



A NASA OPEN-SOURCE SCIENCE INITIATIVE:
TOPS: TRANSFORM TO OPEN SCIENCE

TOPS October 2022 Community Panel

NASA HQ TOPS Core Team

Dr. Chelle Gentemann, Science Lead
Yvonne Ivey, Equity Lead
Cyndi Hall, Community Coordinator
Isabella Martinez, Content Coordinator
Kevin Murphy, Chief Science Data Officer

National Aeronautics and
Space Administration





Welcome!

We are encouraging people to use
#ToOPenSci and #IHeartOpenScience



Housekeeping

Wifi

To access the JPL guest wireless network:

- Username = visitor email address
(1st 24 characters only)
- Password = visitor date of birth (MMDDYYYY)

Bathrooms are in the hall, by the door.



Welcome

Chelle Gentemann
Transform to Open Science
TOPS Science Lead



Meeting Objectives

- Provide constructive feedback on TOPS mission, plans, and recent activities.
- Panelist will:
 - Serve as a representative of their community,
 - Speak to their experience with open science,
 - Provide lessons learned in conducting open science,
 - Provide input on future steps to be taken by TOPS, TOPS partners, and the greater NASA science community.
- Provide a written report within 4 weeks after each panel meeting.



Morning Agenda

Time (PT)	Agenda Item -10/5/22	Description
Day 1: TOPS Objectives and Year of Open Science Path Forward		
8:40am	Meet at JPL front entrance for badging and admittance	Cynthia Hall
9:00am	Review of Agenda and Code of Conduct	Chelle Gentemann
9:05am	Introductions to Panelists	Yvonne Ivey
9:10am	Icebreaker	Cynthia Hall
9:30am	Welcome	Kevin Murphy
9:45am	Coffee Break	
9:50am	TOPS Update	Yvonne Ivey
10:00am	Building TOPS: Spring Panel Feedback and Actions	Chelle Gentemann
10:45am	Coffee Break	
11:00am	2023 Year of Open Science Activities and Partnerships	Yvonne Ivey
11:30am	Discussion: Gaps in the Year of Open Science Plans	Isabella Martinez
12:00pm	Lunch	



Afternoon Agenda

12:00pm	Lunch	
1:00pm	Community Development	Cynthia Hall and Isabella Martinez
1:30pm	Discussion on Community Development	Isabella Martinez
2:00pm	Dance Break	
2:05pm	Tell us about what you are doing that we can work on together	Cynthia Hall
3:00pm	Snack Break	
3:15pm	GitHub Activity	Isabella Martinez
4:10pm	Break	
4:15pm	Framed Discussion	All
4:55pm	End of Day Wrap Up	Chelle Gentemann
5:00pm	Day 1 of Panel Ends	
6:00pm	Group Dinner in Pasadena: Cafe Santorini 64 W Union St, Pasadena, CA 91103	



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

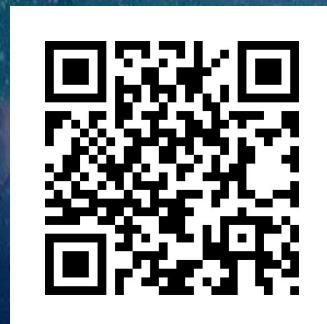
- If you are the subject of unacceptable behavior or have witnessed any such behavior, please immediately notify a meeting host.
- Notification should be done by contacting a host via direct chat or emailing your concern to Chelle Gentemann chelle.gentemann@nasa.gov
- Anyone experiencing or witnessing 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



A circular portrait of a woman with dark, curly hair, smiling. She is wearing a dark green top with a subtle pattern. The background of the slide features a dark blue gradient with a network of glowing blue lines and dots, resembling a digital or scientific visualization.

Yvonne Ivey
Transform to Open Science
TOPS Equity Lead



NASA Community Panelists

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





Icebreaker Time

Pick a NASA postcard that resonates with your ethos of open science!

Virtual Panelists:
<https://go.nasa.gov/3SEK3hK>





Welcome

Kevin Murphy
NASA Chief Science Data Officer



What is the SMD Strategy for Data and Computing?



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:

A handwritten signature in blue ink.

THZ

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

An SMD-approved strategy to enable transformational open science through continuous evolution of SMD's science data and computing systems.

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



SMD Strategy for Data Management and Computing for Groundbreaking Science

SMD identifies strategic data management and science computing as a priority (February 2018)



Archives Processing and Data Exploitation Meeting (GRC) (August 2018)



SMDWG KICKOFF

RFI ACTIVITY

WORKSHOP #1

WORKSHOP #2

STRATEGY DEVELOPMENT



67 RFI Responses with five common themes (July-September 2018)



Maximizing the Scientific Return of NASA Data (DC) (October 2018)

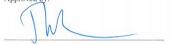


SMD's Strategy for Data Management and Computing (December 2019)



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

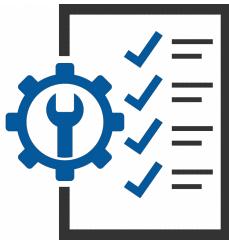
Prepared by the Strategic Data Management Working Group

Approved by:

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

14/11/19

Open-Source Science Initiative

Unlocking the full potential of a more equitable, impactful, efficient, scientific future



Policy development, education, compliance tools
Updating NASA policies on scientific information to better enable the activation of open science



Core Services for Science
Discovery
Developing core data and computing services to enable open science



ROSES Elements
Supporting open-source software, tools, frameworks, libraries, platforms, and training with over \$5 million dollars in grants



Community Building & Partnerships - Transform to Open Science (TOPS)
Accelerating adoption of open science

OSSI Core Values

- As open as possible, as restricted as necessary, always secure
- Increase the accessibility, inclusion, and reproducibility of SMD scientific activities
- When possible, minimize the burden

Progress Since May 2022

What Have We've Been Up To?

Open Meetings Policy

- Chief Science Data Office meetings are open to all.
- This is a working meeting - there will be active discussions.
- Reason for opening up is to provide insight on work being done and to gain perspectives

NASA's Scientific Information Policy (SPD-41)

SPD-41 was released in August 2021.

SPD-41 brings together existing NASA and Federal guidance.

- SPD-41: The Science Information Policy - <https://go.usa.gov/xtNTJ>
- Science Information Policy Website - <https://go.usa.gov/xtNTt>



SPD-41a was released in November with proposed additions.
An RFI was released to the community and closed on **March 4, 2022**.

Updates to NASA's Scientific Information Policy: SPD-41a

Data

Scientific data **should be FAIR** and shall be made publicly available with a clear, open, and accessible data license no later than the publication of the research, **and be citable**.

Mission data shall be openly available with no period of exclusive access.

Software

Research software **shall** be publicly available no later than the publication of the research, assigned a permissive software license, **and be citable**.

Mission software shall additionally be developed openly in a publicly accessible, version-controlled platform that allows for contributions and engagement from the community.

Publications

Manuscripts versions of as-accepted manuscripts shall be deposited in a NASA repository and made publicly available within 12-months. **Publishing as open access is supported and posting preprints is encouraged.**

Mission publications shall additionally be made publicly available at the time of their publication.

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

Supporting Open Source Science

Supporting open source software, open data, and open science practices in the SMD community.

- ROSES20 E.7 Open Source Tools, Frameworks, and Libraries selected 16 proposals supporting 22 different projects.



Full description of supported projects is available on [NSPIRES](#)

Open ROSES22 Elements

F.2 [Topical workshops, symposium, and conferences](#)

Events designed to expand SMD open science capabilities including open science practices; hackathons, data challenges, or un-conferences; or training related to open science. This element has a rolling deadline.

F.8 [Supplemental Open Source Software Awards](#)

Supplemental award to modernize software and release as open source. This element has a rolling deadline.

F.14 [Transform to Open Science Training](#)

Development of training material, summer schools, and virtual cohorts to advance open science literacy for **TOPS. Opened on September 9, closes Dec 8**

F.19. Multidomain Reusable Artificial Intelligence Tools

Enabling critically needed machine learning tools to advance Heliophysics and Earth Science research **Opened on October 4, closes Jan 13**

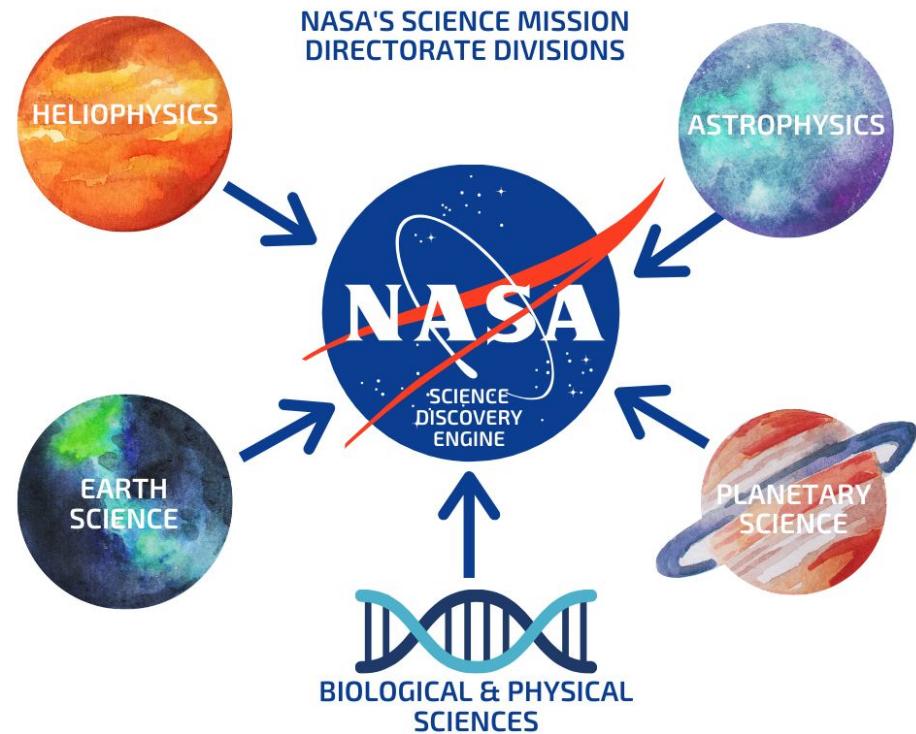
Coming Soon:

Solicitations to support '[F.15 High Priority Open Source Science](#)' and '[F.16 Supplement for scientific software platforms](#)'

SMD Science Discovery Engine

Create an SMD discovery capability to enable open source science. Scope includes:

