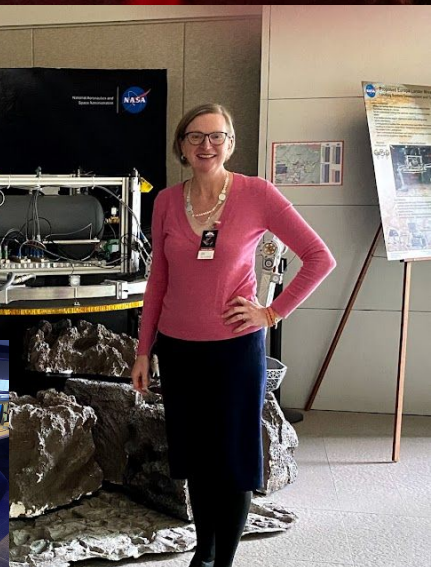

GET INVOLVED IN OPEN SCIENCE
BE A SPARK FOR CHANGE

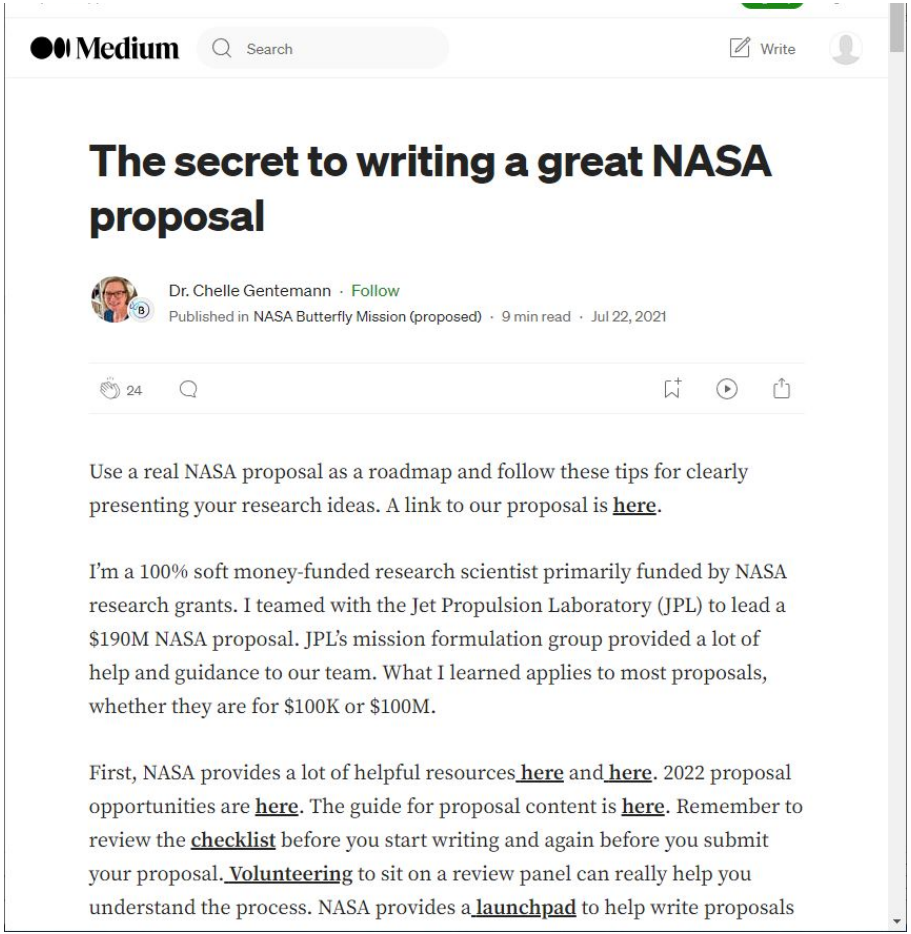
NORF 11/02/2023

Chelle Gentemann
Open Science Program Officer, NASA

Opening Science

Who am I? Dr. Chelle Gentemann
Why am I here talking to you?
More: @ChelleGentemann





"How does access to successful proposals affect who gets funding?

Does this resource give an advantage to certain institutions/groups?

How does that knowledge narrow who participates in science?"

-https://medium.com/nasa-butterfly/how-to-write-a-great-nasa-proposal-2c6010faf7ab

Who participates?

