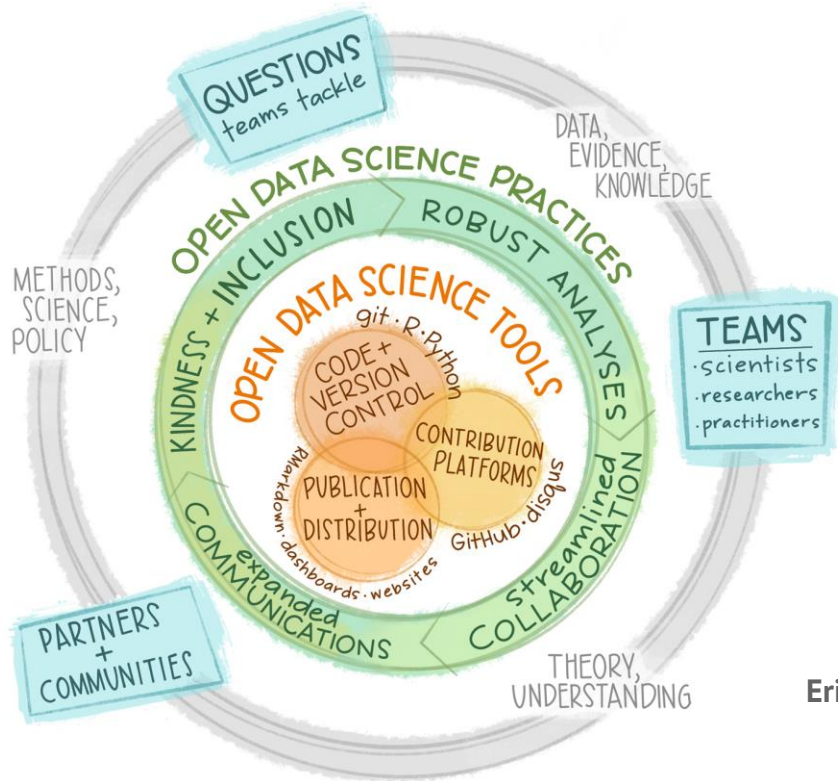


Introduction to NASA Openscapes



We believe open science can accelerate data-driven solutions and increase diversity, equity, inclusion, and belonging in research and beyond.

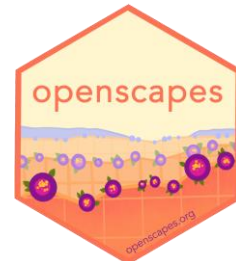
Today's Purpose: to share movement building with NASA Openscapes and discuss impacts

**Erin Robinson & Julia Lowndes, NASA Openscapes Co-Leads
And NASA Openscapes Mentors**

GHRC User Working Group,

Artwork by [Allison Horst](#)

Slides: <https://nasa-openscapes.github.io>



NASA Openscapes Framework Design



Supporting NASA Earth science research teams' migration to the cloud

The overarching vision is to support scientific researcher teams using NASA EOSDIS data as they migrate their workflows to the cloud. We are doing this working with NASA Distributed Active Archive Centers (DAACs) over three years by:

- 1. Develop a cross-DAAC Mentor community** of collaborative cloud data instructors, that co-create, curate, and use shared resources (“make once, use often”)
- 2. Empower science teams through workshops, hackathons and the Champions program** to migrate their download- intensive data analysis workflows to the cloud and open, kinder science
- 3. Scale the Openscapes Champions program with DAAC Mentors** to support more teams transforming their workflows towards open, kinder science and the cloud

NASA Openscapes Mentors



Develop Cross-DAAC Community

Andy Barrett • Chris Battisto • Brandon Bottomley • Aaron Friesz • Alexis Hunzinger • Danny Kaufman • Mahsa Jami • Alex Lewandowski • Bri Lind • Luis Lopez • Catalina Oaida Tagliatalata • Celia Ou • Jack McNelis • Cassie Nickles • Brianna Pagán • Sargent Shriver • Geoffrey Stano • Amy Steiker • Michele Thornton • Makhan Virdi • Jess Welch



Support researchers as they migrate analytical workflows to the Cloud:

- Co-creating common tutorials; review & reuse process
- Community of practice for teaching, mentoring, facilitation
- Scaling open science leaders

Slow down to speed up: deep investment in small numbers 1st. Combine practices from many places - open source software dev, community, facilitation (incl. rOpenSci, Turing Way, Carpentries, Mozilla, ESIP)