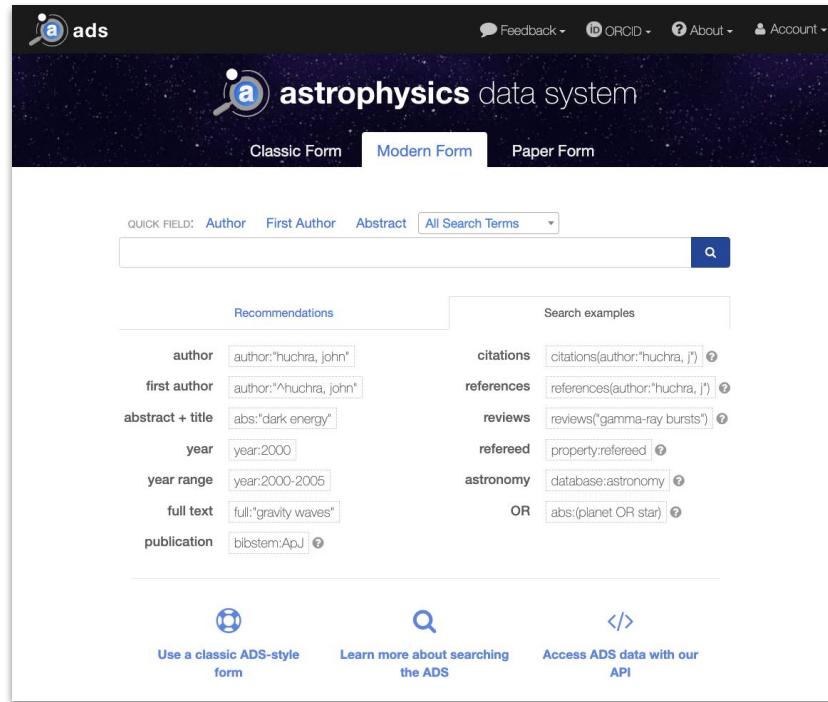
- Astrophysics: NAVO registry
- BPS: GeneLab, Life Sciences Data Archive
- Earth Science: Common Metadata Repository
- Heliophysics: SPASE registry, Events Knowledgebase
- Planetary Science: PDS API
- + Models, software, tools and other contextual information from all 5 divisions
- Over **1 million documents & metadata** included at this time.
- Incorporated 3 SMD relevant facets into the interface
 - Platforms
 - Instruments
 - Missions



The NASA Astrophysics Data System (ADS)

ADS is a NASA-funded project which provides discovery services for scholarly literature in Astronomy & Physics

- 15M metadata records, most of them traditional publications
- 6M full-text documents from all major publishers
- A citation graph with over 8M nodes and 142M edges
- (Anonymous) usage data for 50k regular users



<https://ui.adsabs.harvard.edu>

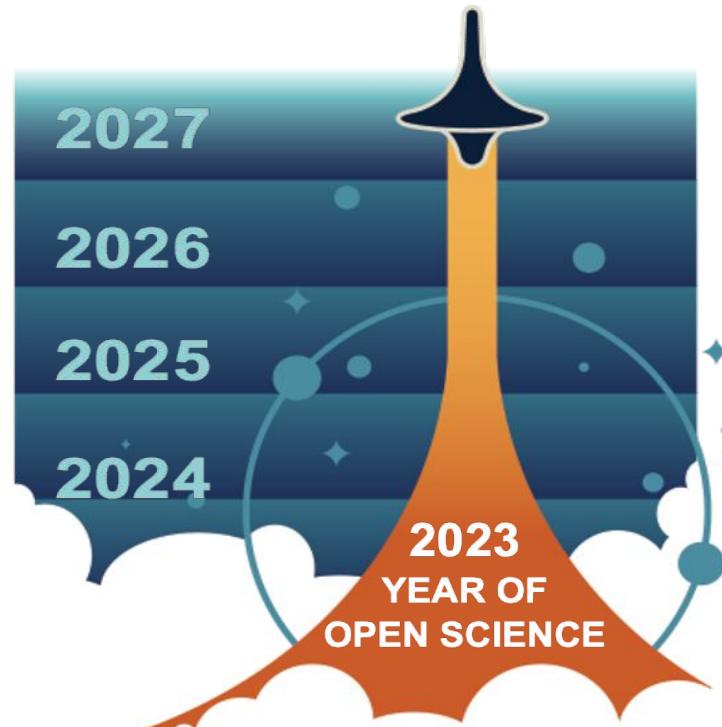
Leading the Path to Open-Source Science

NASA's Transform to Open Science

(TOPS) is a \$40 million* 5-year mission to accelerate the adoption of open science.

Strategic Goals:

- 20K earn open science certifications
- 5+ major discoveries based in open science practices
- Double participation of underrepresented groups



*pending appropriations



AV is Here to Save the Day!

Coffee/AV Break!



See you at 10:25 AM!



National Aeronautics and
Space Administration

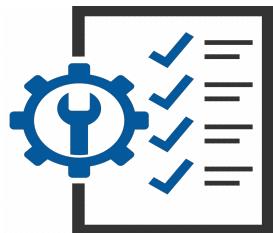


TOPS Update

Yvonne Ivey-Parker
TOPS Equity Lead

Open-Source Science Initiative (OSSI)

Key components of OSSI: **Transform to Open Science (TOPS)** and the **Year of Open Science (2023)**



Policy development, education, compliance tools

Updating NASA policies on scientific information to better enable the activation of open science



Core Services for Science Discovery

Developing core data and computing services to enable open science



ROSES Elements

Supporting open-source software, tools, frameworks, libraries, platforms, and **training** with over \$5 million dollars in grants



Community Building & Partnerships -

Transform to Open Science (TOPS)
Accelerating adoption of open science

What has TOPS been up to since May 2022?



- NASA has allocated \$3 million/year to fund projects related to Open Science Training via the “TOPST” ROSES 22 element.
 - Develop ScienceCore
 - OpenCore summer schools
 - OpenCore virtual cohorts
- **OpenCore** is a community developed introduction to open science
- CSDO is participating in the Office of Science and Technology Policy (OSTP)
 - Subgroup on the Year of Open Science
- Maintaining GitHub to share resources and ensure an open and transparent working environment



Strategic Goal 1: Increase Understanding and Adoption of Open Science

To meet this goal, we need to be as open as possible and provide the larger community with resources to help them meet their open science goals:

- Design and roll out **OpenCore** curriculum
- Develop and publicize the **TOPS Year of Open Science Communications Plan**
- **Announce call for TOPST in ROSES22**
- **Creation of Open Resources** - Openly creating foundational resources to encourage participation in open science
- **Engage with the open science and NASA scientific community - early and often:**
 - **Community Forums (Monthly)** - Feedback from the larger community
 - **Community Panel (Fall/Spring)** - open call to Open Science Advocates or practitioners to give TOPS feedback on plans and strategies. Open to all listeners.

Much of the momentum for these initiatives is already in motion!

Strategic Goal 1: In Action - OpenCore

Open Science Curricula: 5 Modules Organized as a Scientific Workflow

There are basic skills that all scientists need....

but rarely are trained on

How do you share your research to maximize its impact?

- Basic open science skills
 - Discipline-agnostic
- ↓ →
- Additional discipline-specific, advance modules available

OpenCore





Strategic Goal 2: Accelerate Major Scientific Discoveries

F.2 [Topical workshops, symposium, and conferences](#)

Events designed to expand SMD open science capabilities including open science practices; hackathons, data challenges, or un-conferences; or training related to open science. This element has a rolling deadline.

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2023
YEAR OF
SCIENCE



Strategic Goal 3: Broaden Participation by Historically Underrepresented Communities

Open science makes the **gatekeepers irrelevant** and has a **documented impact** on participation and credit for underrepresented communities. This is about changing the framework of science so we aren't just making room at the table - we are creating a new, more equitable table.

- Inclusive accessible *OpenCore*
- Workshops and events designed for underrepresented
- Science team meetings / Summer Schools / Events at MSI
- Science team meetings open & funded participation by underrepresented communities
- Sharing hidden knowledge
- Equitable access

Advancing Open Science Literacy

Prioritizing Expanding Access and Discovery to NASA data for all:
TOPS Training (TOPS-T)

- 1) the development of **ScienceCore**, a discipline specific scientific use cases curriculum Accessible
- 2) implementation of **Summer Schools**, and Built Openly
- 3) implementation of **Virtual Cohorts** Collaborative
Multilingual
Interactive

The **training material** as well as the design of the learning activities should be **targeted to audiences from undergraduate students to established scientists and managers** from all science disciplines supported by SMD.



National Aeronautics and
Space Administration



Building the TOPS Program: Spring Panel Feedback and Actions

Chelle Gentemann
Science Lead



TOPS Integrated Suggestions from the Spring Panel: Engagement

Panel Suggestion

- ★ Develop educational materials, particularly around GitHub, Markdown, licensing, and copyrights
- ★ TOPS should carefully consider the use of proprietary tools, and prioritize community-built resources
- ★ TOPS must draw on the global community of open science practitioners

TOPS Integration

- ★ TOPS plans to point to existing resources (eg. GitHub tutorials on GitHub, Creative Commons for licensing)
- ★ TOPS is using GitHub to share resources. Curriculum planned for open edX deployment
- ★ [OpenCore SMEs](#) (5 leads and 34 SMEs) representing the global scientific community.



TOPS Integrated Suggestions from the Spring Panel: Engagement

Panel Suggestion

- ★ TOPS must not rely solely on volunteer champions to advance this work
- ★ TOPS must involve professional societies in their efforts to establish best practices and incentives
- ★ TOPS needs to recognize and ideally involve science practitioners, such as citizen scientists, outside of traditional academic institutions

TOPS Integration

- ★ SMEs and panelists are being provided honorarium and travel; and TOPST provides funding for a variety of activities
- ★ TOPS is working to engage other societies in the Year of Open Science and develop new open science awards
- ★ TOPS has monthly meetings with NASA's Science Activation and Citizen Science program to ensure close collaboration between our missions



TOPS Integrated Suggestions from the Spring Panel: Capacity Sharing

Panel Suggestion

- ★ TOPS could expand from the coverage of open science practices beyond data, code, and peer-reviewed publications to include the diverse outputs of science
- ★ The average user doesn't know how to find open data or how to use it; democratizing open science must include facilitating this

TOPS Integration

- ★ **Additional guidance from panel requested**
- ★ 'How' part of OpenCore. NASA's Chief Science Data Office is developing data search engines & dashboards, but we also recognize that this is a big problem. **It is on our radar: happy to have addition input!**



TOPS Integrated Suggestions from the Spring Panel: Capacity Sharing

Panel Suggestion

- ★ TOPS should plan on extending the open science curriculum for undergraduate use

- ★ Many people who practice open science don't do so because they lack access to tools and resources, TOPS should create work to overcome this AND resources created for TOPS should be freely accessible to everyone, even international groups

TOPS Integration

- ★ TOPS has monthly meetings with the [NASA SCOPE team](#), which works with early career researchers to submit proposers for [SEED Grant funding](#) to develop curricula for high school teachers. NASA SCOPE will include TOPS extensions as options in 2023.

