National Aeronautics and Space Administration

TOPS

June 2023

Community Panel

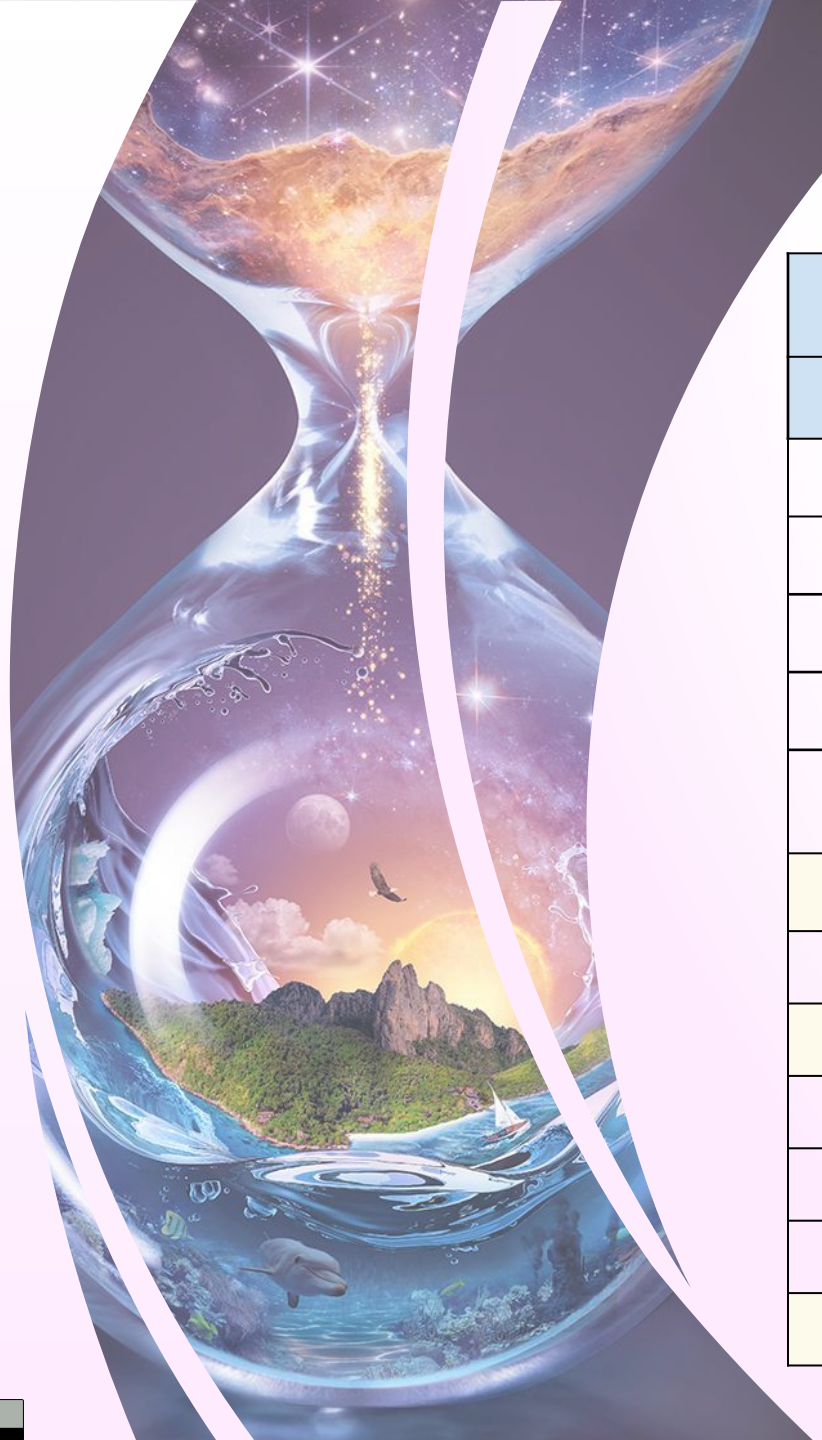
NASA HQ TOPS Core Team
Dr. Chelle Gentemann, Science Lead
Yvonne Ivey, Equity Lead
Dr. Holly Norton, Content Coordinator
Dr. Malcolm Glover, Community Coordinator
Kevin Murphy, Chief Science Data Officer

Welcome!