2021 Cloud Hackathon - teaching researchers early on



<https://nasa-openscapes.github.io/2021-Cloud-Hackathon/>

Preparation:

9 co-created tutorials for data access
User-friendly book with Quarto
Notebook review, teaching dry runs
Shared facilitation & teaching practices

The event:

65 2i2c JupyterHub AWS instances
50 forks of the GitHub repo
8 hack-team projects presented on Day 5

"It was a really great week. The tutorials were AMAZING. Everyone did a great job, and everyone was very nice. I really appreciated welcoming environment. I don't have a strong python background. But i was supported in learning all around"

Blog summaries:

earthdata.nasa.gov/learn/articles/2021-cloud-hackathon

podaac.inl.nasa.gov/announcements/2021-12-15-The-2021-Cloud-Hackathon

2021 Cloud Hackathon
Transitioning Earthdata Workflows to the Cloud

This Hackathon is co-hosted by PODAAC, NSIDC DAAC, and LPDAAC. Additional support is provided by ASDC, GESDISC and Openscapes.

Welcome

Welcome to **Cloud Hackathon: Transitioning Earthdata Workflows to the Cloud**, co-hosted by the NASA EOSDIS Physical Oceanography Distributed Active Archive Center ([PO.DAAC](#)), National Snow and Ice Data Center DAAC ([NSIDC DAAC](#)), Land Processes Distributed Active Archive Center ([LP.DAAC](#)), with support provided by [ASDC DAAC](#), [GES DISC](#) and [NASA Openscapes](#).

The Cloud Hackathon will take place **virtually** from **November 15-19, 2021**. The event is free to attend, but an application is required. The application period (September 21 - October 12, 2021) is now closed. Those who applied will be informed of the outcome on or around October 20th, 2021.

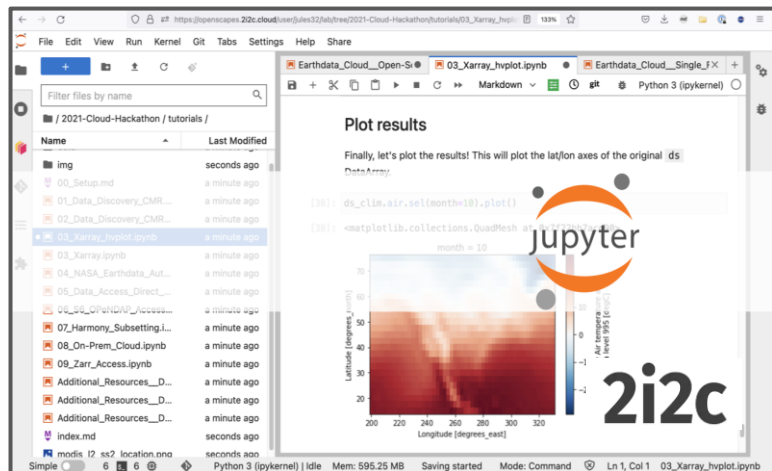
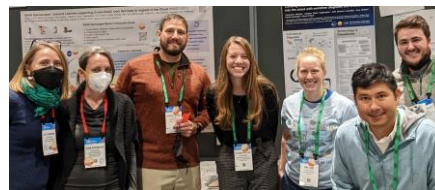
About

The **Cloud Hackathon: Transitioning Earthdata Workflows to the Cloud** is a virtual 5-day (4 hours per day) collaborative open science learning experience aimed at exploring, creating, and promoting effective cloud-based science and applications workflows using NASA Earthdata Cloud data, tools, and services (among others), in support of Earth science data processing and analysis in the era of big data. Its goals are to:

On Day 1, Mentors stepping in to teach due to an emergency: trust + teamwork + familiarity with the material

Identifying & responding to user needs

15+ workshops & talks led by Mentors since: reusing & extending tutorials with software & conceptual solutions



2i2c JupyterHub: Python, R, Matlab, corn base image: built on Pangeo stack

earthaccess
Python library



Cheatsheets
& guides



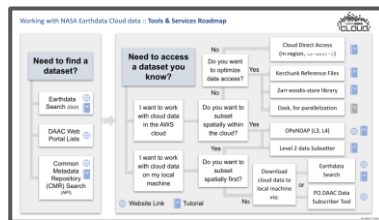
Cookbook: current tutorials & onboarding

Value of Hosted JupyterHubs
White paper / RFI

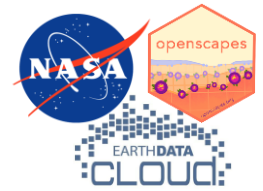
The Value of Hosted JupyterHubs in enabling Open NASA Earth Science in the Cloud

Response to Aspect 1, the question on user needs and use cases for scientific data and computing in support of Open Science at SMD

Relevant NASA SMD scientific Division: Earth Science



NASA Openscapes Champions



NASA Openscapes Champions is a mentorship and professional development opportunity for research teams using data from NASA Distributed Active Archive Centers (DAACs) and interested in open science and migrating their analytical workflows to the cloud.