- ★ All TOPS resources are freely available and licensed CC-BY. TOPS encourages support for additional languages. But a lack of tools and resources, especially with the new open access memo, will likely persist.
Are there specific things TOPS can do to create globally equitable access to science?



TOPS Integrated Suggestions from the Spring Panel: Moving To Open

Panel Suggestion

- ★ NASA ought to leverage its position to influence on open science policy outside of NASA
- ★ Create a policy that can guide best practices in curation and evaluation of data
- ★ TOPS could expand beyond NASA to include academic institutions

TOPS Integration

- ★ TOPS is working to expand the Year of Open Science beyond NASA. To get everyone started, we have curated some "[Transforming to Open Science Suggestions for Organizations](#)"
- ★ The [Open-Source Science Initiative's](#) Data and Computing Architecture Study is focusing on data curation and evaluation; TOPS is integrated in this study
- ★ [HELIOS](#) and TOPS are connected and have created [curated recommendations](#) for universities. We are developing additional engagement opportunities for 2023. TOPST activities prioritize non-R1 institutions.



TOPS Integrated Suggestions from the Spring Panel: Moving To Open

Panel Suggestion

- ★ TOPS must endeavor to draw in groups that haven't been involved in open science prior to this
- ★ A 12-month embargo period is not in line with open science principles
- ★ TOPS should prioritize connections to minority serving institutions (MSIs), including actionable measure to lowering barriers of entry to NASA and open science

TOPS Integration

- ★ 100% agree. We did 3 [SpaceApps](#) challenges and are working to expand how/who we communicate
- ★ Aug 22 Nelson Memo: "[Open Breakthroughs for All](#)" eliminated the embargo for federally funded, peer-reviewed research.
- ★ [TOPST](#) prioritizes proposal by MSIs to host summer schools. Also, we don't think this is enough.

Centering the Conversation: TOPS Goals

- ★ **20K Trained in Open Science**
 - Open edX MOOC, in-person workshops, virtual cohorts
- ★ **5+ Moonshots**
 - ROSES call
- ★ **2x participation**
 - Develop metrics and action plan



Virtual Panelists: <https://go.nasa.gov/3M5XiWe>

What are we **doing well on our journey towards these goals?**

What are we **not doing that we should do?**

What are we **missing as we grow an open science community?**

Image Credit: Noun Project, [Hans Gerhard Meier](#)



Coffee Break!



See you at 11 AM!



TOPS Year of Open Science: Activities and Partnerships

Yvonne Ivey
Equity Lead

National Aeronautics and
Space Administration





What is Year of Open Science?

The **Year of Open Science** dedicates all of 2023 to:

- increasing the understanding and adoption of open science across various communities,
- accelerating major scientific discoveries via open practices, and
- the broadening of participation by historically underrepresented communities in open science activities

Much of the momentum for these initiatives is already in motion!

TOPS Plans to **accelerate** the Year of Open Science through:

- High-level visibility of publications, articles, Open Science Awards, etc.
- Conferences
- Virtual Cohorts
- Summer Schools
- Targeted Workshops



Year of Open Science Rollout

2023 Activities:

- OpenCore online independent, virtual, and in-person workshops
- 12 large society meetings
- Hackathons, open science events
- Prioritize events at non-R1 MSIs
- Share the knowledge resource development
- Call for moonshots

2024 Activities:

- ScienceCore, MOOC extensions, hackathons, events
- Moonshots kickoff
- Prioritize events at non-R1 MSIs
- Share the knowledge resource development

2023 Year of Open Science Plan



High level visibility

Publications, articles, working TOPS into HQ comms
Announce new Open Science awards
Announce recognition of Open Science activities

Conferences

Targeting domestic meetings (EGU only exception)
TOPS at NASA booth, town halls, OpenCore workshop, conference comms
Other meetings (see full list next slide)

Virtual Cohorts

Learners who complete part of OpenCore will be followed up with an enrolled in virtual cohorts to encourage completion of course

Summer Schools

3-4 institutions funded to run 6-8 weeks of OpenCore / Science Team summer schools - train entire science teams all together in 1 week.

Targeted Workshops

In-person workshops with strong outreach to historically underrepresented communities to learn open science and build community at the same time



Conferences Supporting YOS with TOPS

Conference	Date	Size	BPS	PDS	HPD	ESD	APD	HUGS*
AGU Fall	Dec	25K	X	X	X	X	X	
AMS/AAS	Jan	6K			X	X		
AAAS	Mar	9K	X	X	X	X	X	
LPSC	Mar	2K		X				
EGU	Apr	18K	X	X	X	X	X	
AAS	Jun	3K		X	X			X
IGARSS	Jul	3K					X	
Society of Asian Scientists & Eng	Oct	3K						X
Amer. Indian Sci & Eng	Oct	2K						X
SACNAS	Oct	6K						X
ASGSR	Nov	1K	X					
AGU Fall	Dec	25K	X	X	X	X	X	
Hackathons at MSIs	May/Sep	200						X
Totals		~100K	5	6	6	6	5	4

*HUGS- historically underrepresented groups



Open Discussion: Gaps in Our Plan

**What gaps exist in the
Year of Open Science
plan? How can we
address those gaps?**



**What other details are
we overlooking?**

Virtual Panelists: <https://go.nasa.gov/3RDKKqe>

Image Credit: Noun Project,
[Hans Gerhard Meier](#)

- Is holding ½ day workshops at large busy meetings a good strategy?
- What are other strategies to reach 20K open science badges?
- Learners using open edX, certification will be automatic and learning experience will be consistent. The in-person workshop materials will be online and available for anyone to use and hold their own workshops.
- Should we have minimum requirements for events that offer TOPS badges? What should those requirements be?
- Should there be any minimum requirements?



Lunch Time!



See you at 1:00 PM!

Image Credit: Noun
Project, [Anna Witt](#)



Afternoon Agenda

12:00pm	Lunch	
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4:55pm	End of Day Wrap Up	Chelle Gentemann
5:00pm	Day 1 of Panel Ends	
6:00pm	Group Dinner in Pasadena: Cafe Santorini 64 W Union St, Pasadena, CA 91103	



Community Development

Cynthia Hall and Isabella Martinez
Community Coordinator & Content Coordinator





Year of Open Science: Community Outreach



WORLD
RESOURCES
INSTITUTE



Association
of American
Colleges and
Universities



ASSOCIATION OF
PUBLIC &
LAND-GRANT
UNIVERSITIES



CHORUS



HACU



GREAT
Minds
in STEM



Native Land
Information System

AHEAD

Association
on
Higher Education
And Disability®



COS
CENTER FOR
OPEN SCIENCE

CSCCE





Year of Open Science: Community Outreach

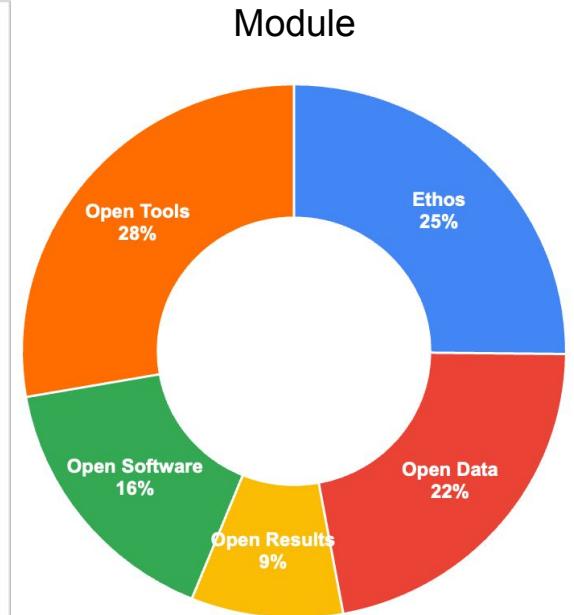
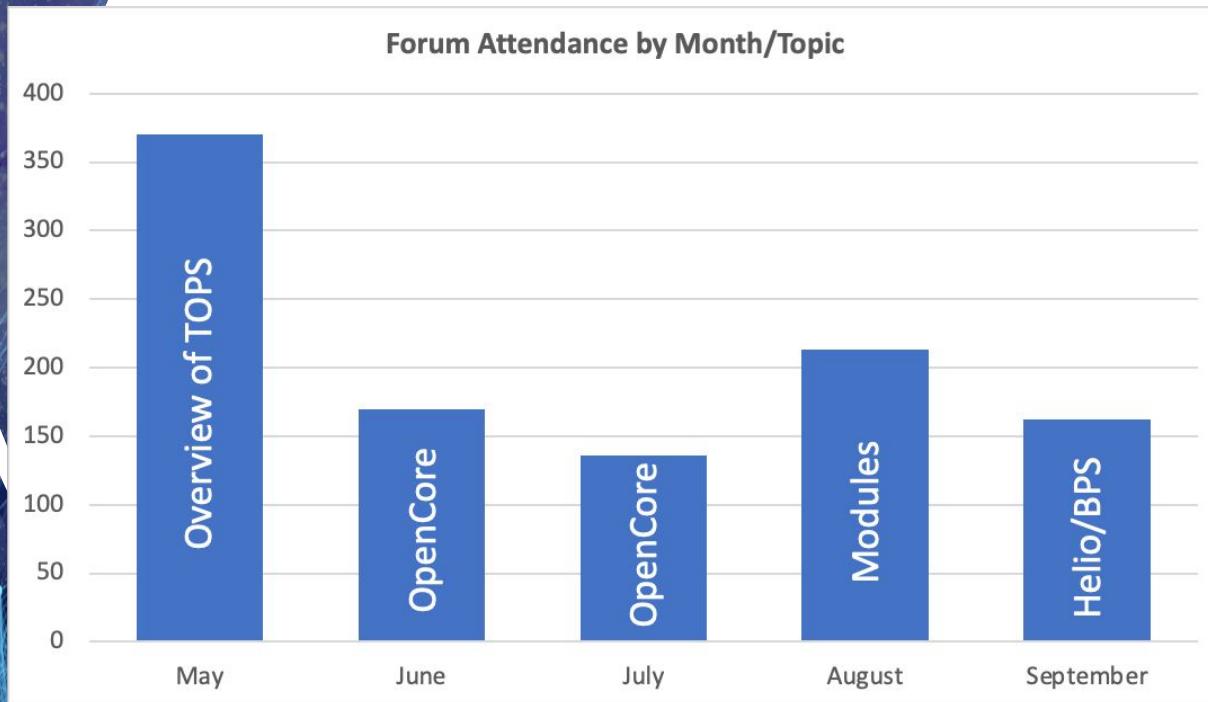




Year of Open Science: Community Outreach - Professional Societies



Year of Open Science: Community Outreach - Community Forums



Year of Open Science: Community Outreach - Listening Sessions



- Tribal GIS Conference
- AGU Chapman Justice in the Geosciences
- Earth Science Information Partners
- Society for Advancement of Chicanos/Hispanics & Native Americans in Science

Year of Open Science: Community Outreach - Success Stories

Dr. Reina Camacho Toro Dr. Afshin Beheshti

Dr. Leo Singer Africa Ixmucane Flores-Anderson Dr. Flavio Azevedo

Success Stories of Open Science

TOPS

OpenCore SME Highlights

Forty amazing subject matter experts (SMEs) have been working since late June to gather the content for the TOPS OpenCore. We asked them what inspired them to join the Open Science community and have received permission to share some of their responses here. There are many paths to open science - and we hope some of their paths inspire you!

