NASA SMD Scientific Information Policy

Steve Crawford
Science Data Officer

Strategy for Data Management and Computing for Groundbreaking Science 2019-2024

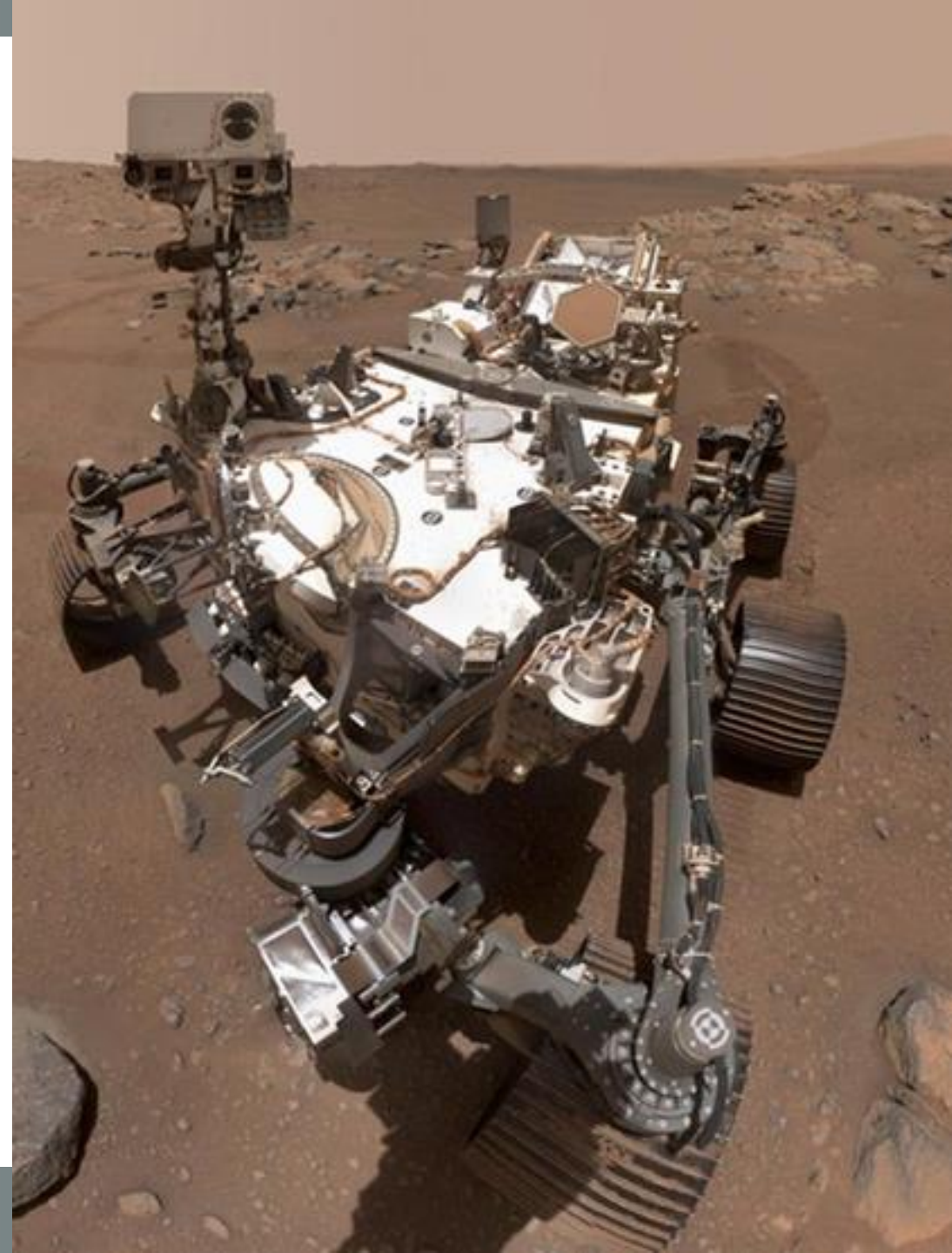|	**Goal 1:** Develop and Implement Capabilities to Enable Open Science		**Goal 2**: Continuous Evolution of Data and Computing Systems		**Goal 3:** Harness the Community and Strategic Partnerships for Innovation
1.1	Develop and implement a **consistent open data and software policy** tailored for SMD	**2.1**	Establish **standardized approaches for all new missions** and sponsored research that encourage the adoption of advanced techniques	**3.1**	Develop **community of practice and standards group**
1.2	Upgrade capabilities at existing archives to **support machine readable data access using open formats and data services**	**2.2**	Integrate investment decisions in High-End Computing with the strategic needs of the research communities	**3.2**	Partner with a**cademic, commercial, governmental and international organizations**
1.3	Develop and implement a SMD data catalog to support discovery and access to complex scientific data across divisions	**2.3**	Invest in capabilities to use commercial cloud environments for open science	**3.3**	Promote opportunities for continuous learning as the field evolves through collaboration
1.4	Increase transparency into how science data are being used through a free and open unified journal server	**2.4**	Invest in the tools and training necessary to enable breakthrough science through application of AI/ML		

