

Openscapes: Supporting better science for future us

We believe Open Science can accelerate interoperable, data-driven solutions and increase diversity, equity, inclusion, and belonging in research and beyond.

Today's purpose: share open science mindset and tooling to welcome you to the movement



Julia Stewart Lowndes PhD, Openscapes Director

In collaboration with Erin Robinson
and the Openscapes community

HPC webinar, January 11, 2023

Artwork by Allison Horst

Slides: openscapes.org/media | openscapes.org

Better Science

- more open, reproducible, efficient, interoperable, resilient
- more diverse, equitable, inclusive, kind

Future Us

- ourselves, teams, communities
- next hour, week, decades



Important mindset
for (environmental)
science

A real investment,
particularly for
data-intensive
research

Hi, I'm a marine ecologist and Openscapes founder

Julia Stewart Lowndes, PhD

Founding Director, Openscapes
Senior Fellow, National Center for Ecological Analysis & Synthesis,
University of California Santa Barbara
Mozilla Fellow • Better Scientific Software Fellow

Openscapes helps research teams transition to inclusive open data science workflows

We mentor teams to better tackle their questions by strengthening shared practices, underpinned by existing tools. [Supercharge your research](#) (Lowndes et al. 2019); [Open software means kinder science](#) (Lowndes 2019)

Motivation from our own data-intensive marine science

Our team found out the hard way that our default approaches for data analysis were not reproducible by even ourselves.

[Our path to better science in less time using open data science tools](#) (Lowndes et al. 2017)

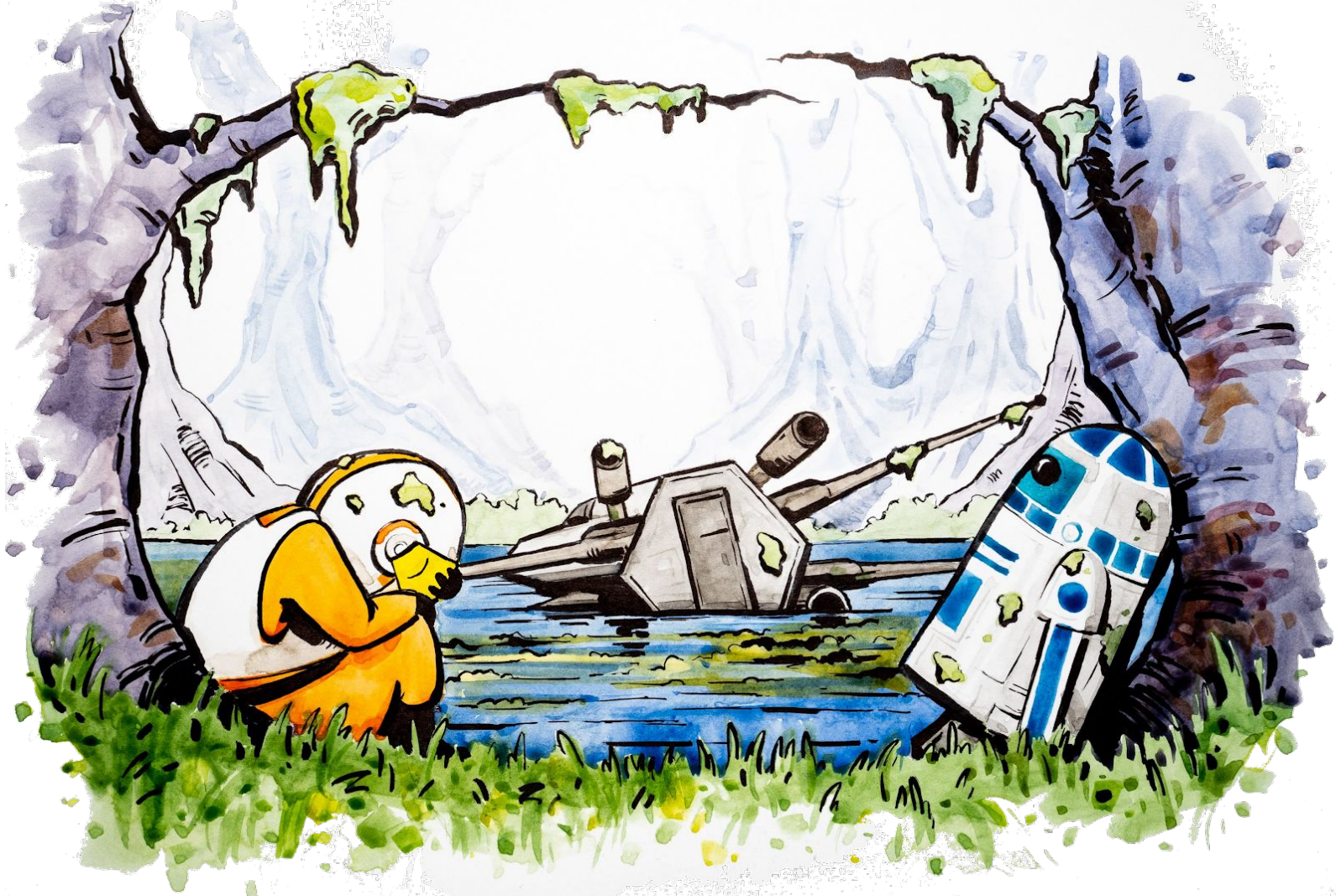
Open Science Community Member, entryway through R