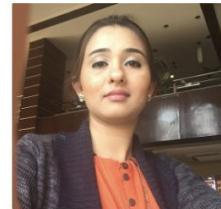
Amber Osman

Why I practice open science?

I faced issues in doing research because the research content available was blocked behind paywalls and our institution had limited subscription access to research databases. The open access initiatives provided platform for everyone to easily access research materials and collaborate on global level and that's why I practice Open Science; it definitely allows progression in science.

How did I get involved in open science?

While doing different research studies as a student then my job was related to research & development; being an Editor for a journal and all these roles & responsibilities brought me close to Open Science practices. I joined the Creative Commons movement and other renowned publishing platforms for open science & best practices in scholarly communication advocacy because I believe that the right to open knowledge is for all.



Elio Campitelli

Why I practice open science?

Because what other science is there? Science is a collaborative enterprise that builds upon the work of a community, so methods, data and results need be open for it to work properly. You cannot see further if the shoulders of the giants you need to stand on are tucked away behind a paywall.

How did I get involved in open science?

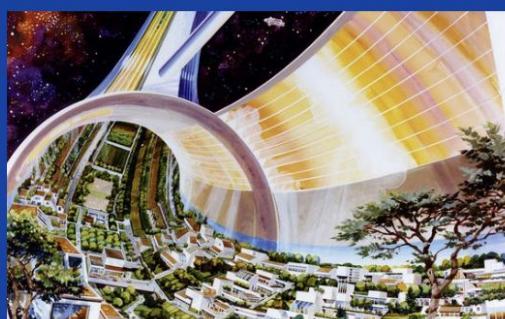
By doing science myself. I new I needed to make my results open and so searched around for tools



Year of Open Science: Community Outreach - Space App Challenges



**TURNING STEM
INTO STEAM**



**THE ART IN OUR
WORLDS**



**MEASURING
OPEN SCIENCE**

Year of Open Science: Community Outreach - Social Media



TOPS - Transform to Open Science
@ToOpenScience



ScienceAtNASA
204K subscribers





Year of Open Science: Online Community-Building

Why have an “online engagement” plan?

- Give learners a forum to ask questions and receive advice from experts
- Keep everyone informed of our plans and accomplishments
- Resource distribution and success amplification
- Continue to identify areas where we can do more and where we can do better

Work will not end in December 2023! We can use an online community to keep people involved during the lifetime of the TOPS mission and beyond!

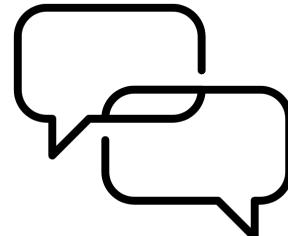


Getting the Most Out of Our GitHub

**Blog Posts &
Resources!**



**GitHub
Discussions**



GitHub Issues

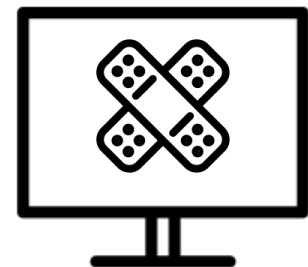


Image Credit: Noun
Project, [Umer Younas](#)



Online Activity Aligns with In-Person Engagement

Monthly:

- Blog posts (~4 per month)
- Discussion posts (2 per blog)
- Polls (1 per blog)

Weeks with a TOPS presence at a conference will feature blogs and discussions that **align** to that conference.

“Off” weeks will have a theme related to Open Science, NASA divisions, etc.



Suggested Off-Week Blog Themes (1)

- **Kick-off Blog in Nov 2022:** Why "Transform towards Open Science?"
- Introduction to "Ethos of Open Science"
- Year of Open Science Overview
- The Importance of Open Science Training?
- Intersection of DEIA and Open Science
- Introduction to the Open Data Module and Getting Started with Open Data
- Introduction to Open Software Module and Getting Started with Open Software
- Introduction to Open Results Module and What Does it Mean to Have "Open Results"
- Altmetrics: What Does "Scientific Merit" Incentivize
- In honor of National Space Symposium: Open Science in Helio and Astro
- History Lesson: Why Did We Have "Closed" Science in the First Place?
- FAIR principles
- CARE Principles
- International Efforts in Open Science
- Happy summer! Science Summer Camp and Early Exposure to Science!
- Expanding Open Science: What Does it Mean to Have Open Scholarship?



Suggested Off-Week Blog Themes (2)

- Citizen Science Highlight (Guest Blog)
- Science Activation (Guest Blog)
- Open Science Highlight: Helio
- What Does the Reproducibility and Replicability Crisis Have to Do with Open Science?
- Open Science Highlight: BPS
- Open Science Highlight: Astro
- Open Science Highlight: Planetary
- Open Science Highlight: Earth
- Reflection on the Open Science Summer Schools
- World Space Week: Space is for Everyone
- The MARS Helicopter project (Guest Blog)
- The Arctic Vault Project (Guest Blog)
- Open Science Highlight: Artemis Mission Principles (Guest Blog)
- Personal Reflection on a Year of Open Science by Kevin Murphy, Chief Science Data Officer)
- **Personal reflection on a Year of Open Science by the TOPS Team**



Open Discussion: Gaps in Our Plan

What **gaps exist in our community outreach and engagement plans?**



Virtual Panelists: <https://go.nasa.gov/3yi3GnE>

Who are we **not reaching?**

How should we reach them?

What **discussions would you like to see take place?**

How should TOPS **participate in existing open science communities?**



Dance Break!



Dance for 5 minutes!

Image Credit: Noun
Project, [Supalerk Laipawat](#)



Open Discussion: YOU!!

What are **you** currently working on?



How can we **work together**?

Virtual Panelists:<https://go.nasa.gov/3M3LluZ>

Image Credit: Noun Project, [Hans Gerhard Meier](#)



Snack Break!



See you at 3:15 PM!



Remaining Afternoon Agenda

12:00pm	Lunch	
1:00pm	Community Development	Cynthia Hall and Isabella Martinez
1:30pm	Discussion on Community Development	Isabella Martinez
2:00pm	Dance Break	
2:05pm	Tell us about what you are doing that we can work on together	Cynthia Hall
3:00pm	Snack Break	
3:15pm	GitHub Activity	Isabella Martinez
4:10pm	Break	
4:15pm	Framed Discussion	All
4:55pm	End of Day Wrap Up	Chelle Gentemann
5:00pm	Day 1 of Panel Ends	
6:00pm	Group Dinner in Pasadena: Cafe Santorini 64 W Union St, Pasadena, CA 91103	



Collaborative Activity: GitHub

Please navigate to our GitHub at
<https://github.com/nasa/Transform-to-Open-Science> and
go to the “Resources” Folder

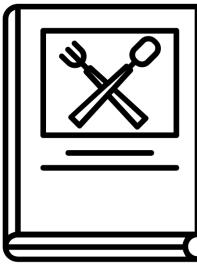
The screenshot shows a GitHub repository page for 'nasa / Transform-to-Open-Science'. The 'Code' tab is selected. In the center, there's a list of files and folders under the 'resources' directory. The files listed are: 'branding_graphics', 'open_science_cookbook', 'templates', 'year_of_open_science_cookbook', and 'readme.md'. Each item has a timestamp and a 'History' link. At the bottom of the list, there's a section titled 'TOPS Resources' with the text: 'We encourage everyone to help us develop these resources for organizing and holding TOPS events!'

File/Folder	Action	Last Updated
branding_graphics	Update readme.md	3 days ago
open_science_cookbook	Rename readme.md.md to readme.md	7 days ago
templates	Update readme.md	20 hours ago
year_of_open_science_cookbook	Rename readme.md.md to readme.md	7 days ago
readme.md	Update readme.md	7 days ago

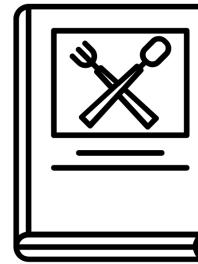


Collaborative Activity: GitHub

Year of Open
Science Cookbook



Open Science
Cookbook



← Branding Materials →

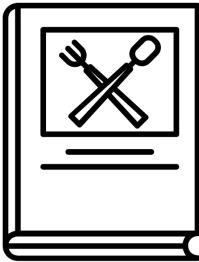
← Templates & Supplements →

Image Credit: Noun
Project, [Cahya Kurniawan](#)

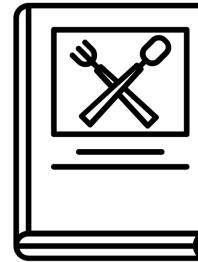


Collaborative Activity: GitHub

**Year of Open
Science Cookbook**



**Open Science
Cookbook**



Each Cookbook is arranged in three tiers:

Promote

Engage

Strengthen

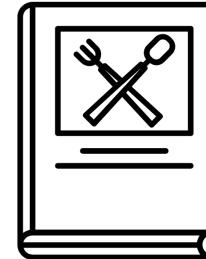
Image Credit: Noun
Project, [Cahya Kurniawan](#)



Collaborative Activity: GitHub

Please create **issues** to suggest changes to the open science cookbook or create **pull requests** to add additional resources!