We are encouraging people to use #NASATOPS and #IHeartOpenScience

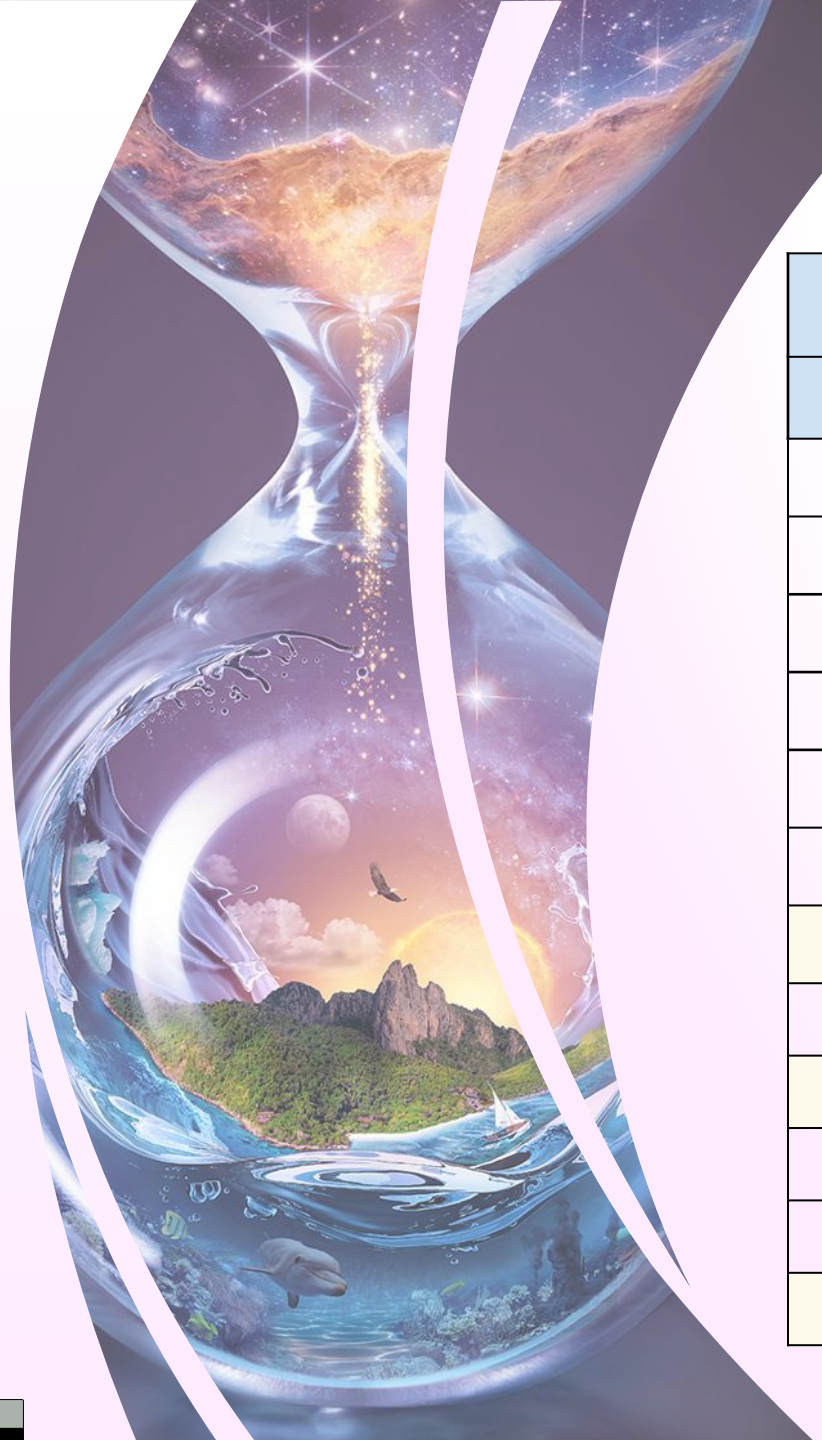
Review of Agenda and Code of Conduct

Holly Norton
Transform to Open Science
TOPS Content Coordinator



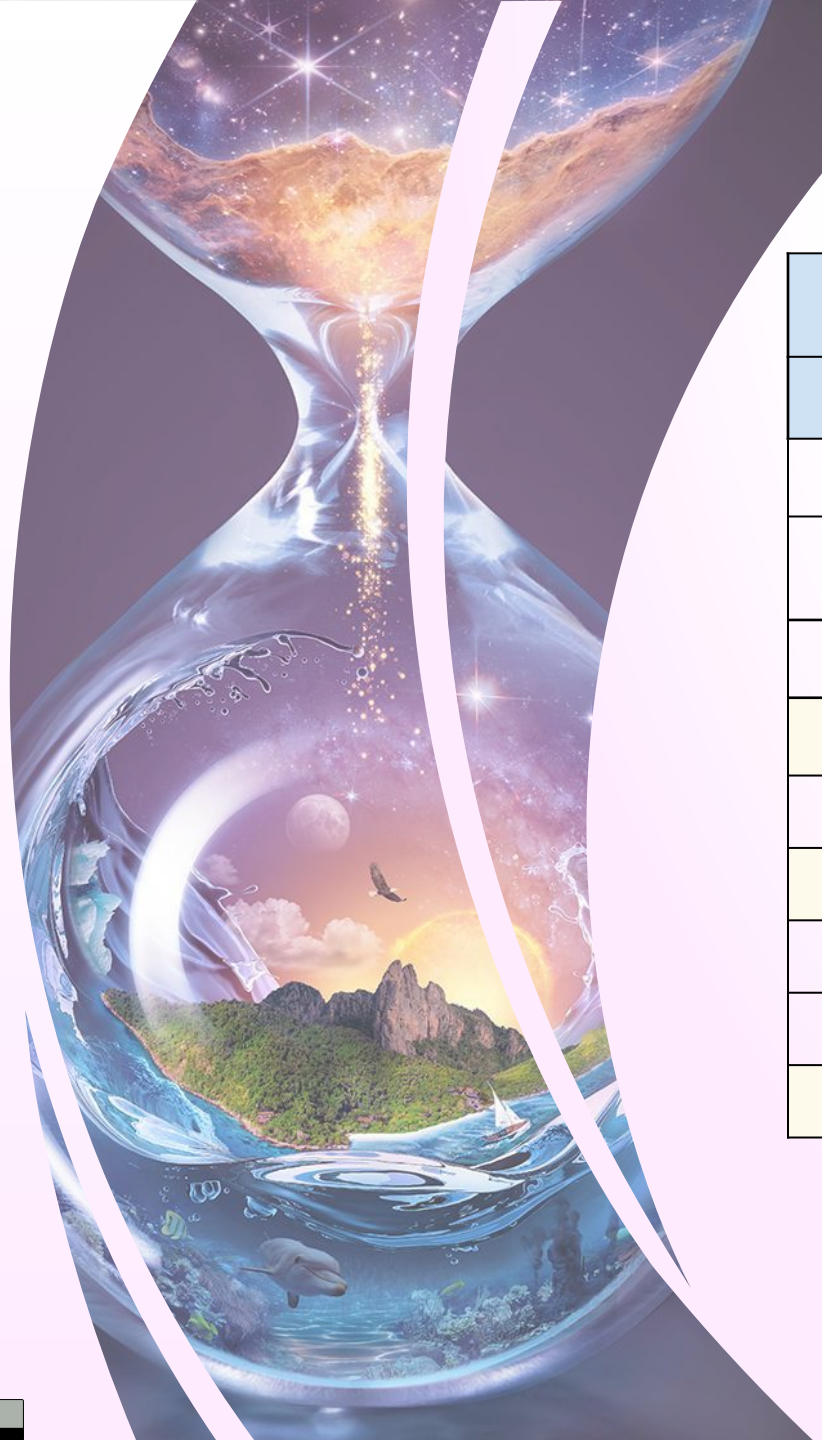
Agenda – Day One

Wednesday June 14th, 2023 TOPS Update and Creating the Curriculum		
Time (ET)	***Agenda Item***	***Presenter***
12:00 PM	Review of Agenda and Code of Conduct	Holly Norton
12:05 PM	Introductions	Chelle Gentemann
12:15 PM	Welcome	Kevin Murphy
12:30 PM	TOPS Update	Chelle Gentemann
1:00 PM	Year of Open Science	Jamaica Jones Chelle Gentemann
1:30 PM	**Coffee Break**	
1:45 PM	Open Science 101 Module Content Development	Diana Ly
2:45 PM	**Coffee Break**	
3:15 PM	Open Science 101 MOOC Development	Ilona Serrao
3:45 PM	Open Discussion	Holly Norton
4:10 PM	Wrap Up	Chelle Gentemann
4:15 PM	**Day 1 of Panel Ends**	



Agenda – Day Two

Thursday June 15th, 2023 Training 20K scientists		
Time (ET)	***Agenda Item***	***Presenter***
12:00 PM	Introduction and Review of Code of Conduct	Holly Norton
12:10 PM	Honoraria Q&A	NRESS
12:15 PM	TOPST Update	Steve Crawford
12:30 PM	Open Science 101 Certification	Diana Ly
12:45 PM	Open Science 101 Instructor training	Diana Ly
1:00 PM	Open Science 101 Rollout - Year 1 and Beyond	Paul Bremner
1:30 PM	**Coffee Break**	
1:45 PM	Community Forum (Public)	MSFC
2:45 PM	**Coffee Break**	
3:00 PM	Open Discussion	Holly Norton
3:25 PM	Wrap Up	Chelle Gentemann
3:30 PM	**Day 2 of Panel Ends**	



Agenda – Day Three

Friday June 16th, 2023 Doubling Participation		
Time (ET)	***Agenda Item***	***Presenter***
12:00 PM	TOPS Recruitment and Outreach	Amanda Adams
12:30 PM	2024 Engagement Strategy	Amanda Adams Paul Bremner
1:00 PM	HQ DEIA Engagement Strategy	Malcolm Glover
1:30 PM	**Coffee Break**	
1:45 PM	SWOT Analysis Activity	Holly Norton
2:45 PM	**Coffee Break**	
3:15 PM	Open Discussion	Holly Norton
3:45 PM	Wrap Up	Chelle Gentemann
4:10 PM	**Day 3 of Panel Ends**	

Code of Conduct

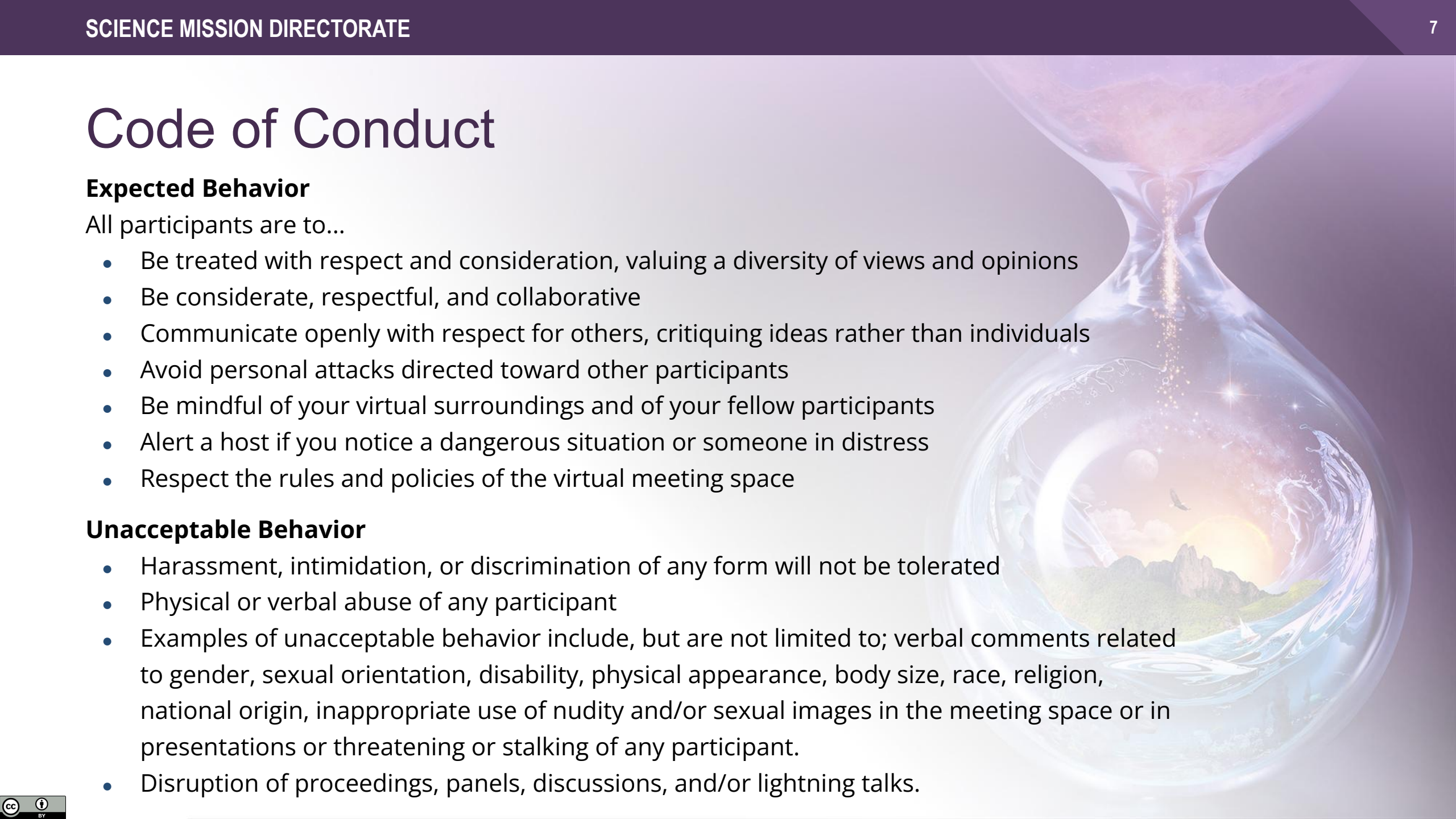
Expected Behavior

All participants are to…

- Be treated with respect and consideration, valuing a diversity of views and opinions
- Be considerate, respectful, and collaborative
- Communicate openly with respect for others, critiquing ideas rather than individuals
- Avoid personal attacks directed toward other participants
- Be mindful of your virtual surroundings and of your fellow participants
- Alert a host if you notice a dangerous situation or someone in distress
- Respect the rules and policies of the virtual meeting space

