b>	<b>80</b>
1_1	Behavior (Elevated Plus Maze, Novel Object Recognition)	ESD+18	Behavior (Mus musculus)	Hindlimb Unloading, Ionizing Radiation, Sex	3	1	120 (15 animals per treatment, 8 treatment groups)
				<b>Total # of conditions</b>	<b>8</b>	<b>1</b>	<b>120</b>
<b>Microbe Example</b>							
1_1	Confocal Microscopy (Nikon SIM A1 Laser Scanning Microscope)	ESD+24	Cells (Pseudomonas aeruginosa, Saccharomyces cerevisiae)	Spaceflight, Growth Environment/Medium, Time (3 timepoints)	3	3	540 (2 species, 3 replicates, 15 samples per treatment, 3 timepoints per spaceflight/medium combination treatment)
				<b>Total # of conditions</b>	<b>12</b>	<b>3</b>	<b>540</b>