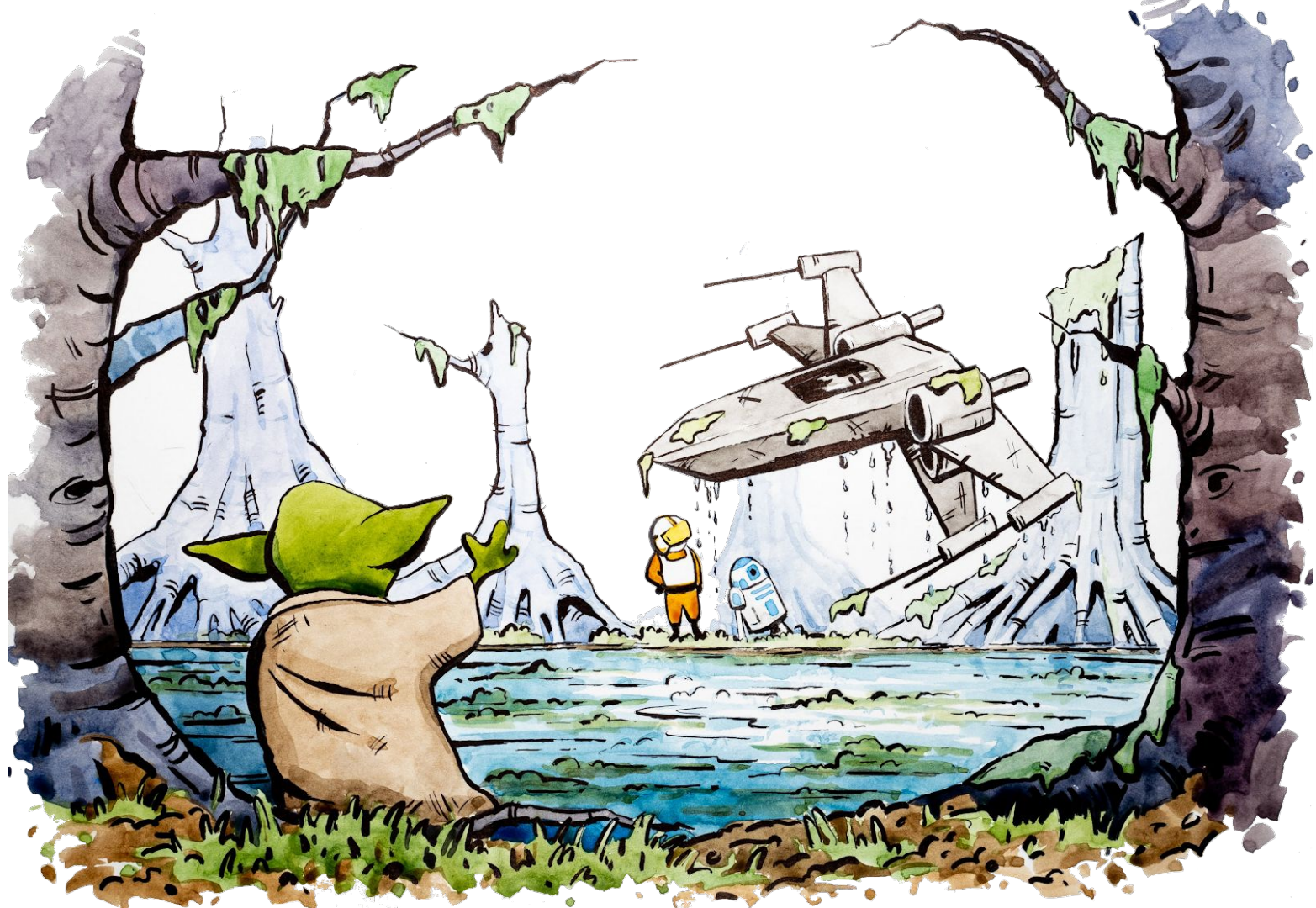
Inclusive peer-learning role-modeled across disciplines & career stages