Heart valves and seat belts are made that only fit men's bodies (significantly increasing mortality rates for women)

Voice-recognition software only recognizes the voices of men

Twitter/Zoom AI racial image cropping algorithm biases

Murphy, M. C., Mejia, A. F., Mejia, J., Yan, X., Cheryan, S., Dasgupta, N., et al. (2020). Open science, communal culture, and women's participation in the movement to improve science. Proceedings of the National Academy of Sciences, 117(39), 24154–24164. https://doi.org/10.1073/pnas.1921320117

Closed Software

- Redundant effort
- Error prone
- Anti-competitive
- Ownership
- Reinforces institutional advantages


If you want to go fast, go alone,
if you want to go far, go together

"No Silver Bullet"

There is no single development, in either technology or management technique, which by itself promises even one order-of-magnitude improvement within a decade in productivity, in reliability, in simplicity.

- Frederick P. Brooks, Jr
Turing Award

Technology + Open Science is increasing our ability to build better&faster together

Go faster,
Go farther,
Together

Leaked Google Memo

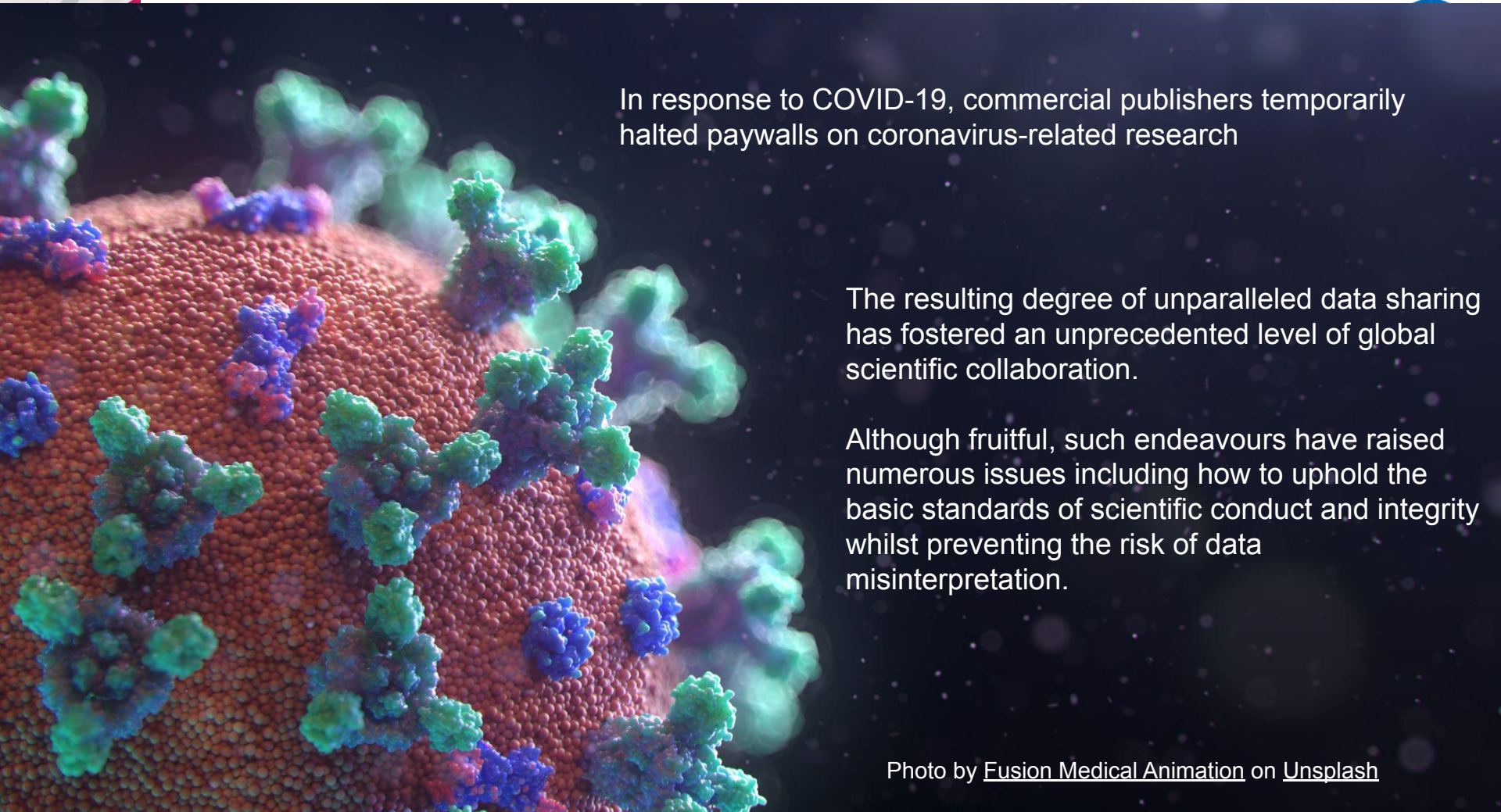
We Have No Moat…..And neither does OpenAI
We've done a lot of looking over our shoulders at OpenAI. Who will cross the next milestone? What will the next move be?