NASA Scientific Information

The information produced as part of NASA's scientific research activities represents a significant public investment. NASA holds this information as a public trust to increase knowledge and serve the public good.

Types of information:

- Publications: Scientific and technical documents released through print, electronic, or alternative media.

- Data: Scientific information that can be stored digitally and accessed electronically.

- Software: Computer programs in both source and object code that provide users some degree of scientific utility or produce a scientific result or service.

Why an Information Policy?

- Openly and widely sharing NASA research to maximize benefit and reach of the information
- The Policy consolidates a wide range of applicable laws, guidance, and policies
- Provides accessible and transparent policy for our program officers, scientists, and communities
- Helps support open science

Core Values in the Development of the policy

- Maximize the openness of useful scientific information produced by NASA SMD funding

- Preserve the scientific information produced by NASA SMD funding

- Support the community in accessing the information that they want

- Minimize the burden in complying with the policy

SPD-41: Scientific Information Policy

The science mission directorate has adopted SPD-41 that is a consolidation of existing policies applicable to SMD. These policies are based on our understanding of existing NASA and Federal guidance, and they are already part of solicitations for funding such as ROSES or SALMON Announcement of Opportunities. This applies to all SMD-funded activities related to producing scientific information, but the policy excludes restricted information.

- These policies are applicable to all current or future awards, contracts, or cooperative agreements for scientific activities.

- SPD-41: The Science Information Policy

- Science Information Policy Website

In addition, SMD will be releasing a Request for Information on proposed additions to the information policy based on new Federal guidance, NASA policy, National Academy studies, or community best practices.

Highlights from the General Policy

- All SMD-funded publications (publications funded by SMD or reporting on SMD-funded research) shall be made publicly accessible.

- SMD-funded data shall be made publicly available without fee or restriction of use.

- SMD-funded software should be released as open-source software.

- All SMD-funded activities shall have data management plans describing the management and release of data to facilitate the implementation of these information policies The DMP should include a description of the software to be used and how it will be managed.

Mission Specific Highlights to the Policy

- SMD shall commit to the full and open sharing of information produced by NASA SMD Missions. This includes observations, calibrations, coefficients, documentation, software, algorithms, technical reports, and any ancillary information or work product related to the Mission.

- There shall be no period of exclusive access to Mission data. A period after the data have been obtained may be allowed for activities such as calibration and validation of the data. This period shall be as short as practical and shall not exceed six months.

Research Specific Highlights to the Policy

- Research data shall become publicly available no later than the publication of the peer-reviewed article that describes it.
  - This includes data and software required to derive the findings communicated in figures, maps, and tables.
- In order to achieve reproducibility, research software developed using SMD funding and used in support of a scientific, peer-reviewed publication should be released as open source software no later than the publication date.

New Guidance and Additional Policies

Since 2015 there have been a range of new and proposed laws, recommendations, policies and Federal Guidance related to Open Science. We will be releasing an updated draft version of SPD-41 to include some of these changes.

Some divisions may enact these policies earlier, but these new policies will only be enacted once adopted and will fully apply only to new missions and investigations. Existing investigations should adopt the policy consistent with available resources.

TITLE II—OPEN GOVERNMENT DATA ACT

SEC. 201. SHORT TITLE.

This title may be cited as the "Open, Public, Electronic, and Necessary Government Data Act" or the "OPEN Government Data Act".