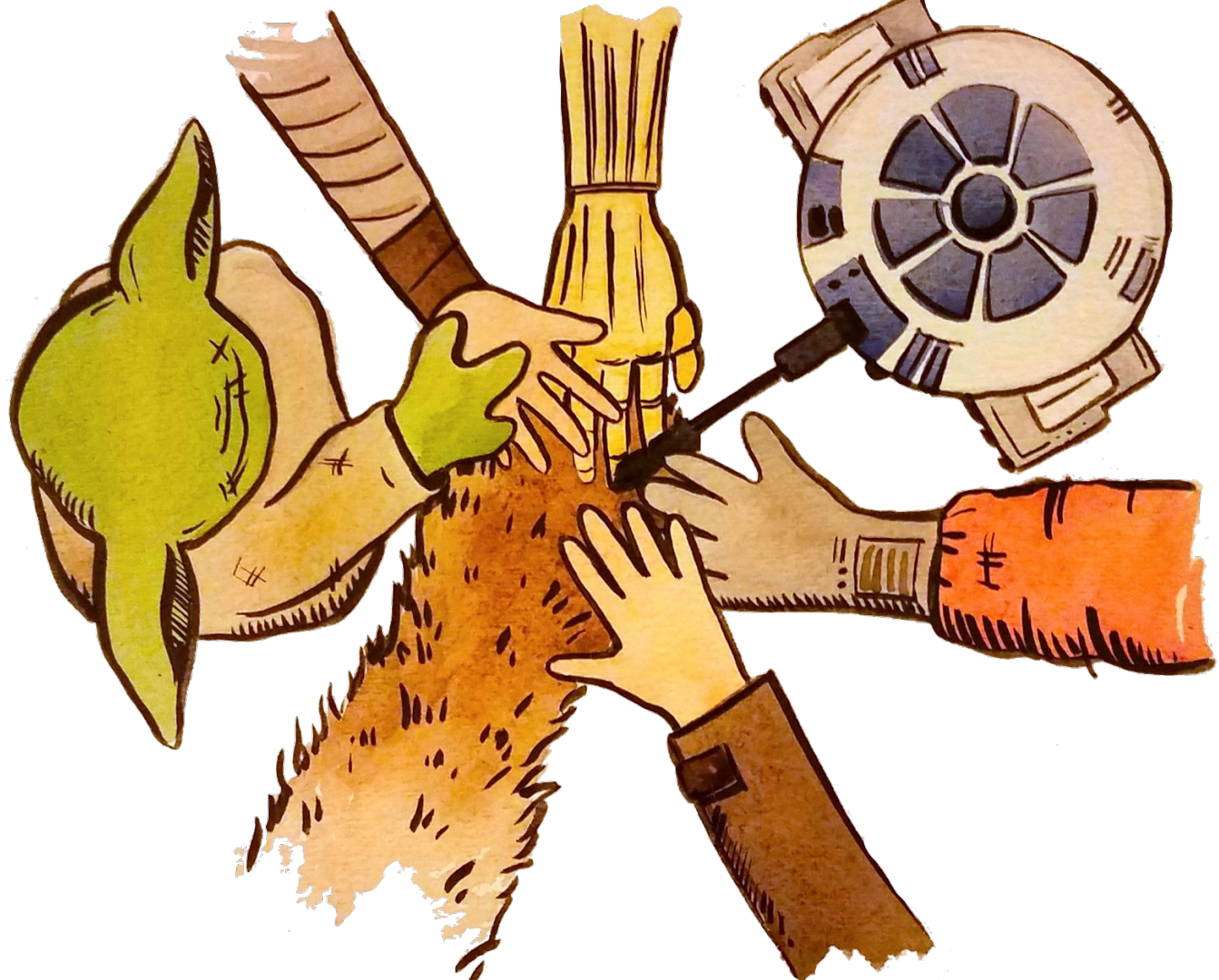
[R for Excel Users](#) (Lowndes & Horst 2020)