Unacceptable Behavior

- Harassment, intimidation, or discrimination of any form will not be tolerated
- Physical or verbal abuse of any participant
- Examples of unacceptable behavior include, but are not limited to; verbal comments related to gender, sexual orientation, disability, physical appearance, body size, race, religion, national origin, inappropriate use of nudity and/or sexual images in the meeting space or in presentations or threatening or stalking of any participant.
- Disruption of proceedings, panels, discussions, and/or lightning talks.



Code of Conduct (continued)

Expected Behavior

- Anyone requested to stop unacceptable behavior is expected to comply immediately.
- Hosts may take any action deemed necessary and appropriate, including immediate removal from the meeting without warning.

Reporting Unacceptable Behavior

- If you are the subject of unacceptable behavior or have witnessed any such behavior, please immediately notify a meeting host.
- Notification should be done by contacting a host via direct chat or emailing your concern to Chelle Gentemann chelle.gentemann@nasa.gov
- Anyone experiencing or witnessing behavior that constitutes an immediate or serious threat to public safety is advised to contact 911 or your local emergency number.

Submit Feedback or Suggestions

Your inputs are essential to the success of our mission. Throughout this week's panel, please feel free to submit questions, feedback, or suggestions via the feedback tool.

You can use the QR code to access the feedback tool

Introductions

Chelle Gentemann
Transform to Open Science
TOPS Science Lead

NASA Community Panelists

1. James Colliander
2. Kelle Cruz (Hans Guenther)
3. Monica Granados
4. Pen-Yuan Hsing
5. SherAaron Hurt
6. Logan Kilpatrick
7. Brian Nosek
8. Fernando Perez
9. Malvika Sharan
10. Gloria Washington
11. Talitha Washington
12. Lou Woodley
13. Qiusheng Wu

Welcome

Kevin Murphy
NASA
Chief Science Data Officer

Background

Science Mission Directorate's
Strategy for Data Management and Computing for Groundbreaking Science 2019-2024

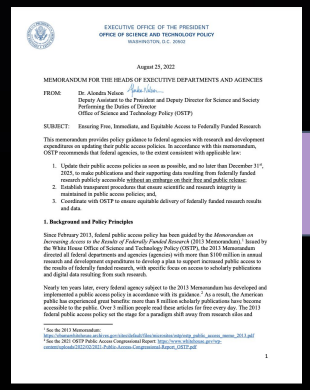
Prepared by the Strategic Data Management Working Group

Approved by:

Thomas H. Zurbuchen, Ph.D.
Associate Administrator,
Science Mission Directorate

[2019 - 2024]

SMD Strategy for Data Management and Computing for Groundbreaking Science



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20502

August 25, 2022

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Dr. Alondra Nelson
Deputy Assistant to the President and Deputy Director for Science and Society
Performing the Duties of Director
Office of Science and Technology Policy (OSTP)

SUBJECT: Ensuring Free, Immediate, and Equitable Access to Federally Funded Research

This memorandum provides policy guidance to federal agencies with research and development expenditures on updating their public access policies. In accordance with this memorandum, OSTP recommends that federal agencies, to the extent consistent with applicable law:

1. Update their public access policies as soon as possible, and no later than December 31st, 2025, to make publications and their supporting data resulting from federally funded research publicly accessible without an embargo on their free and public release.
2. Establish transparent procedures that ensure scientific and research integrity is maintained in public access policies; and,
3. Coordinate with OSTP to ensure equitable delivery of federally funded research results and data.

1. Background and Policy Principles

Since February 2013, federal public access policy has been guided by the *Memorandum on Increasing Access to the Results of Federally Funded Research* (2013 Memorandum).[1] Issued by the White House Office of Science and Technology Policy (OSTP), the 2013 Memorandum directed all federal departments and agencies (agencies) with more than $100 million in annual research and development expenditures to develop a plan to support increased public access to the results of federally funded research, with specific focus on access to scholarly publications and digital data resulting from such research.

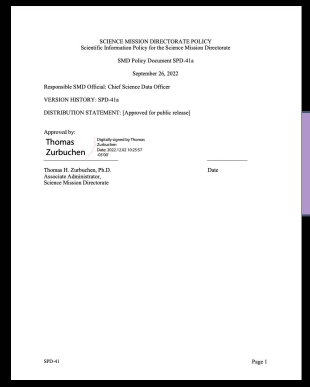
Nearly ten years later, every federal agency subject to the 2013 Memorandum has developed and implemented a public access policy in accordance with its guidance.[2] As a result, the American public has experienced great benefits: more than 8 million scholarly publications have become accessible to the public. Over 3 million people read these articles for free every day. The 2013 federal public access policy set the stage for a paradigm shift away from research silos and

[1] See the 2013 Memorandum:
https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf
[2] See the 2021 OSTP Public Access Congressional Report: https://www.whitehouse.gov/wp-content/uploads/2022/02/2021-Public-Access-Congressional-Report_OSTP.pdf

1

[August, 2022]

OSTP Memo: Ensuring Free, Immediate, and Equitable Access to Federally Funded Research



SCIENCE MISSION DIRECTORATE POLICY
Scientific Information Policy for the Science Mission Directorate

SMD Policy Document SPD-41a

September 26, 2022

Responsible SMD Official: Chief Science Data Officer

VERSION HISTORY: SPD-41a

DISTRIBUTION STATEMENT: [Approved for public release]

Approved by:
Thomas Zurbuchen
Digitally signed by Thomas Zurbuchen
Date: 2022.12.02 10:25:57 -05'00'

Thomas H. Zurbuchen, Ph.D.
Associate Administrator,
Science Mission Directorate

Date

SPD-41 Page 1

[September, 2022]

Scientific Information Policy for the Science Mission Directorate: *SPD-41a*

Chief Science Data Office

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

NASA's Open-Source Science Initiative

NASA's approach for putting Open Science into practice.

https://science.nasa.gov/open-science-overview

NASA's Open-Source Science Initiative

Policy and Governance

Implement policies that advance open science, support SMD working groups and meetings, and develop standards and governance.

Core Data and Computing Services

Develop SMD-wide data and computing infrastructure (Cloud and HEC), provide tools for discovery of NASA's scientific information, reduce burden of SPD-41a, and support the adoption of advanced technologies (AI/ML).

Open Science Incentives

Grants, CANs, prizes and challenges to enable groundbreaking scientific discoveries using open science principles and tools.

Community Engagement

Advance open science practices in the SMD community and build strategic partnerships for innovation in open science.

SPD-41a is NASA's Science Mission Directorate's updated Scientific Information Policy

Updates were developed with:

- Presentations to over >1000 stakeholders since Dec 2022
- Community input via workshops & town halls
- Received 61 Request For Information (RFIs) responses
- National Academies studies
- White House Memo on Ensuring Free, Immediate, and Equitable Access to Federally Funded Research
- Open-Source Science Guidance for Researchers and FAQ
- Each science division has released policies & templates for their communities.