Open Science Cookbook



Each Cookbook is arranged in three tiers:

Promote

Engage

Strengthen

Image Credit: Noun Project, [Cahya Kurniawan](#)



Snack Break!



See you at 4:15 PM!



Open Discussion: Community Part 2

**How do we *grow and sustain*
community engagement beyond
the Year of Open Science?**



Virtual Panelists: <https://go.nasa.gov/3C7YeVM>

Image Credit: Noun Project, [Hans Gerhard Meier](#)



Day 1 Wrap-Up

Chelle Gentemann
Transform to Open Science
Science Lead

A NASA OPEN-SOURCE SCIENCE INITIATIVE:
TOPS: TRANSFORM TO OPEN SCIENCE

AGU Update—Culture Change and OpenCore

Brooks Hanson, EVP Science

bhanson@agu.org

0000-0001-6230-7145

Laura Lyon

0000-0003-0585-9853

Kristina Vrouwenvelder

0000-0002-5862-2502



Housekeeping

Wifi

To access the JPL guest wireless network:

- Username = visitor email address
(1st 24 characters only)
- Password = visitor date of birth (MMDDYYYY)

Bathrooms are in the hall, by the door.



Welcome!

We are encouraging people to use
#ToOPenSci and #IHeartOpenScience





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





Agenda

Time (PT)	Agenda Item -10/6/22	Description
<i>Day 2: The Open Science Curriculum</i>		
8:40am	Meet at JPL front entrance for badging and admittance	Cynthia Hall
9:00am	Introduction and Review of Code of Conduct	Chelle Gentemann
9:10am	Honoraria Q&A	Annie Rattanaphone
9:20am	TOPS Open Science Curriculum Update	AGU
9:45am	Coffee Break	
9:50am	Curriculum Discussion (Part 1)	AGU
10:20am	Curriculum Engagement and Retention Strategy	AGU
10:30am	Coffee Break	AGU
10:45am	Curriculum Discussion (Part 2)	AGU
11:45am	End of Day Wrap Up	Yvonne Ivey
12:00pm	Lunch	
1:15pm	JPL Tour	All
3:00pm	End of Meeting	

TOPS OpenCore Team



Shelley Stall
Vice President,
Data Leadership



Brooks Hanson
Executive Vice
President, Science



Lauren Parr
Senior Vice President,
Meetings and Learning



Samantha Streamer
Veneruso
Director, Learning



Lorena Barba
Professor
Open Science Expert



Kristina
Vrouwenvelder
Program Manager,
Open Science



Laura Lyon
Program Manager,
Science



IBL Education
Course Production Team

+2 open, open-science positions

AGU Strategic Plan and Objectives



- **Open Science**
- **Global Climate Leadership**
- **Inclusive Collaboration**
- **Diverse and Just Science Culture**
- **Organizational Excellence**

Key Challenges of the 21st century (and beyond): Convergent science for the benefit of humanity

1 Habitable Planet

All major sustainability issues are convergent and transdisciplinary



All require massive data and integration with modeling and across science and with society. Open science with Integrity is a must.

Population 7-10 billion; food-energy-water?
Major health issues are convergent science: include clean air, soil, and water, geohealth, pandemics, etc.

All ecosystems and biogeochemical cycles are human dominated

- Huge climate change experiment underway
- Key limited resources (Li, P, REE's, clean water...)
- Imminent energy transition
- Transportation, navigation, trade (e.g., economy) all convergent science based
- Natural hazards, weather, and



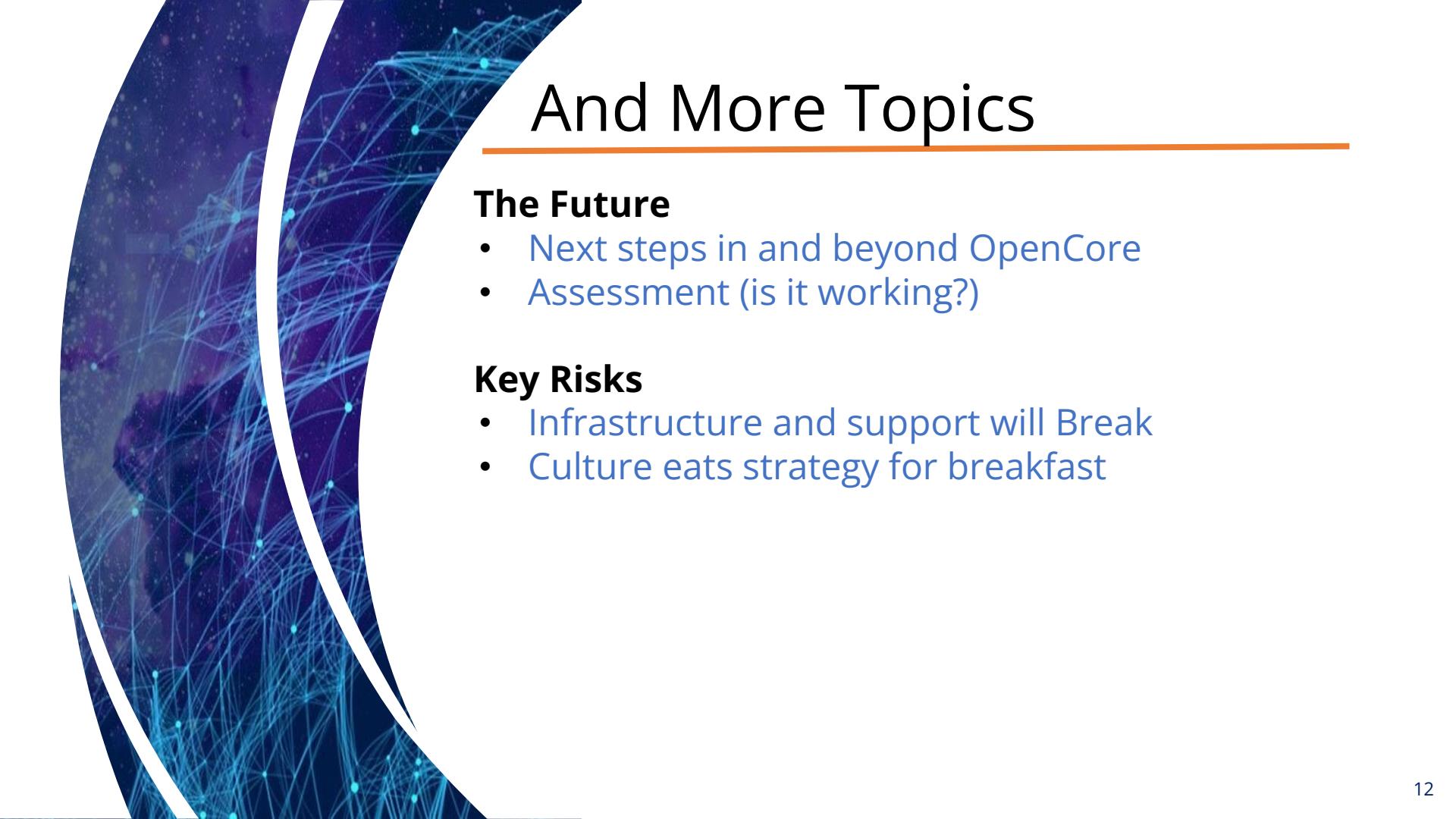
Topics

Context for thinking about OpenCore, Outreach, and Next Steps

- Open Science Culture Change in Earth and Space Sciences
- Society partners and resisters and opportunities; Institutional partners and resisters

OpenCore Update

- MVP Goal, Timeframe and progress
- Some Lessons and Challenges
- Outreach and Engagement Plans
- Badges
- Fall Meeting
- Awards (and culture)



And More Topics

The Future

- Next steps in and beyond OpenCore
- Assessment (is it working?)

Key Risks

- Infrastructure and support will Break
- Culture eats strategy for breakfast



Society Opportunities



Society and other partnerships on OS

- **FAIR Data initiative in the ESS and COPDESS** (many partners—publishers, repositories, and infrastructure)
- **All4OS.org** (11 partner societies and NAS)
- **Data Sharing Series** (7 partner societies)
- **NSF Public Access Repository and Data Workflows** (w/ COPDESS)
- **ESS Open Archive** (6 partner societies)
- **Convergence Accelerator around community science and resilience** (50 partners)
- **Open Science on Environmental Protected Areas** (Belmont Forum; 5 countries; Nature conservancy)
- **Community Science Exchange** (5 partner societies)
- **Data Help Desk** (with ESIP and others)
- **Society and AAU-APLU engagement**

Other are repositories, publishers, OS infrastructure/orgs

The Alliance for Open Scholarship is a cohort of societies and associations collaborating to identify, articulate, and socialize appropriate open scholarship norms within their disciplines. All4OS works with participating organizations to tailor field-specific guidance on core considerations like supporting and sustaining open infrastructure; providing training on good open research and scholarship practices; and aligning awards and recognition schemes to promote a culture of open research and scholarship.



- 10 Societies with NAS
- Commitment to actions in awards, activities, emphasis
- Yearly reports
- Culture change esp.working w/ universities
- Supporting infrastructure

Cultural Challenge:

- 2 societies dropped out
- Starting conversations with universities

Data Sharing Seminar Series for Societies

<https://wesharedata.org>

WELCOME

Societies have a unique role in bringing awareness of developing practices and supporting the necessary discussions within disciplines to bring their voice to the larger community.

These seminars are monthly through January 2022 held on the first Friday of each month at 10am ET (14:00 UTC). There will be 2-3 speakers with ~30 minutes of Q&A and discussion specific to society engagement to help with data sharing, credit, transparency and more. Recordings will be made available here following the session.

This series is supported and guided by these collaborating societies and federations:



Federation of Associations in
Behavioral & Brain Sciences

Next Webinar

Data Sharing for Societies: Pinnacle Seminar

20 April 2022, 10am ET (1400 UTC)

REGISTER



Data Help Desk

Earth Science Data Support

Connecting Earth science data researchers and data experts to enhance research and make data and software more open and FAIR.

Volunteer as a Data Expert

More Details

Do you have data-related questions? Are you looking to make your data and/or software open and FAIR? Are you interested in tools and resources for working with your data or for finding data to reuse? The Data Help Desk is here for you!