@juliesquid PhD research
Photo: Greg Auger, 2009









My story: building confidence as an open science contributor & leader

Ocean Health Index open edu resources

rOpenSci R package contributor

RStudio collaborator

Carpentries instructor

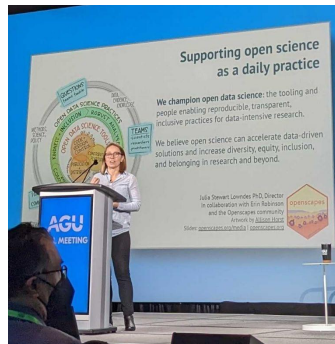
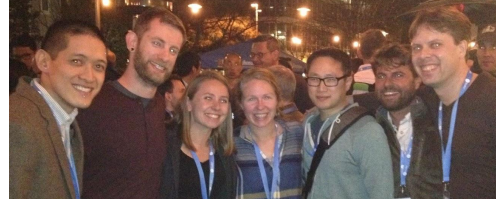
Eco-Data-Science co-founder

RLadies Santa Barbara co-founder

Open science community speaker

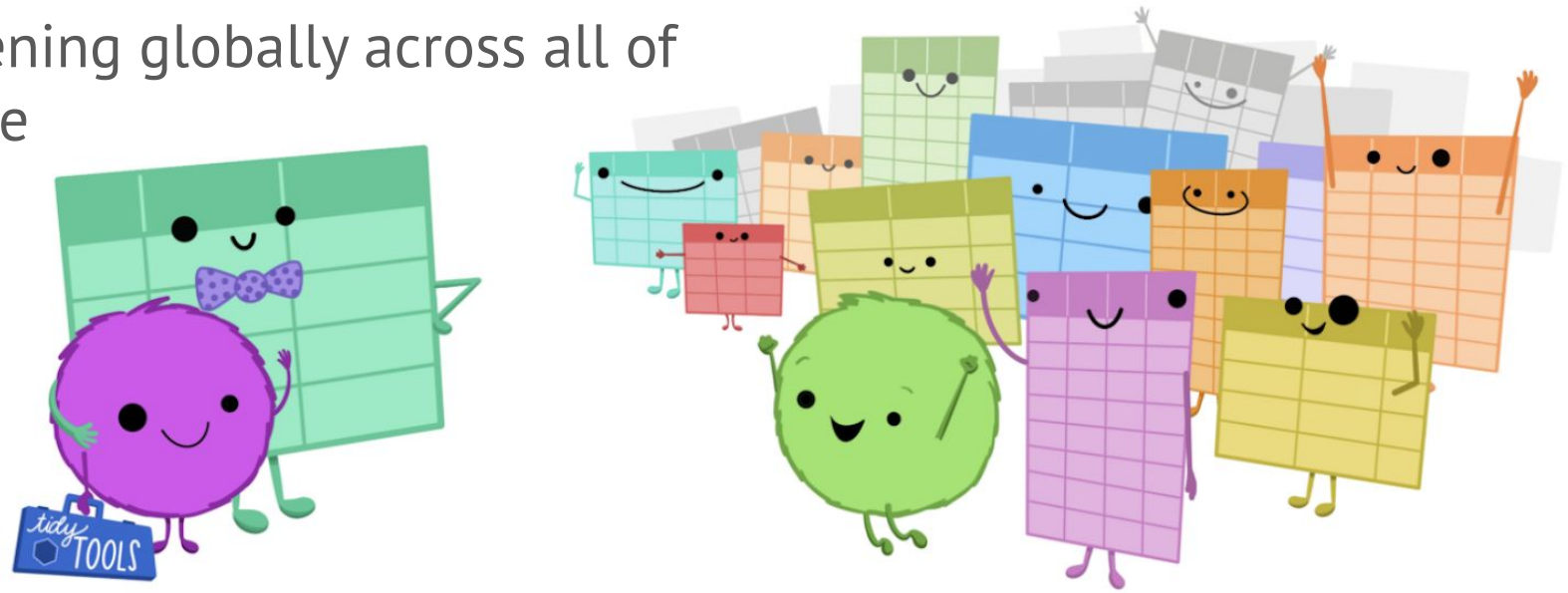
Mozilla fellow, Open Leaders

Openscapes founder, director, collaborator



Open science is a movement

Happening globally across all of science



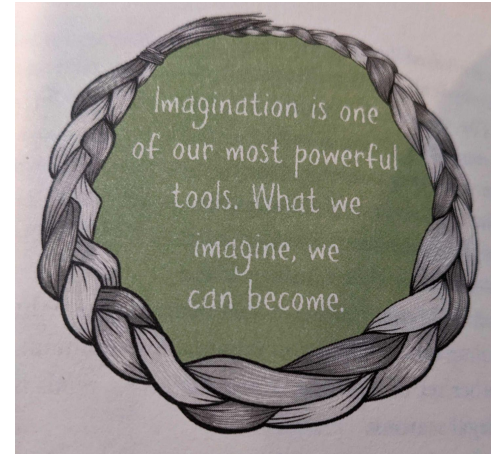
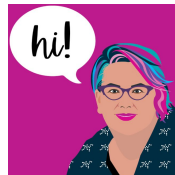
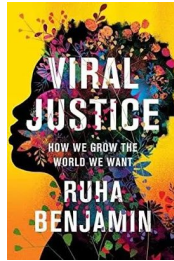
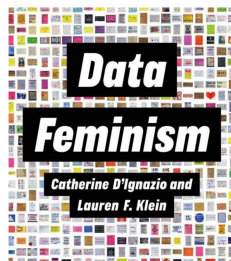
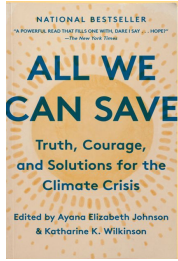
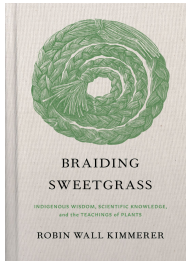
“Open science is not just about improving the way we share data and methods, it’s about improving the way we think, work, and interact with each other. It’s about technology enabling social infrastructure towards kinder science.”

[Open software means kinder science](#) (Lowndes 2019, *Scientific American*)

Aligns with & learning from many other movements

“To address our climate emergency, we must rapidly, radically reshape society. We need every solution and every solver.”