To date we have supported 17 teams migrate their workflows to the cloud.

Benefits to the Champions:

- Access to the 2i2c Hub for 1-year
- More direct support from the DAACs
- Pathway toward cloud migration

Benefits to NASA DAACs

- Clear identification of user needs
- Success stories to showcase

Cohort Call Topics	Open science resources	Guest Teachers
1. Openscapes mindset, Better science in less time	mindset, better science in less time	Jinbo Wang, Caltech/JPL; Allan Just, Mount Sinai
2. Team culture and data strategies for future us	team culture, data strategies for cloud	Andy Barrett, NSIDC
3. Open communities and coding strategies for future us	open communities , coding strategies for cloud	Amy Steiker, Luis Lopez, NSIDC
4. NASA Earthdata Cloud Clinic, hands-on lesson from NASA Mentors	NASA Earthdata Cloud Clinic	Amy Steiker, NSIDC
5. Pathways share	Earthdata Cloud Cookbook	Cassie Nickles, PO.DAAC



<https://nasa-openscapes.github.io/2023-nasa-champions/>

**How we work:
Openscapes' Flywheel
for movement building**

Engage

A Future Us mindset

Create space and place

Welcome

openscapes
Flywheel

Invest in learning
and trust

Empower
Learning culture

Inspire

Work Openly

Amplify

Open leaders

Leverage common workflows,
skills, tools

openscapes.org

The Openscapes Flywheel:
A framework for managers to
facilitate and scale inclusive
Open science practices
[Robinson & Lowndes 2022 \(preprint\)](#)

NASA Openscapes: Supporting Open NASA Earth Science in the Cloud



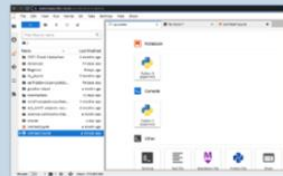
NASA Openscapes: Learning supporting Cross-DAAC User Services to migrate to the Cloud (IN22C-0321). Aaron Friesz, Alexis Hunzinger, Amy Steiker, Catalina Oaida Tagliatella, Luis López, Cassandra Nickles, Bri Lind, Mahsa Jami, Celia Ou, Julia Stewart Lowndes, Erin Robinson, NASA Openscapes DAAC Mentors.



NASA Openscapes Mentor Community

DAAC Staff

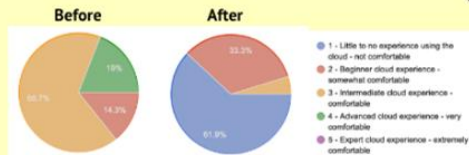
- Lay a foundation with **cloud terminology and concepts**
- Provide resources that are **easy to revisit**
- **Continued support** and education are critical
- Significant **learning curve and time investment** required for cloud adoption



Shared 2i2c cloud environment featuring JupyterHub

End-Users

- Improved **conceptual understanding** of why and when to use, or not use, the cloud
- Inconsistent data and service availability leads to **difficulties reusing** a given workflow
- Lack of common and robust resources
- Earthdata Cloud ecosystem is **complex and overwhelming**



Sentiments from cloud workshop

Open Science Community

- Recognizing **easy cloud access as a core service**
- Continuing to close the loop between the users we work with and our engineers to **build solutions together**



Cheatsheets are a one-stop shop for cloud data access vocabulary & roadmaps (see poster IN22C-0320 for all cheatsheets)

NASA Earthdata Cookbook is a central resource for common tutorials, use cases, and self-guided learning

earthaccess Python library is an open-source library to simplify Earthdata Cloud search and access



**Openscapes Flywheel:
Our hands-on role supporting
NASA Openscapes Mentors**

Engage

A Future Us mindset

Welcome

- **Community events, talks, & blogs** (ESIP [cross-gov takeaways 2022, 2023](#))