300

Data Experts

100%

Free

16

Data Help Desks Held



AGU



Culture challenge:
Lots of basic open data and software questions

[Advanced Search](#)

Browse

 [SUBJECTS](#) [AUTHORS](#) [MEETINGS](#) [PREPRINTS](#) [PRESENTATIONS](#) [SOCIETY MATERIALS](#)

Crop Science
SOCIETY OF AMERICA

Soil
Science
Society of America

AGU ADVANCING
EARTH AND
SPACE SCIENCE

esa

ASLO Association for the Sciences of
Limnology and Oceanography

SETAC Society of Environmental
Toxicology and Chemistry®

ESS society supported “preprint” server

- Preprints, presentations (posters and slides), and society materials
- Educational materials and resources are coming (modules, virtual field trips)
- Moving to open-source platform; adding HTML support
- **Culture Challenge:** Uptake: 10% in conference presentations; about 25% in journal submissions; Resistance from several other societies



Community Science Exchange



Community Science Exchange is a new platform, led by a coalition of societies and partners, aimed at developing and promulgating leading practices, resources, and information around community science.

The Hub

The open-source Journal *Community Science*

Culture Challenge: Slow uptake and recognition of value of community science

<https://communitysci.org/>

NSF Convergence Accelerator Grant (50 partners)

Challenge: Institutional Resistance

Key EU weather and climate modeling centers not yet supporting open software, even subroutines

AGU had recent conversations with two major modeling centers for weather and climate. Some open software and routines; much still closed. They are considering opening up more code but very deliberate process.

A quote: "We will advise our authors to publish elsewhere on some topics given AGU's policies"

Engaging with Societies and more

- Multiple societies ready; Networks formed and focusing on larger culture change around open science
- PARTNERSHIP MODEL (they need ownership and feeling of true partnership)
 - Equal governance
- Some resistance still
- Focus on: culture change; award, reward, recognition; infrastructure; policy alignment; communication; disciplinary guidance; working w/ universities



OpenCore

Initial Plan

5 modules

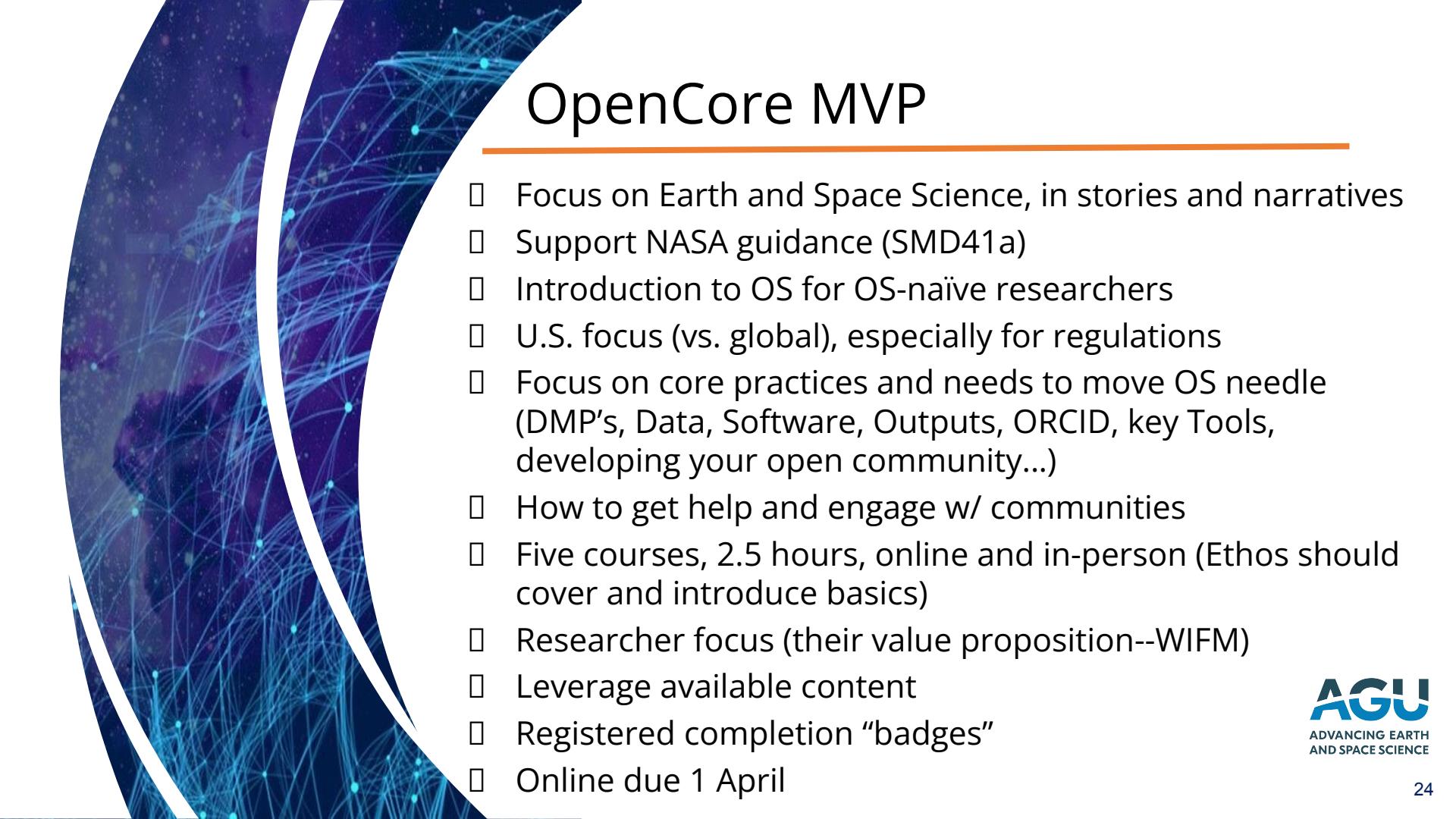
Developed with/by open science experts in fully open process

Ready by AGU Fall Meeting

Started with content development/transfer sprint in summer; great content

But... didn't have full design constraints; tight schedule; capacity vs. asks for volunteers; transition to educational framework was big lift

So...revised plan



OpenCore MVP

- Focus on Earth and Space Science, in stories and narratives
- Support NASA guidance (SMD41a)
- Introduction to OS for OS-naïve researchers
- U.S. focus (vs. global), especially for regulations
- Focus on core practices and needs to move OS needle (DMP's, Data, Software, Outputs, ORCID, key Tools, developing your open community...)
- How to get help and engage w/ communities
- Five courses, 2.5 hours, online and in-person (Ethos should cover and introduce basics)
- Researcher focus (their value proposition--WIFM)
- Leverage available content
- Registered completion “badges”
- Online due 1 April

OpenCore MVP

□ Ethos of Open Science

What is Open Science and Benefits; Ethos of Open Science; Open Science Ecosystem; Planning for Open Science, Challenges

□ Open Tools and Resources

Introduction to OS tools; Tools across research lifecycle; Tools for reproducibility; Practicing open science as a team; Open science communities.

□ Open Data

What are open data (including finding quality data); Basic principles; Planning for open data; Publishing open data; Challenges.