Scientific Information Policy Website

https://science.nasa.gov/researchers/science-data/science-information-policy

Core Data and Computing Services Program

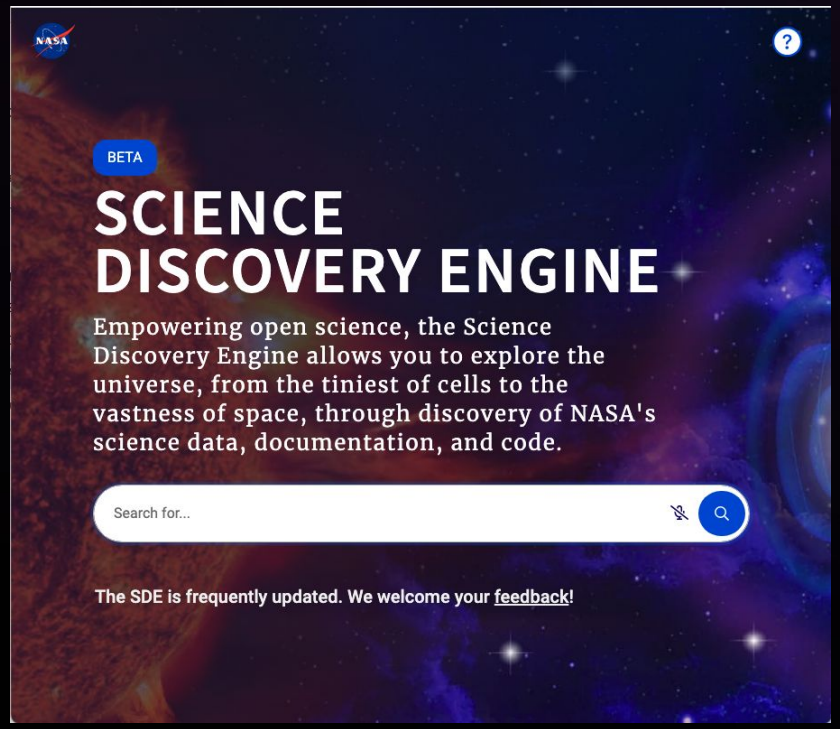
The **Core Data and Computing Services Program** will provide a layered architecture on which SMD science Divisions can seamlessly and efficiently integrate their discipline-specific services such as data archives.

Central to the development of Core Data and Computing Services will be **the integration of new and existing data and computing capabilities**, including existing Division capabilities, into a modular and secure architecture such that they are reusable by all SMD Divisions.

SMD Core Data and Computing Services will:

- Develop SMD-wide data and computing infrastructure to support Open Science
- Develop services to support the adoption of SPD-41a by SMD Divisions

Infrastructure: Core Services



Science Discovery Engine

SMD data catalog to support discovery and access to complex scientific data across Divisions

Science Explorer

Extend the primary digital library portal for researchers in astrophysics, planetary science & heliophysics, the Astrophysics Data System (ADS), to support Earth and Biological and Physical Sciences

Data and Computing Infrastructure

On-going Data & Computing Architecture study to identify scientific data and computing capabilities and architectures that enable Open Science; Recently closed **RFI**

NASA is Sustaining Open-Source Software

NASA provides funding for open science through a solicitations and opportunities. This includes supporting innovative open science projects and open source tools, frameworks, and libraries.





NASA Funding

F.2 Topical Workshops, Symposia, and Conferences

Events, Hackathons, un-conferences, and challenges that build open science skills, Training in open science. (Rolling deadline in ROSES-22; to be released as standalone ROSES-23 element)

F.7 Support for Open Source Tools, Frameworks, and Libraries

Support and maintain open source tools, frameworks, and libraries that are significantly used by the SMD community. $8.7M awarded in 2022. (ROSES-23 dates TBD)

F.8 Supplemental Open Source Science Awards

Supplemental award to encourage the conversion of legacy software to open source. (Rolling deadline in ROSES-22; ROSES-23 dates TBD)

F.14 Transform to Open Science Training

Tutorials showcasing open science in action and NASA cloud data, summer schools, virtual cohorts. $6.5 Million awarded in 2023.

F.15 High Priority Open-Source Science

Supporting innovative open source tools, software, frameworks, data formats, and libraries. (Rolling deadlines in ROSES-22 & ROSES-23)

F.16 Supplement for Software Platforms

Supplemental support to existing awards for usage of scientific platforms. Budget TBD. (ROSES-23 dates TBD)

TOPS Update

Chelle Gentemann
Transform to Open Science
TOPS Science Lead

Chief Science Data Office (CSDO)
Responsible for advancing open science across SMD

Diversity and Community Engagement
Committed to actualizing an environment where Inclusion, Diversity, Equity and Accessibility (IDEA) principles are ways of working and being

Open Source Science Initiative (OSSI)
Enable and support moving science towards openness, including policy adjustments, supporting open-source software, and enabling cyberinfrastructure.

Earth Science Data Systems
(ESDS) - Oversees the lifecycle of NASA's Earth Science Data

Core Services
Working toward an Open Science Infrastructure

Transform to Open Science (TOPS) Rapidly transform agencies, organizations, and communities to an inclusive culture of open science.

- Curriculum (ARC)
- Program (MSFC)
- Center Champions

TOPS Headquarters Team

The TOPS headquarters team is situated within the Chief Science Data Office (CSDO) at NASA Headquarters and is responsible for

- enabling the science communities transition to open science,
- developing inter-agency, international, and external collaborations around open science, and
- advancing broader participation in science.

The office is responsible for programmatic design, concept development, strategic vision, and reporting on execution to the CSDO. The office co-chairs SYOS (alongside NOAA and NSF).

Chelle Gentemann

Paige Martin

Holly Norton

Malcolm Glover

Meet the Open Science 101 (OS101) Team

Diana Ly
Project Manager

Katherine Blanchette
Project Support

Porsche Parker
Project Support

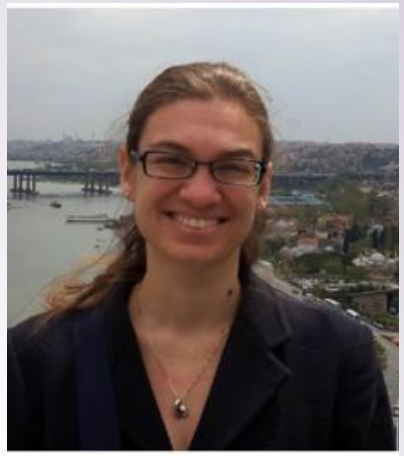
Cassie Conley
Project Scientist

Sara Edwards
Project Support

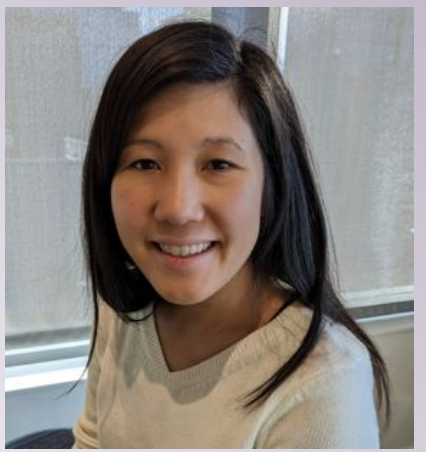
Vandhana Lal
Deputy PM

Natasha Batalha
Project Scientist

Pamela Marcum
Project Scientist



Kristina Pistone
Project Support



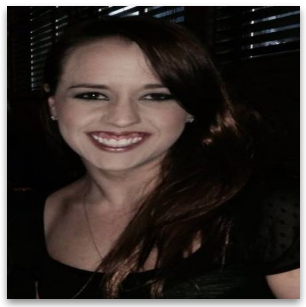
Caroline Dang
Project Support

TOPS Project Office

The TOPS effort is composed of many efforts and includes a variety of stakeholders from both within and outside of NASA. In order to streamline and organize these efforts and stakeholders, the TOPS Project Office (PO) was created to provide

1. Training 20,000 scientists
2. Increasing Open Science visibility
3. Measuring the performance of TOPS
4. Coordinating TOPS activities

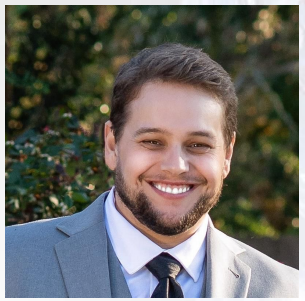
Paul Bremner
Project Scientist



Shannon Gant
PM, Consultant

Kyle Westbrook
Project Coordinator

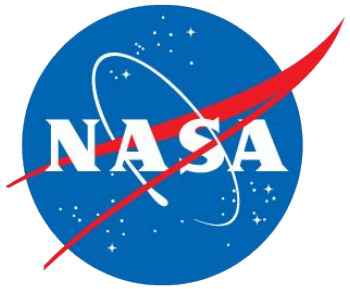
Amanda Adams
Comms Lead



Adam Farragut
Strat Comm

Jaclyn Stursma
Digital Community Lead

Brian Ressler
Social Media Lead



Vision & Mission

NASA VISION

To discover and expand knowledge for the benefit of humanity.

NASA MISSION

Pioneer advances in aeronautics, space exploration, science, and technology to transform our understanding of the universe, unlock new opportunities, and inspire the world.

TOPS VISION

A future where new scientific discoveries and solutions are enabled by inclusive open science collaborations.

TOPS MISSION

Inspire and empower scientists, researchers, and communities to embrace open science as a catalyst for positive change, leading to a more equitable and impactful scientific ecosystem.