But the uncomfortable truth is, we aren't positioned to win this arms race and neither is OpenAI. While we've been squabbling, ***a third faction has been quietly eating our lunch.***

I'm talking, of course, about open source. Plainly put, they are lapping us. Things we consider "major open problems" are solved and in people's hands today. Just to name a few:

- LLMs on a Phone: People are running foundation models on a Pixel 6 at 5 tokens / sec.
- Scalable Personal AI: You can finetune a personalized AI on your laptop in an evening.
- Responsible Release: This one isn't "solved" so much as "obviated". There are entire websites full of art models with no restrictions whatsoever, and text is not far behind.
- Multimodality: The current multimodal ScienceQA SOTA was trained in an hour.

While our models still hold a slight edge in terms of quality, the gap is closing astonishingly quickly. **Open-source models are faster, more customizable, more private, and pound-for-pound more capable.** They are doing things with $100 and 13B params that we struggle with at $10M and 540B. And they are doing so in weeks, not months. This has profound implications for us.

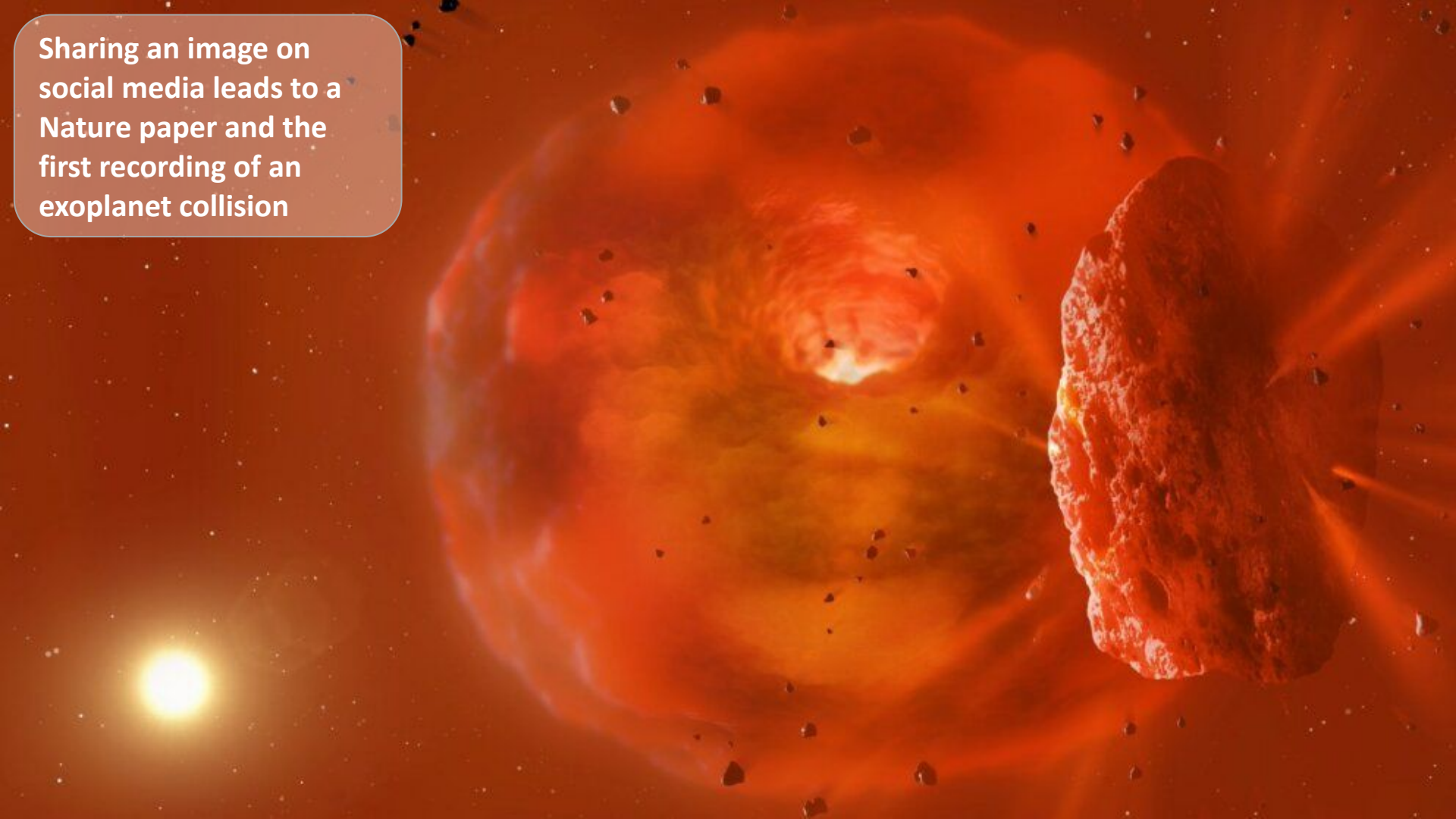


In response to COVID-19, commercial publishers temporarily halted paywalls on coronavirus-related research

The resulting degree of unparalleled data sharing has fostered an unprecedented level of global scientific collaboration.

Although fruitful, such endeavours have raised numerous issues including how to uphold the basic standards of scientific conduct and integrity whilst preventing the risk of data misinterpretation.