Inspire

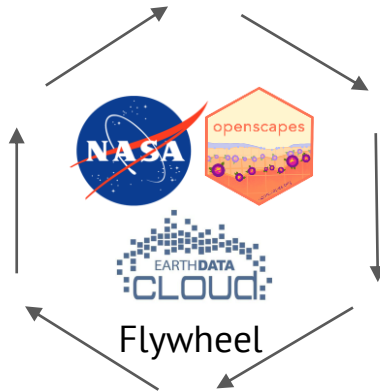
- **Internal workshops** (DAAC staff)
- **Career advancement**, bringing mindset to new places
- **Speaking up in other meetings** (TIM, TRAIN, Cloud Playground)

Amplify

Open leaders

Create space and place

- **11 DAACs participating** (Cohort Calls, Coworking, Hackdays)
- **2i2c, Quarto, Notebooks, GitHub**
- **Onboarding documentation** - [Flywheel pub](#), [Approach Guide](#)



Leverage common workflows, skills, tools

- **External workshops** (e.g. [Cloud Hackathon](#), [Champions](#) Unis, Science Teams, SWOT, EMIT)
- **Connecting & consulting based on experiences** (Pathfinder for 2i2c, compare w/ SMCE; AWS)
- **Engaging beyond** (Pangeo, Ladies of Landsat, rOpenSci, Posit, Carpentries, pyOpenSci)

Invest in learning and trust

- **“I made my first pull request”**
- **Co-create consistent tutorials**, teaching style, less reinventing
- **More awareness cross-DAAC**
- **Coworking** - eg someone brought a Q, Mentors from 4 DAACs discussed, tested in 2i2c 🌟🚀

Empower

Learning culture

Work Openly

- **Reuse**: tutorials, slides, art, facilitation & open practices
- [Earthdata Cloud Cookbook](#)
- [Cheatsheets](#)
- [earthaccess](#) library
- [corn](#) base image
- [Value of Hosted JupyterHubs \(White paper RFI\)](#)
- “Cheatsheets helped visualize all the steps, now we’re reducing the ‘time to science’ with earthaccess”

Communicating impact of movement building: NASA Openscapes

“Openscapes has created a collaborative environment for DAAC staff to collectively support open science initiatives for NASA Earthdata users. It enables us to work more openly with other DAACs toward our common goal of making the Earthdata ecosystem more accessible and inclusive. **We’ve developed awesome material to help Earthdata users** such as [workflow cheatsheets](#), a python package ([earthaccess](#)), and data recipes hosted in the cross-DAAC [NASA Earthdata Cloud Cookbook](#).

Perhaps just as important as what we’ve done however, are mindsets we’ve grown into along the way. It’s okay to share imperfect works in progress. The virtual environment can be conducive to laughter and connection. Ideas are not too big or too small to share. **We are better at dreaming and implementing the future together.**” –Cassandra Nickles (PO.DAAC)

Sustaining NASA Openscapes

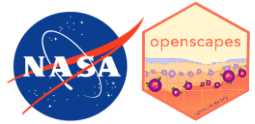
Moving Beyond the First Three Years



Our goal is to sustain NASA Openscapes across the DAACs. We are working with NASA HQ and DAACs over two years to:

- 1. Cultivate internal facilitation and leadership for the cross-DAAC Mentor community** The Mentors have already made this work part of their jobs. Continue to grow the mentor community. We appreciate the value of 3rd place.
- 2. Transition the 2i2c Infrastructure and the NASA-Openscapes GitHub organization to NASA** The mentors feel it's important to have the official NASA brand behind the material being developed. We have all realized the value of the 2i2c JupyterHub for learning to access data in the cloud. We are exploring solutions for continuing to support users.

Upcoming in 2024 - the Flywheel Keeps Turning



Champions Program - starts Spring 2024

Remote-by-design mentorship for environmental & Earth science research teams to explore open science. **For NASA Openscapes, research teams will also spend time experimenting & planning what analytical workflows with NASA Earthdata are like in the Cloud.** Complements workshops & hackweeks.

Our ask: personal invites to 2 DAAC UWG or Science Teams

Nominations by will open in January 2024; <https://nasa-openscapes.github.io/champions>

Mentors Community - Growing NASA Openscapes

Current Mentors aren't leaving, we're growing the community. Welcoming Mentors from new and existing DAACs! Please email if you are interested in getting involved (erin@metadatagamechangers.com)



Thank you!

More depth on everything at
nasa-openscapes.github.io:

Learn about our recent work: [Blog Posts](#)
• [Presentations](#) • [Annual Reports](#) • [Flywheel](#)
[Preprint](#) • [White Paper: The Value of](#)
[Hosted JupyterHubs](#)