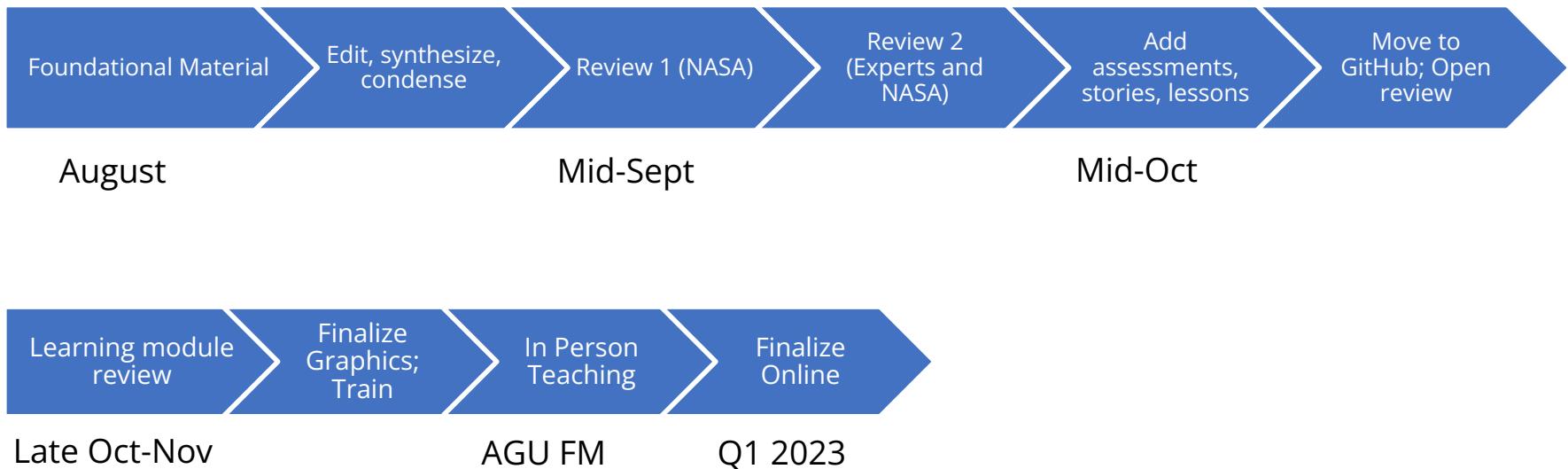
□ Open Software

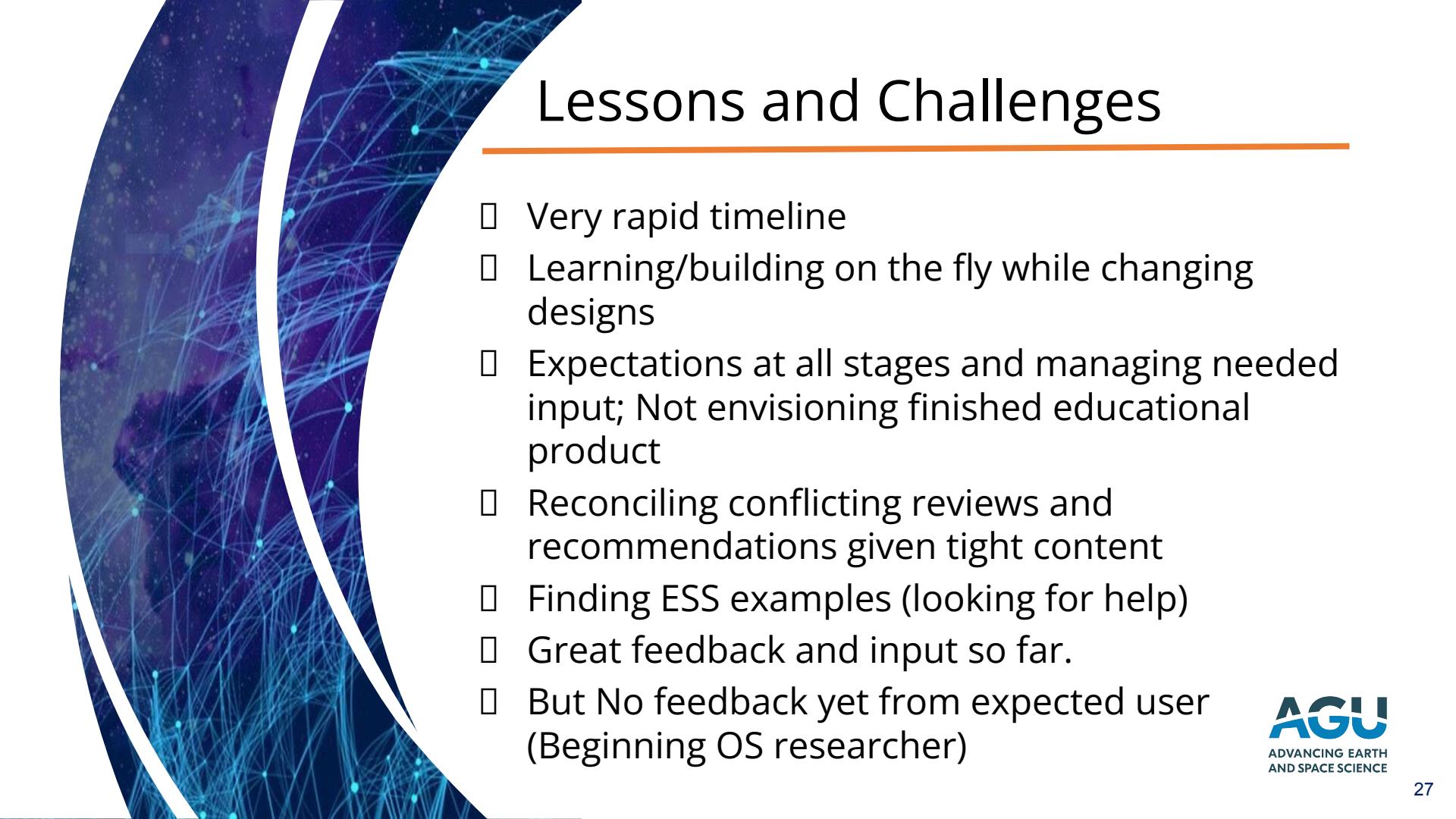
Open software; Pros and cons of open software; Licenses; Code management and quality; Contributing to open software

□ Open Results

Results throughout the research process; Advantages of Open Results; Sharing pre-publication results, Publishing open science, Inclusive authorship and contributions

Overall Timeline for MVP (1st Module)





Lessons and Challenges

- Very rapid timeline
- Learning/building on the fly while changing designs
- Expectations at all stages and managing needed input; Not envisioning finished educational product
- Reconciling conflicting reviews and recommendations given tight content
- Finding ESS examples (looking for help)
- Great feedback and input so far.
- But No feedback yet from expected user (Beginning OS researcher)



Open Discussion

Feedback on the open science curriculum, lessons learned so far and challenges presented?



Image Credit: Noun Project, [Hans Gerhard Meier](#)



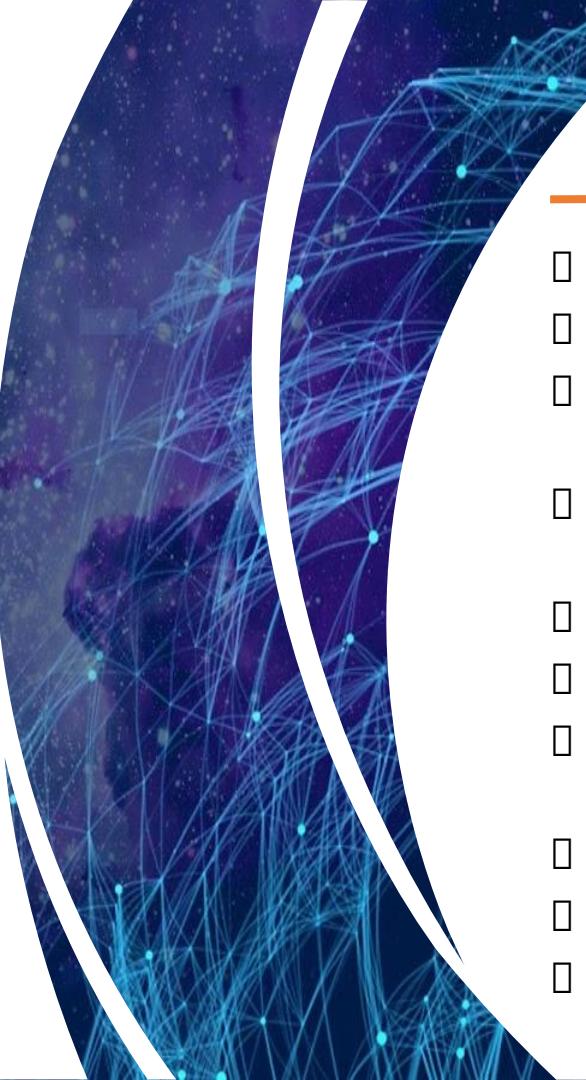
Badges

Badges

- Starting dicussions with ORCID for registration
- Completion of course
 - Microbadges for modules
- In-person still complete assessments (have registration logs)
- How to make them valuable

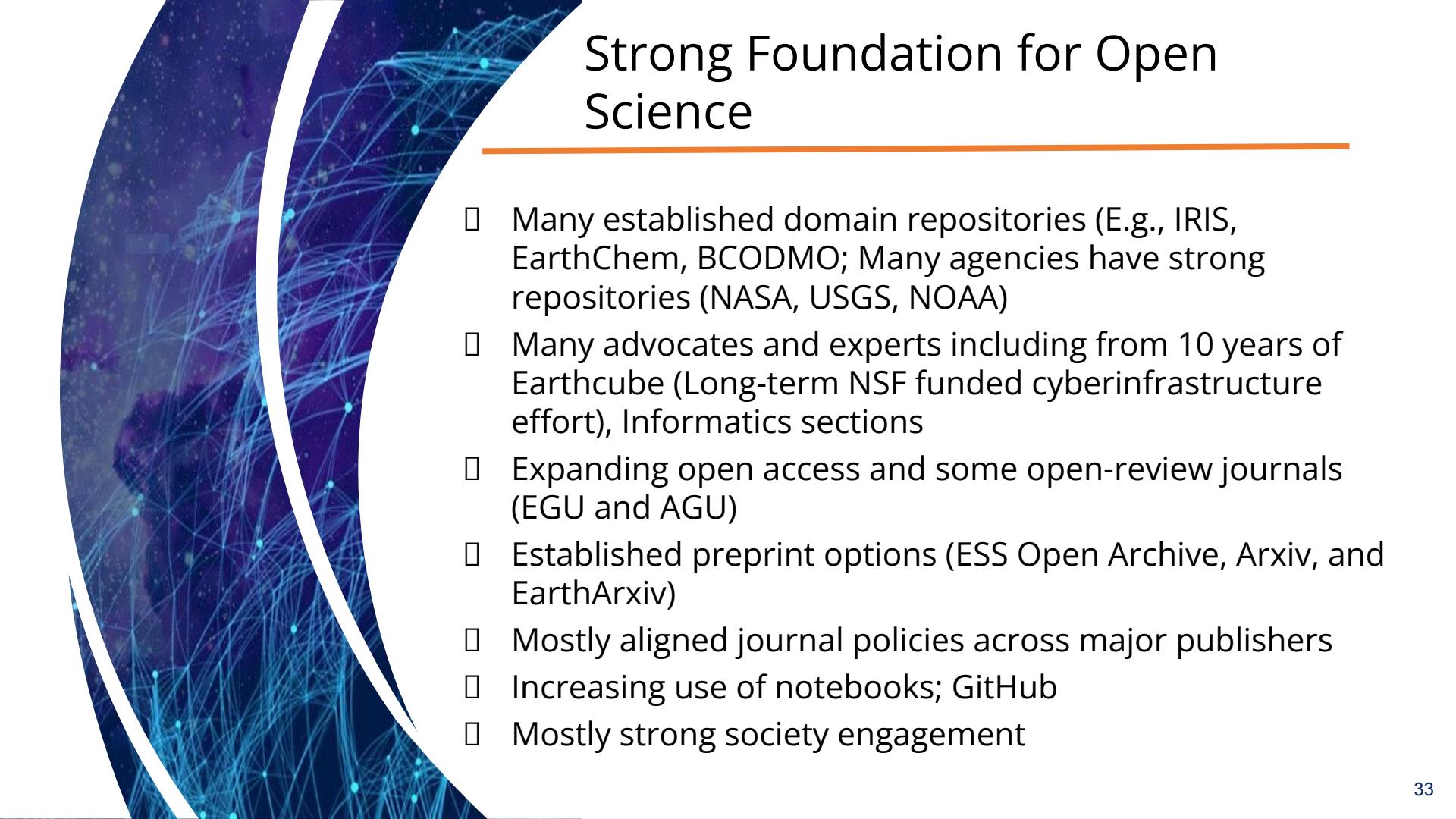


Outreach and AGU Fall Meeting



Culture Context for OpenCore MVP, Outreach, Next Steps

- Good foundation; incentives; early adopters
- Lots of partners (Societies, repositories, institutions...)
- For many researchers, still little basic understanding of Open Science practices
- Little perceived value for many researchers (vs perceived hassle)
- Other urban legends
- Complex landscape for researchers
- Institutional resistance in several key areas for societies, centers.
- Open science infrastructure not complete
- Reward/award system not aligned
- But a key moment of opportunity



Strong Foundation for Open Science

- Many established domain repositories (E.g., IRIS, EarthChem, BCODMO; Many agencies have strong repositories (NASA, USGS, NOAA))
- Many advocates and experts including from 10 years of Earthcube (Long-term NSF funded cyberinfrastructure effort), Informatics sections
- Expanding open access and some open-review journals (EGU and AGU)
- Established preprint options (ESS Open Archive, Arxiv, and EarthArxiv)
- Mostly aligned journal policies across major publishers
- Increasing use of notebooks; GitHub
- Mostly strong society engagement

Outreach and Engagement—Getting to 20k

- Via AGU and other Societies and Publishers
 - Focus on AGU and other authors, editors (~900), and reviewers
 - AGU alone engages about active 150k researchers in meetings and publications.
 - Society partners holding workshops
- Via repository users and communities (COPDESS, Council of Data Facilities, ESIP, Earthcube; AGU Informatics Section)
- Funders and agencies (NASA; NSF GEO and Cyber; USGS; NOAA)
- Student Focus--AGU sections, student conferences, and programs
- MSI and HBCU focus (via AGU); AGU DEI connections
- Heads and Chairs program at AGU (mostly US)
- Community groups via Thriving Earth Exchange and many partners

AGU Fall Meeting 2022

- Open Science Plenary (Friday)
 - Alex Szalay and Panel Discussion
 - Year of Open Science kick off
 - Open Science Theme for 2023 meeting
 - Announce Open Science Award
- 4-5 In-person Workshops (Ethos)
- NASA and AGU Booth
- Data Help Desk (AGU + ESIP)
- Many other Open Science sessions and events and promotions
- AGU Society Partnership discussions



Awards and Recognition

New Context for AGU Fellows Nominations (Effective 2022—this year)

Nominees are expected to have shown leadership in following and promulgating AGU values. This leadership may include but is not limited to ***fostering equity, integrity, diversity, and open science; mentoring; public engagement; and communication.***

Cultural Challenge:

Took 3 years to implement; in context and not requirements

But...Full AGU Honors Audit in Progress
(teams, solutions science....)