Photo by Fusion Medical Animation on Unsplash


Sharing an image on social media leads to a Nature paper and the first recording of an exoplanet collision

NASA is supporting scientists to integrate open science principles into the entire research workflow

NASA's Open-Source Science Initiative

2023 is NASA's Year of Open Science

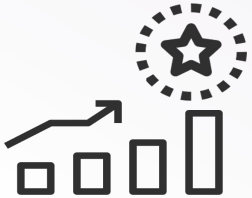
NASA has designated 2023 as the Year of Open Science. Throughout the year NASA will be energizing and uplifting open science across the scientific community through:

Visibility

Open Science everywhere: Articles, announcements, Twitter Spaces, conferences

Capacity Sharing Resources

Online, free, Open Science curriculum. Workshops, events, virtual cohorts, science team meetings, hackathons.



Incentives

NASA digital open science Badge.

High profile prizes and challenges

Moving towards open

Require open science for funding. Decisions consider open science activities. Partnerships.

The United States White House announces

2023: A Year of Open Science

A multi-agency 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**
- **Environmental Protection Agency**
- **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**

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.

-White House OSTP 2022

Complete NASA's Open Science 101!

A community-developed introduction to **core open science skills**

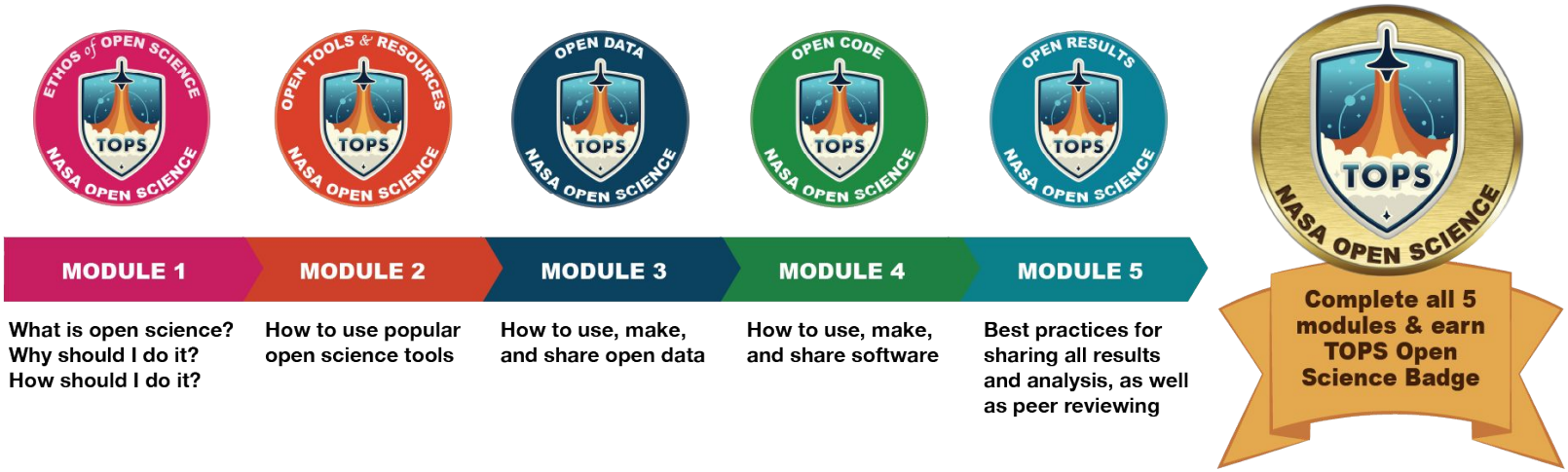
- Learn how to write a NASA open science and data management plan
- Increase the impact & visibility of your science
- Earn your digital NASA open science badge