NASA's Transform to Open Science (TOPS)

A 5-year mission to accelerate adoption of open science

Objectives:

- Increase understanding and adoption of open science principles and techniques
- Broaden participation by historically excluded communities
- Accelerate major scientific discoveries

Engagement

Resources

Incentives

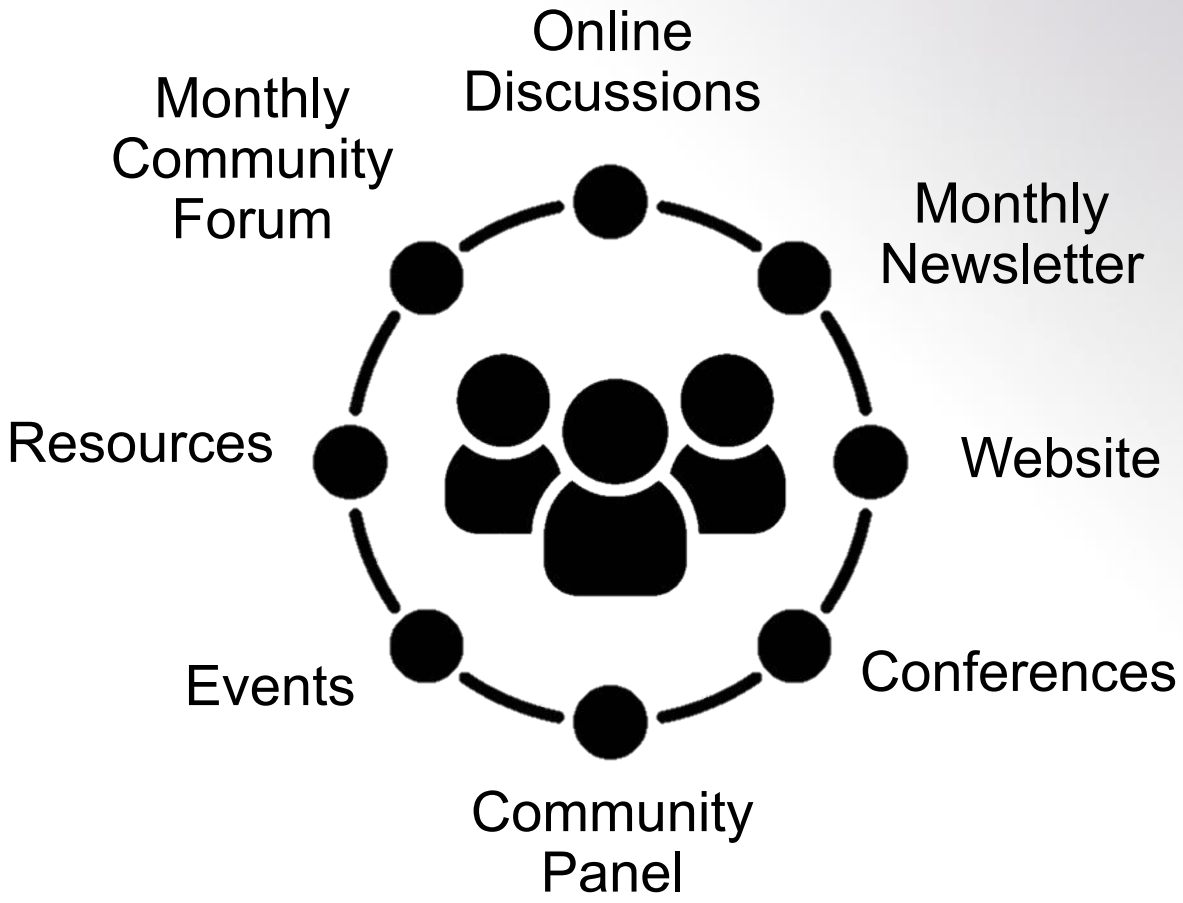
Coordination

Learn more at: https://nasa.github.io/Transform-to-Open-Science/

Community Engagement

Community participation is the foundation of an open scientific process.

Listening, Learning, Collaborating, & Engaging



Open Science Success Stories:

https://zenodo.org/record/6994587#.ZG0lUOzMJoZ

Earn your NASA open science certification!

Open Science 101: A **community-developed** introduction to open science with inclusivity, accessibility, and diversity at the forefront.

NASA's Open Science certificate identifies researchers who know key open science skills:

- Use digital tools to perform open science (e.g., ORCID, Zenodo, Github accounts)
- Familiar with data management and software management plan best practices and resources
- Grow connections across a community of open science practitioners

Enroll now!

https://forms.gle/AVj8CH38FXwBZvCn8

TOPS 2023 Marquee Event

CERN/NASA Workshop

Workshop for agencies / large institutions to advance and align open science planning

- open to all - hybrid option
- in-person prioritizes individuals responsible for open science policy at their organization)

TOPS Update Summary Slide

- 2023 Year of Open Science
- TOPS Project and Curriculum offices (MSFC and ARC) ramping up activities
  - ~3400 enrolled in TOPS listserv (goal >5K for 2023)
  - 33 TOPS center champions (from ARC, GSFC, JPL, ARC, LaRC, MSFC) are developing Open Science 101 and teach workshops at centers and conferences
- TOPS Open Science 101 (OS101) (released ~June 23)
  - Development: Slides & teaching guides to support in-person workshops, virtual cohorts, and independently online (Massive Open Online Course - MOOC). Open Science Certification process. V0 slides in community review.
  - Implementation: OS101 workshop organization, instructor training, tracking certifications & completion of modules.
    - ~1600 pre-enrolled for open science 101 curriculum
    - ~250 completed first module at in-person workshops held at science team, society meetings, and HQ
    - **Goal 1,500 earn open science certification in 2023**
- TOPST selections - $6.5M for OS101 virtual cohorts, summer schools, and science extensions.
- Events:
  - 12 Priority Society Meetings - Town halls, sessions, OS101 workshops, booths
  - 2023 Marquee event: NASA/CERN workshop; TOPST workshop (Fall)
  - Listening sessions to better understand barriers of entry for underrepresented communities into NASA science proposals, internships, and activities; virtual roundtables with early career researchers (ECRs) from diverse backgrounds to discuss their needs, priorities, and roles in advancing a sustainable open science enterprise that can deliver on equitable outcomes

Discussion:

Later today - time to discuss the curriculum development
Thursday - time to discuss training 20K
Friday - time to discuss engagement

For Now: Let's focus on

What could we be doing better?
Are there gaps in our approach?

Year of Open Science

Jamaica Jones
Transform to Open Science
Year of Open Science
Coordination Lead

Chelle Gentemann
Transform to Open Science
TOPS Science Lead

How do federal agencies work together?

1. Inter-agency Agreements

(Complicated. Take time.)

2. Informal committees of the willing

NSTC-OSTP-PCAST

Currently, the White House science and technology (S&T) advisory structure consists of OSTP and two advisory councils:

- National Science and Technology Council (NSTC)
- President’s Council of Advisors on Science and Technology (PCAST)

NSTC Subcommittee on Open Science (SOS)

44 Agency representatives meet once monthly

Subgroups include:

- Infrastructure
- Effective Data Management
- Persistent Identifiers, and
- Year of Open Science


All carrot.
A coalition of agents of change.

SOS Subgroup on the Year of Open Science (SYOS)

Formed May 2022

Co-chaired by NASA, NSF, NOAA

OSTP and Co-Chairs meet weekly
Full SYOS meetings bi-weekly, all agencies welcome

<u>Products to date:</u>

- 15 Agencies join 2023 A Year of Open Science, representing >$90B in science funding
- White House recognizes 2023 as Year of Open Science
  - White House Fact Sheet
- Federal definition of open science
- 4 goals for A Year of Open Science
- Website: https://open.science.gov/
- Nature: https://doi.org/10.1038/d41586-023-00019-y

The United States White House announces

2023: A Year of Open Science

A multi-agency (15) initiative across the US Federal Government to spark change and inspire open science engagement through events and activities that will advance adoption of open science.

- Centers for Disease Control and Prevention
- Department of Commerce
- Department of Energy
- Department of State
- Department of Transportation
- General Services Administration
- NASA
- National Endowment for the Humanities
- National Institutes of Health
- National Institute of Standards and Technology
- National Oceanic and Atmospheric Administration
- National Science Foundation
- Smithsonian Institute
- US Department of Agriculture
- US Geological Survey

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2023 Year of Open Science: Goals

1. Establish strategic approaches
2. Engage underrepresented communities in open science and research
3. Account for open science activities in reviews, recognition, and incentives
4. Increase openness and transparency in review processes

2023 Year of Open Science: Agency Activities

- OSTP Early Career Researcher Listening Sessions
- National Science Foundation FAIROS-RCN grant funding
- USGS “Open Data for Open Science” Community for Data Integration Workshop

2023 Year of Open Science: NASA

- Goal 1: Establish Strategic Approaches
  - CERN/Nasa Workshop July 10-14
  - Advance open science at external organizations
  - Track SMD-funded open science activities
- Goal 2: Engage underrepresented communities
  - Study barriers & biases in NASA science
  - Engage underrepresented groups in data-intensive research
  - Understand barriers to proposals from underrepresented groups

2023 Year of Open Science: NASA

- Goal 3: OS Activities in Review, Recognition and Incentives
  - Develop criteria for philanthropic organizations in considering open science activities in award reviews
  - Establish open science awards
  - Incorporate open science activities into existing honors evaluation
- Goal 4: Increase Openness and Transparency in review processes
  - Publish anonymized proposal demographic data
  - Publish review best practices

The United States White House announces

2023: A Year of Open Science

SYOS & A Year of Open Science

- 15 Participating Agencies
- Federal recognition of 2023 as a Year of Open Science
- Federal definition of open science
- Options paper
- 4 goals for federal open science

Discussion:

1. What have we done well thus far in the Year of Open Science?

2. What recommendations do you have for us as we work towards a sustainable and equitable future of open science?

Open Science

is the principle and practice of making research products and processes available to all, while respecting diverse cultures, maintaining security and privacy, and fostering collaborations, reproducibility and equity.