AGU-NASA TOPS Open Science Award

- 3 Awards—Open data, Open Software, Open Results + honorable mentions
- Recent innovation + \$25-30k prizes
- Team awards emphasized
- Pending approval by Council in December
 - Will apply for 2023 awards cycle



Assessment

Assessment

- Pretty good baseline on some OS practices
- Course uptake (ORCID)
 - Feedback
 - Assessment and activities
 - Follow up
- Preprints--usage
- Repository use (tied to grants, ORCID, publications) for data
 - still incomplete for software (Scholix and Event Data are fixed)
- Data help desk logs
- Longitudinal surveys



Coffee Break!



See you in 10 min!



Future Development

Future Development—Beyond MVP

- Much additional foundational material for more targeted Open Science cases and deeper training and awareness
 - Disciplinary focus or needs (life science, materials science, community science...)
 - Disciplinary guidance needed (Finding right repositories)
- All content will be open to allow further build-out and linking
- Learn, improve, assess, update
 - Active process for assessment of modules and improvement
 - Open review welcome
- Larger assessment—are practices improving?
 - Developing assessment plan. Some robust metrics are available (preprints, data and software citations, repository usage, openDMPs).
 - Longitudinal surveys on practices (AGU has cooperated on several)
- Integrate into other, broader efforts for culture change.
 - Integrate into other AGU programs on DEI, community science...



Key Risk: TOPS and OSTP will Break Data Infrastructure

ENABLING FAIR DATA PROJECT

[HOME](#) / ENABLING FAIR DATA PROJECT

Funded by the Laura and John Arnold Foundation

Commitment to Open Data

- Developed by 300 volunteers representing repositories, publishers, societies
- **Being implemented by most ESS publishers and major interdisciplinary journals (Springer/Nature, AMS, Science, Elsevier, PLOS, T&F, Wiley/Hindawi, Copernicus...)**

Adopted Common Practices

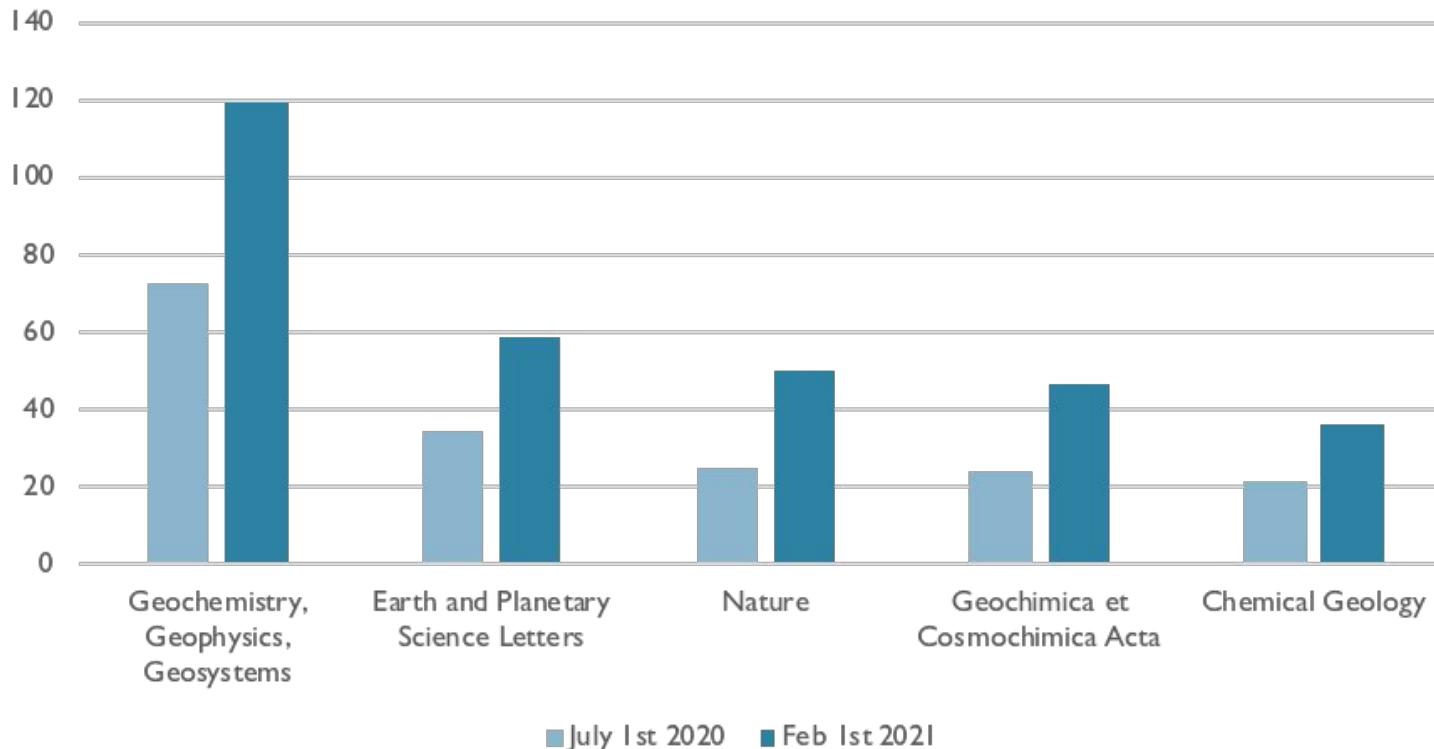
- Standard author guidelines and FAQ's
- Eliminate supplements for data
- Promote data in domain repositories (best curation)
- Covers data, software, samples

Culture Challenges:

Slow adoption by many
Had to fix broken data citation system

Related publications for ECL datasets - Top 5 journals

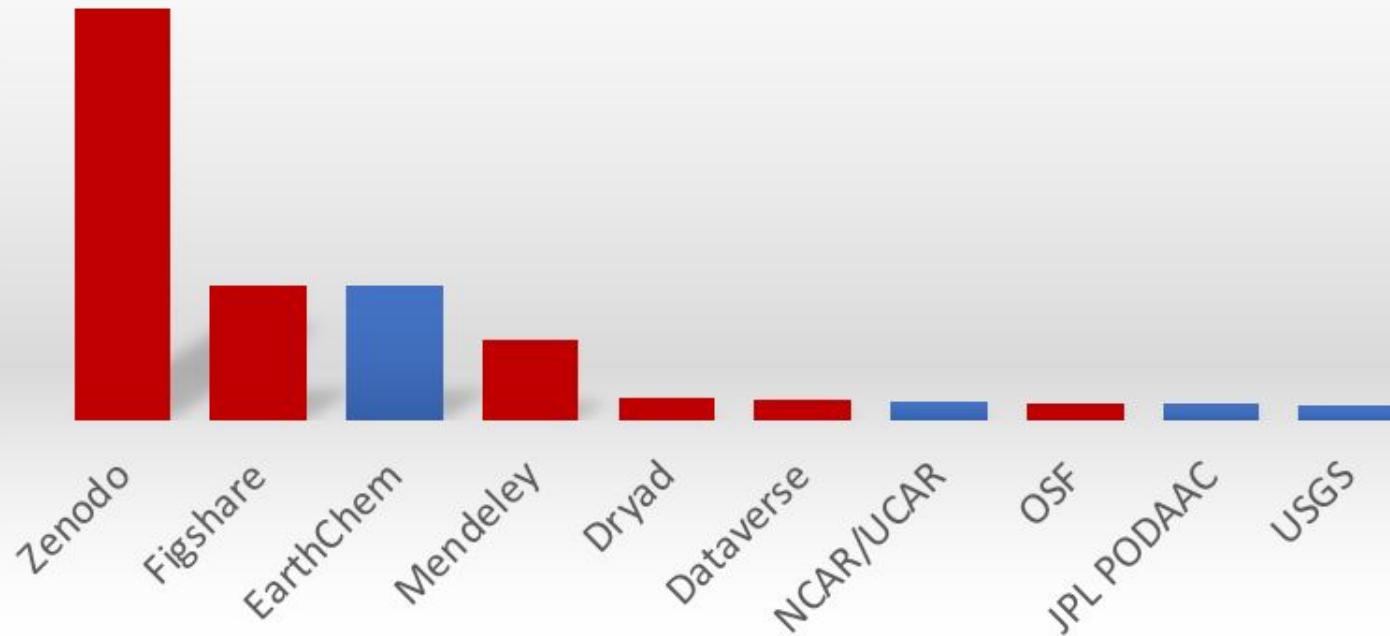
Growth in One Domain Repository
Since FAIR Data Project



Light blue is from inception (ca. 2005) thru 1 July 2020; Dark blue is after 1 July 2020

Top Ten AGU Repositories in 2021

General Repositories



Key Risk 1:

Data Infrastructure will break

Domain repositories need sustained support

Open communities need sustained support



Open Discussion

Feedback on the open science curriculum



Image Credit: Noun Project, [Hans Gerhard Meier](#)



Day 2 Wrap-Up

Chelle Gentemann

Transform to Open Science
Science Lead



Lunch Time!



**See you at 1:15 PM for our
Tour of JPL**

Image Credit: Noun
Project, [Anna Witt](#)