The National Academies of
SCIENCES · ENGINEERING · MEDICINE

CONSENSUS STUDY REPORT

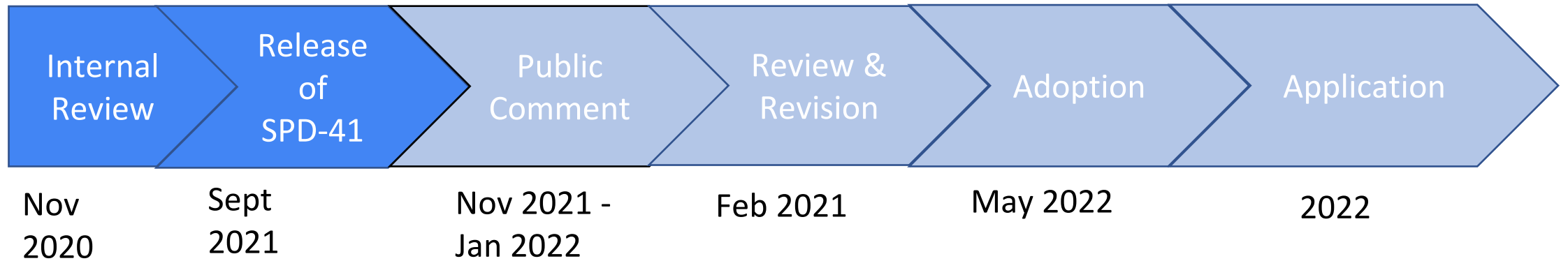**Open Source Software Policy Options for NASA Earth and Space Sciences**

Highlights of Proposed Additions

- SMD-funded data should follow the <u>FAIR Guiding Principles for scientific data management and stewardship</u>. This means data should be findable, accessible, interoperable, and reusable (FAIR).
- Persistent identifier should be used for funding mechanisms and missions
- NASA data collections should have DOIs and meta-data available
- SMD-funded investigators should have a persistent identifier such as ORCID
- Mission software shall be developed openly allowing for community contributions

Highlights of Proposed Additions

- Scientifically useful data should be made publicly available at the end of the award
- SMD-funded software shall be released as open source software.
- Peer reviewed data and software shall be recognized as having the commensurate value as peer reviewed manuscripts.
- There will be further guidelines on compliance with the policy

Schedule for the policy development

Internal Review → Release of SPD-41 → Public Comment → Review & Revision → Adoption → Application

Nov 2020 | Sept 2021 | Nov 2021 - Jan 2022 | Feb 2021 | May 2022 | 2022

SPD-41 was released in September 2021. The schedule for the policy is:
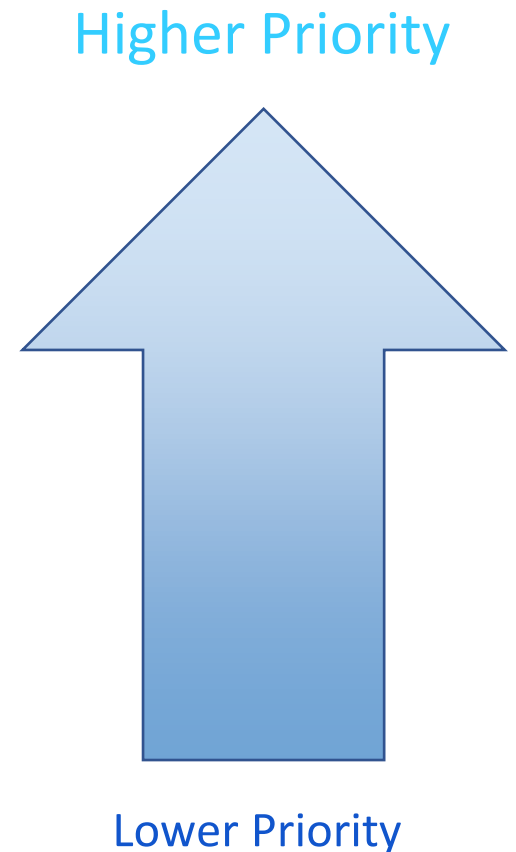
- Approval of the proposed additions will occur no earlier than December 2022.

- If adopted, policy will be in place for ROSES and AO calls in 2023.
  - Some solicitations or divisions may adopt parts of the policy earlier.
  - Existing Missions and Researchers should adopt the policy as their resources allow.