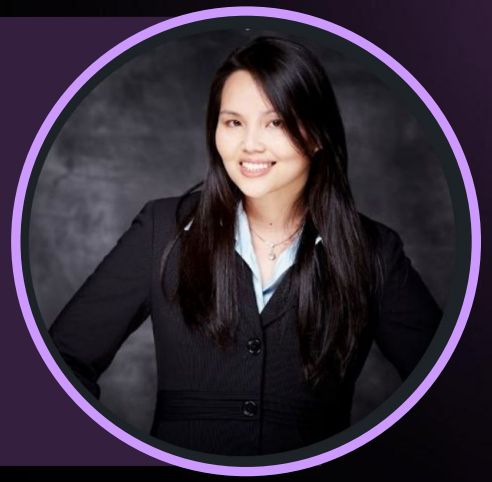
But wait, there's more….

Quarterly updates on agency activities at open.science.gov

More announcements soon:

- Interagency collaborations
- Incentive
- Events

Open Science 101 Module Content Development



Diana Ly
Transform to Open Science
OS101 Project Manager

Meet the Open Science 101 (OS101) Team

Diana Ly
Project Manager

Katherine Blanchette
Project Support

Porsche Parker
Project Support

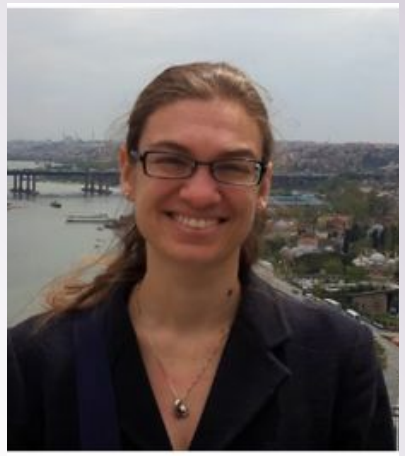
Cassie Conley
Project Scientist

Sara Edwards
Project Support

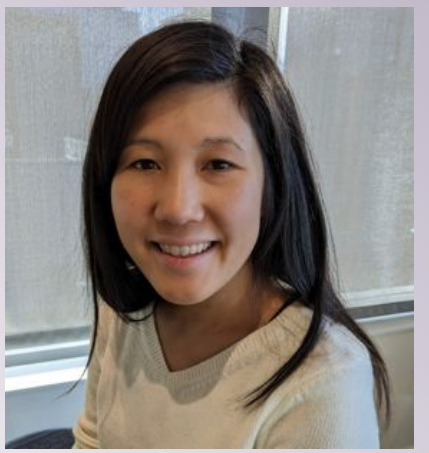
Vandhana Lal
Deputy PM

Natasha Batalha
Project Scientist

Pamela Marcum
Project Scientist



Kristina Pistone
Project Support



Caroline Dang
Project Support

NASA TOPS Leads and Champions

Name	Role	Center
Jessie Dotson	Lead	ARC
Josh Alwood	Champion	ARC
Natasha Batalha	Champion	ARC
Margaret McAdam	Champion	ARC
Daniel Whitt	Champion	ARC
Richard Barry	Lead	GSFC
Michael Barker	Champion	GSFC
Michael Croteau	Champion	GSFC
Lan Jian	Champion	GSFC
Alicia Joseph	Champion	GSFC
Avi Mandell	Champion	GSFC
Leo Singer	Champion	GSFC

NASA TOPS Leads and Champions

Name	Role	Center
Brian Knosp	Co-Lead	JPL
Karen Yuen	Co-Lead	JPL
Shawn Brooks	Champion	JPL
Jennifer Burt	Champion	JPL
Cedric David	Champion	JPL
Nereida Rodriguez Alvarez	Champion	JPL
Gao Chen	Co-Lead	LaRC
Kathleen Dejwakh	Co-Lead	LaRC
Brian Collister	Champion	LaRC
Crystal Gummo	Champion	LaRC
Carolyn Jordan	Champion	LaRC
Danny Kaufman	Champion	LaRC
Danny Mangosing	Champion	LaRC

NASA TOPS Leads and Champions

Name	Role	Center
Claire Robinson	Champion	LaRC
Kevin Sanchez	Champion	LaRC
Elizabeth Wiggins	Champion	LaRC
Paul Bremner	Lead	MSFC
Adam Kobelski	Champion	MSFC
Teresa Miller	Champion	MSFC
Pontus Olofsson	Champion	MSFC

Content Creation

A BIG THANK YOU to the OpenSciency team and all the work they did in 2022!

Open Science Curricula: Open Science 101
5 Modules Organized as a Scientific Workflow

What is open science? Why should I do it? How should I do it?

How to use, make, & share open data

Best practices for sharing all results and analysis, as well as peer reviewing

ETHOS OF OPEN SCIENCE | OPEN TOOLS & RESOURCES | OPEN DATA | OPEN SOFTWARE | OPEN RESULTS

How to use popular open science tools

How to use, make, & share software

Earn Badges at Each Level

Complete All 5 & earn TOPS Open Science Badge

Completed Milestones

Milestone	POC	Completion Date	Notes
TOPS Leads/Champions Kick-off	Diana Ly and Vandhana Lal	2/23/23	
Module 1 De-brief	Paul Bremner and Paige Martin	3/9/23	
Module 2 and 4 kick-off	Diana Ly and Vandhana Lal	3/17/23	
Module 3 and 5 kick-off	Diana Ly and Vandhana Lal	3/21/23	
Leads/Champions Onboarded	MSFC Project Office	4/6/23	All center leads and champions identified and onboarded
Content turned over to MOOC Developers	Leads/Champions	5/12/23	