Self-Paced Online Course

Online & In-person Workshops

Enroll now!

5 Modules Organized as a Scientific Workflow



The White House Office of Science and Technology Policy

Open Science Recognition Challenge

Spotlighting stories of open science innovation which benefit society, and the teams behind them which address a challenge and advance a solution, while embodying open science principles and practices.

LIVE Q&A Nov 8 at 3:30 pm ET: Register here

Team self-nominations due 11/22/23

https://www.challenge.gov/?challenge=ostp-year-of-open-science-recognition-challenge

LIVE Q&A

Challenge

NASA's new scientific information policy

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 without any embargo. Publishing as open access is supported.

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

Open science activities will be considered in reviews of proposals. Proposals require Open Science and Data Management Plan

What Will NASA Fund?

* Requires an existing NASA grant or facility.

NSPIRES
https://nspires.nasaprs.com/

- workshops, Conferences, trainings
  - TWSC-24: Topical Workshops, Symposia, and Conferences
- platforms that support scientific analysis and processing
  - F.16 Supplement for Scientific Software Platforms*
- support and maintain open source tools
  - F.7 Support for Open-Source Tools, Frameworks, and Libraries
- machine learning tools to advance science
  - F.19 Multidomain Reusable Artificial Intelligence Tools
- develop citizen science projects
  - F.9 Citizen Science Seed Funding Program
- develop new open-source tools, software, data formats, or libraries
  - F.15 High Priority Open-Source Science (HPOSS)
- Add an open science component to an existing award*
  - F.8 Supplements for Open-Source Science*
- your amazing idea
  - NASA Unsolicited Proposals

*including cloud credits

What are your ideas to advance openness?

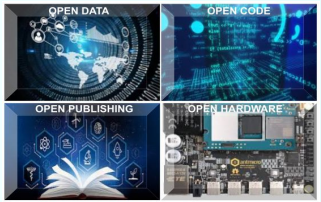
Most EFFORT → Least EFFORT

$$$

$

INTERNATIONAL YEAR OF OPEN SCIENCE

Open Science Stamps



Hall of Fame

Short stories

Enabling Participation

Listening Sessions

Walking the walk

Automatic Pre-registration

Open Conferences

Pay to Play

What are we missing?

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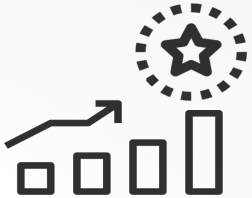

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to change everything, we need everyone

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

Communication strategies:

- We are asking people to change.
- The term ‘open science’: Oh, I already do that (& usually they are right, but maybe only partially) Snore
- Don’t tell me how to do my work

Incentives

- Immediate rewards are often larger for closed-science. Open is an investment.
- How do you quickly evaluate open science contributions? (Metrics
- How do we incentivize alternatives to for-profit peer reviewed articles?
- How are non-peer reviewed research outputs evaluated/reviewed/measured?

Infrastructure is not where it needs to be at, all the problems aren’t solved....

- (why isn’t there just a ‘get doi’ button in github)
- What other things could be easier?
- Where does data >50GB <agency archive go?
- Connection between data / executable notebooks / permissions / not robust

to change everything, we need everyone

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

Scientific Training / Library Services
- Age of Curation
- Responsible AI
- Support scientific use of AI tools (lit review/outlines/writing)
- Support proper use/citation of AI models

Scientific Training / Library Services
- NASA Open Science 101 Badge - NORF branch?

“Somewhere,
something incredible
is waiting to be known.”
-Carl Sagan

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