- Except for variances, researchers funded from ROSES23 will need to be compliant.
  - Funded projects will typically start in 2024.
  - Funded publications will typically be produced starting in 2025

Next steps on the Information Policy

The development of the policy is only an early step in the overall process that will take place over the next 5 years.
Here are *some* of the next steps:

1. Identify ways to automate

2. Provide further guidance from the divisions

3. Provide training (TOPS)

4. Provide support for adopting open science

5. Support and/or develop technologies

6. Identify metrics for assessing compliance.

Higher Priority

Lower Priority

Open-Source Science Policy for Earth System Observatory

A. **All mission data, metadata, software, databases, publications, and documentation shall be available on a full, free, open, and unrestricted basis starting in Phase B** with no period of exclusive access.

B. **Science workshops and meetings** shall be **open** to broad participation and documented in public repositories.

1 **Software shall be developed openly** in a publicly accessible, version-controlled platform using a **permissive software license allowing for community use and contributions.**

4 Scientific data, metadata, software, publications and documentation **shall be archived and made available by NASA and/or [Partner] starting in Phase B.**

2 **Manuscripts shall be published with open access licenses**; versions of as-accepted manuscripts shall be made available as open preprints and deposited in a NASA or [Partner] **repository upon publication.**

5 **NASA and [Partner]** software, documentation and data **shall be properly marked, cited, and/or attributed**. Metrics to measure and acknowledge open-source science contributions will be developed.

3 All mission **data, calibration information, and simulated products supporting development and validation of algorithms shall be made available without any conditions to use.**
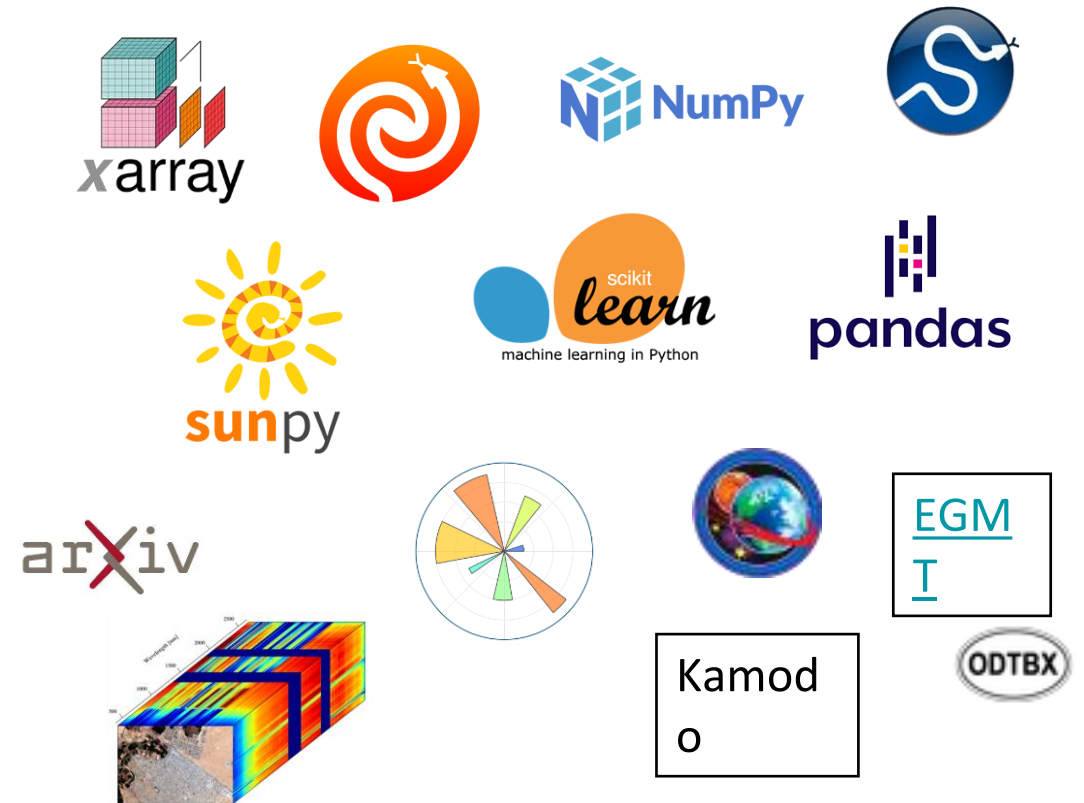
6 **NASA and [Partner] will mutually develop an Open-Source Science Plan** that specifies details of collaboration.

* Projects should release all information with open licenses unless exceptions are granted based on laws or regulations, including classified, ITAR, EAR and CUI restrictions. CSDO ...s and approves or declines deviation requests by projects for NASA.