Module 1 – Ethos of Open Science

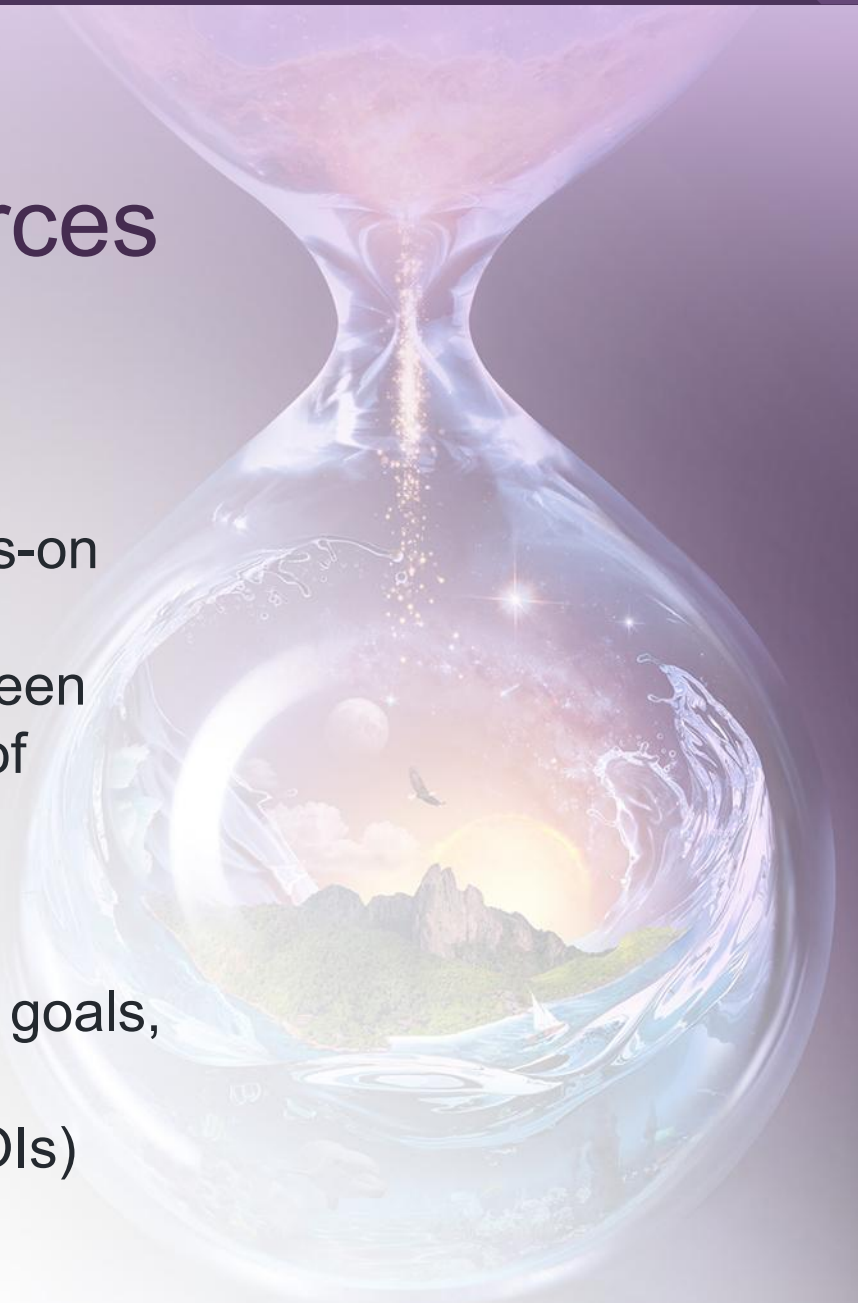
Learning Outcomes

By the end of this module, learners will be familiar with the definitions central to open science and have explored some concrete examples of the benefits of open science principles and practices. The course will include best practices for building open science communities, increasing collaboration, and introducing open principles to project design, as well as an overview of open science norms. This module will also explore the historical impact of “closed” science, and how open science seeks to create a more diverse and equitable scientific community.

Key Terms

Open science, open data, open source, open access, interdisciplinary, equitable, citizen science, open research, open scholarship, reproducibility and replicability, peer-review, FAIR principles, metrics [in context of scientific merit], altmetrics, openness, transparency, rigor, computational provenance

Module 2 – Open Tools and Resources



Learning Outcomes

At the end of this module, a learner will have gained hands-on experience working with different open science tools, databases/datasets, and policies. Learners should have been introduced to open science communities within their field of study.

Key Terms

Key Terms: Virtual research environments (VRE), SMART goals, advocacy, metadata, data repository, executable papers, Permanent URLs (PURLs) or Digital Object Identifiers (DOIs)

Module 3 – Open Data

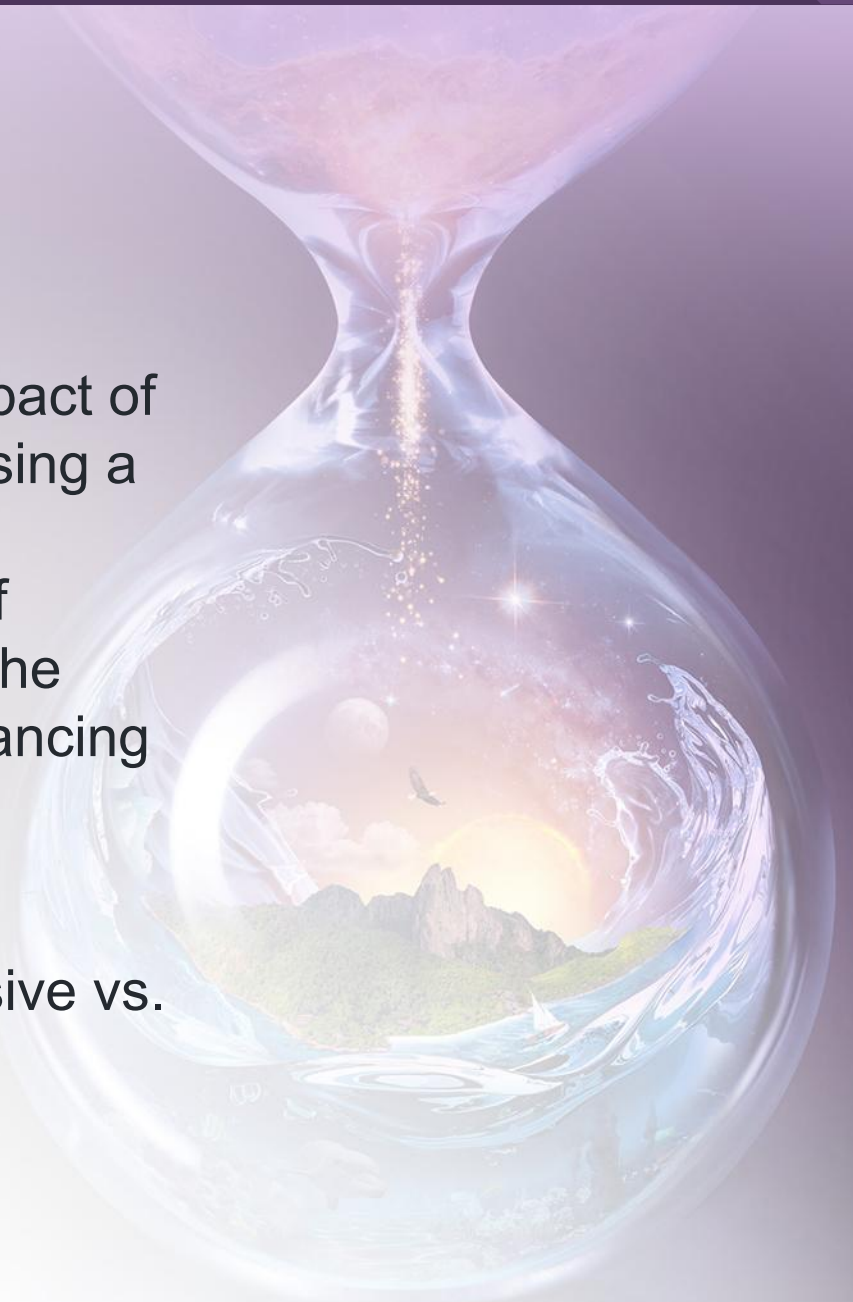
Learning Outcomes

By the end of this module, learners should feel comfortable creating a data management plan that follows FAIR principles, including assigning a license/copyright, metadata tagging, and assigning PIDs. Learners should also feel comfortable utilizing and assigning metadata.

Key Terms

Copyright, license, CC-BY and CC0 license, data management plan, metadata, machine-readable persistent identifiers (PID), findable (data), accessible (data), interoperable, reusable (data), privacy, sensitivity, de-identification, mediated access, crawl and mine [research articles], analytical reproducibility, dataflow

Module 4 – Open Software



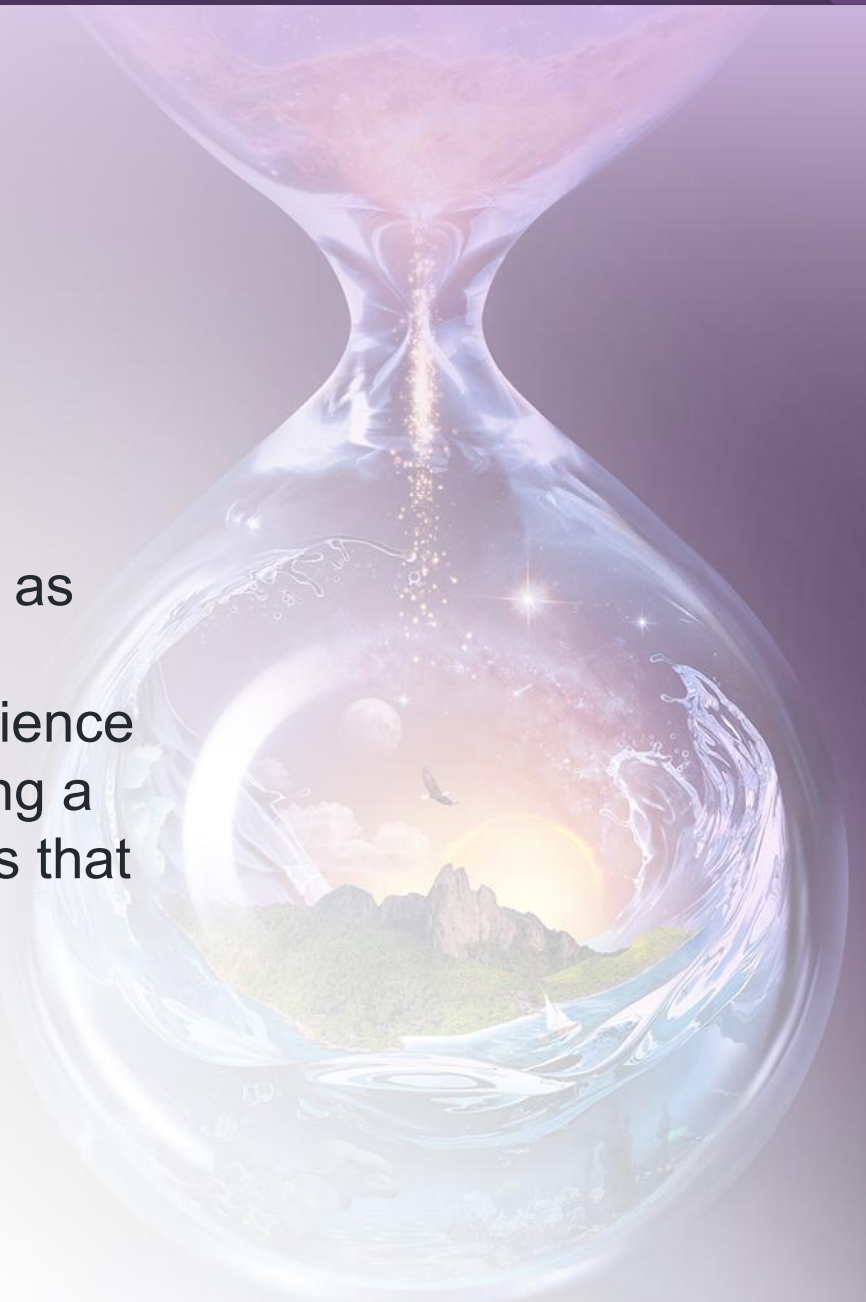
Learning Outcomes

By the end of this module, learners will understand the impact of open-source code, and have hands-on practice with choosing a license, creating a README, and uploading code to GitHub/GitLab. Learners will understand the importance of high-quality and documented code. Learners will discuss the impact of open-source software on open science and advancing equity in scientific fields.

Key Terms

Open-source software, source vs. compiled code, permissive vs. non-permissive license, version control, README, documentation, code repository vs. software repository

Module 5 – Open Results



Learning Outcomes

By the end of this module, learners will have an in-depth understanding of how open science principles help with increasing the reproducibility and replicability of research, as well as guidelines by which to choose the best location to publish their research. Learners will have hands-on experience with creating a replicable, open science workflow and using a virtual research environment, and practice with some tools that make such a workflow possible.

Upcoming Milestones

Module	Description	Dates	Notes
Module 1: Ethos of Open Science	Intermediate Content Review	6/23/23	Community Review
Module 1: Ethos of Open Science	Final Delivery	6/29/23	Ready for beta-test
Module 2: Open Tools	Intermediate Content Review	7/7/23	Community Review
Module 2: Open Tools	Final Delivery	7/12/23	Ready for beta-test
Module 3: Open Data	Intermediate Content Review	7/12/23	Community Review
Module 3: Open Data	Final Delivery	7/17/23	Ready for beta-test
Module 4: Open Software	Intermediate Content Review	7/17/23	Community Review
Module 4: Open Software	Final Delivery	7/21/23	Ready for beta-test
Module 5: Open Results	Intermediate Content Review	7/18/23	Community Review
Module 5: Open Results	Final Delivery	7/25/23	Ready for beta-test

Community Review

Instructor-led training will be available on TOPS Github for review.

MOOC will be on Open edX once completed.

Open Science 101
MOOC Development

Ilona Serrao

Transform to Open Science
Chief Learning Officer, Mt. Tam Innovations

Meet the MOOC Team

George Churchwell
Director, Customer Experience

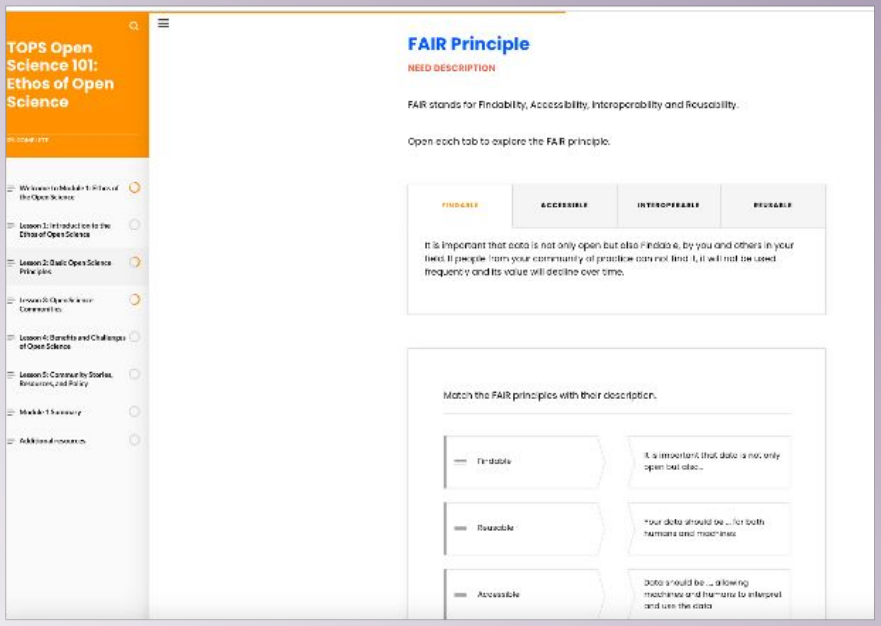
Ilona Serrao
Chief Learning Officer

Olha Turutova
E-Learning Specialist

Irene Korotkova
Instructional Designer

MOOC Overview

Online option to consume the instructor led material



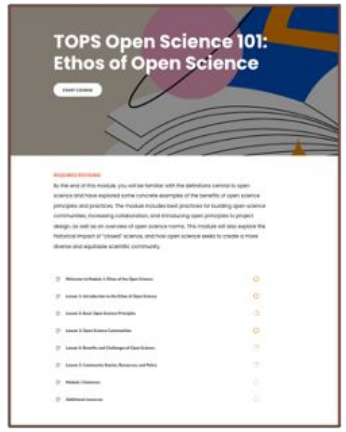
The Content Breakdown

- Lecture in the form of text
- Interactions such as Drag and Drop
- Knowledge Check

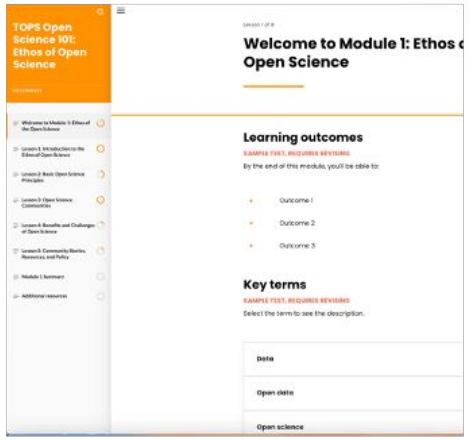
The User Experience

- Choice
- Completion Tracking
  - Module and Lesson Level
- Multiple attempts with Knowledge Check Questions

Learning Flow

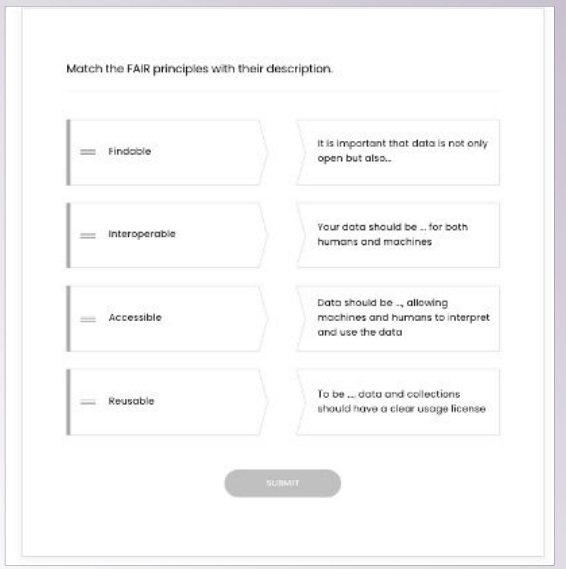


Start the Module



Choose a Lesson

Study the Lectures



Check Your Knowledge

Perform Tasks

Questions?

Open Discussion

Holly Norton
Transform to Open Science
TOPS Content Coordinator

Progress

- ✓ Development of A Year of Open Science Strategic Plan
- ✓ Community building activities with a presence at major science meetings
- ✓ Develop the Open Science 101 curriculum
- ✓ Develop research opportunities in Space and Earth Sciences (ROSES) solicitations

Open Discussion: Potential

- ❑ Are there any gaps in our curriculum?
- ❑ Thoughts on community engagement strategy?

Closing Remarks

Chelle Gentemann
Transform to Open Science
TOPS Science Lead

National Aeronautics and Space Administration

TOPS

June 2023

Community Panel

NASA HQ TOPS Core Team
Dr. Chelle Gentemann, Science Lead
Yvonne Ivey, Equity Lead
Dr. Holly Norton, Content Coordinator
Dr. Malcolm Glover, Community Coordinator
Kevin Murphy, Chief Science Data Officer