Supporting Open Source Software

- ROSES20 E.7 Open Source Tools, Frameworks, and Libraries selected 8 proposals supporting 14 different projects.
- [ROSES21 F.8 Supplemental Open Source Software Awards](#) - Support for existing grant holders to move to open source
- Improving the software release process for NASA civil servants and missions

Full description of supported projects is available on NSPIRES

Increasing Access to SMD Publications

NASA has a mandate to ensure access to and reliable preservation of peer-reviewed publications that arise from NASA-funded research.

- NASA SMD supports publishing as Open Access and encourages making your publications available on preprint servers.

- SMD is funding ADS to expand its holdings in Heliophysics and Planetary Science.

- NASA STI is working on an agreement with CHORUS and improving the PubSpace interface.

- We will be working with our partners and publishers to further improve the process.

- We will be developing further guidance and services to make it automatic to preserve and make your publications accessible.
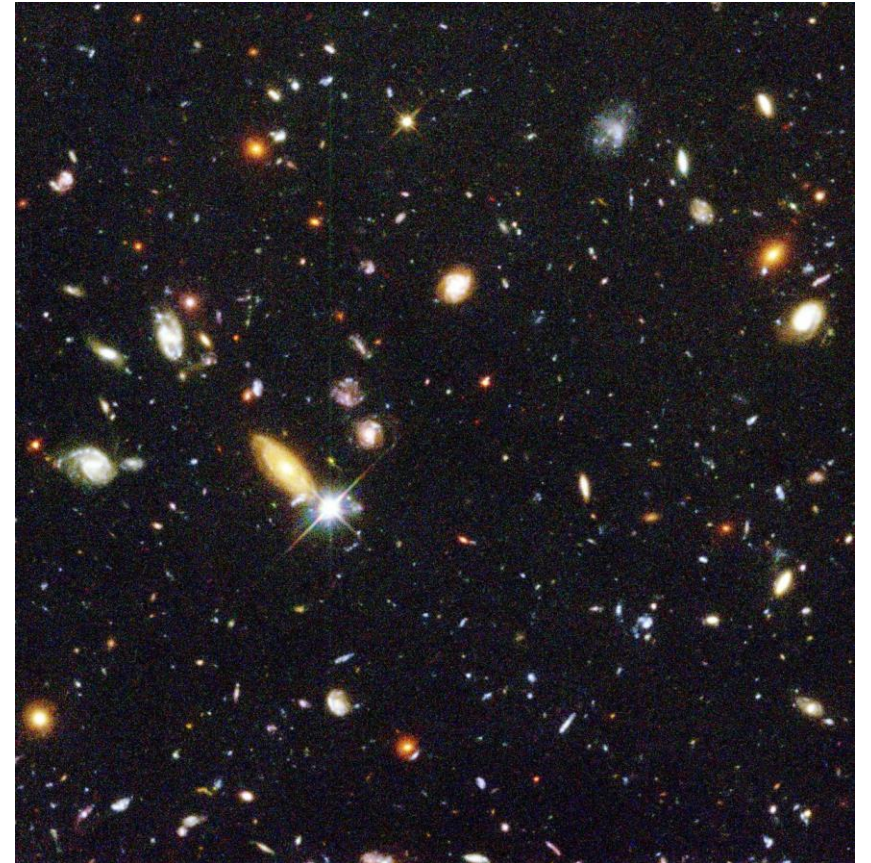
Making NASA's Data Accessible

NASA has a fantastic legacy in making our scientific data freely accessible and widely available. What are the next steps?   How can we innovate?

Current OSSI Activities/Activities kicking off:

- SMD Data Catalog Search
- Standards for NASA Data
- AI Enable data

- Cloud ready data
- Openscapes

Some Open Questions

- What will we do to make research data accessible?
- How do we ensure that our data is accessible by all?
- How do we further empower citizen science?
- How do we make our data FAIR?
- How do we efficiently handle the large volumes of data and enable interoperability?
- How can we make use of the cloud and HEC?

Public Comment on the Policy

RFI to be released requesting information on:

- How will the proposed changes to the existing information policy impact the research activities of your communities?

- What support, services, training, funding, or further guidance is needed to support the successful implementation of the existing or proposed information policy?

Questions can also be sent to HQ-SMD-SPD41@mail.nasa.gov