- Ayana Elizabeth Johnson & Katharine Wilkinson
All We Can Save



Robin Wall Kimmerer, Braiding Sweetgrass (young adults version)

Goals for today



1. Movement building: share Openscapes stories of open science for climate
2. Skill building: Quarto demo
3. Onward: how you can help your colleagues and join the movement

Why is this relevant to the Exascale community?

Computing skills critical for science & society; we're hampered by inequity. Let's change this.

- [Unmet needs for analyzing biological big data](#) - Barone et al. 2017
- [Barriers to integration of bioinformatics into undergrad life sci education](#) - Williams et al. 2019
- [“Technology can exacerbate inequities if the corresponding social infrastructure is not in place”](#)
- Benjamin 2022

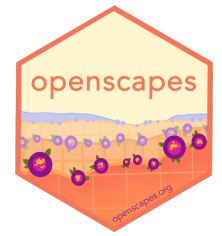
Openscapes helps researchers move from lonely science as they explore and navigate the open science landscape safely with their teams.

engage • empower • amplify



Openscapes mentorship programs

Transforming collaborative work places that affect climate change



16 Champions Cohorts since 2019

3+ Mentors Cohorts since 2021



Not limited to any skills, team, or activity

No coding or software skills required

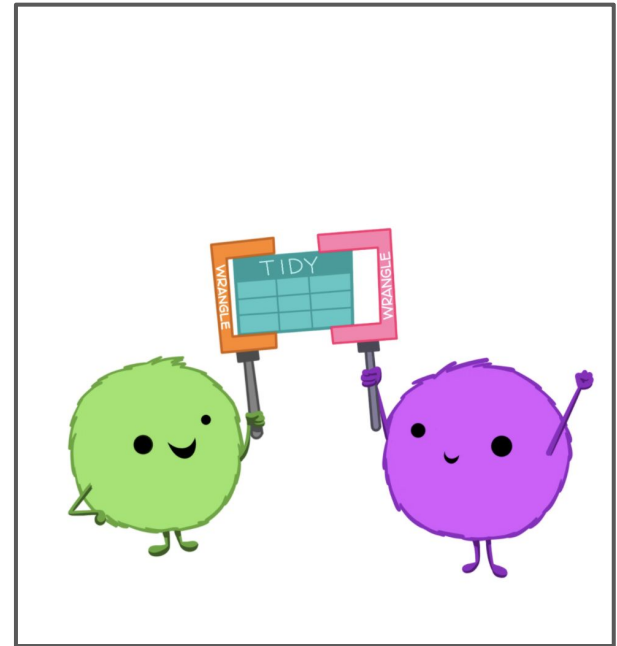
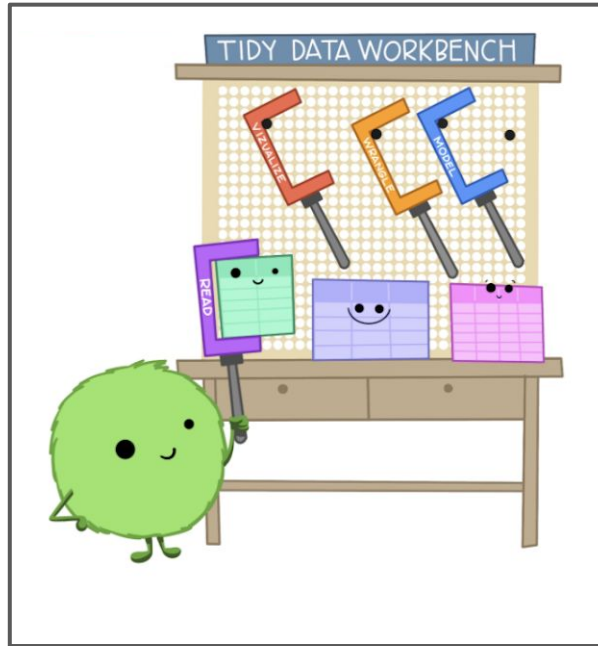
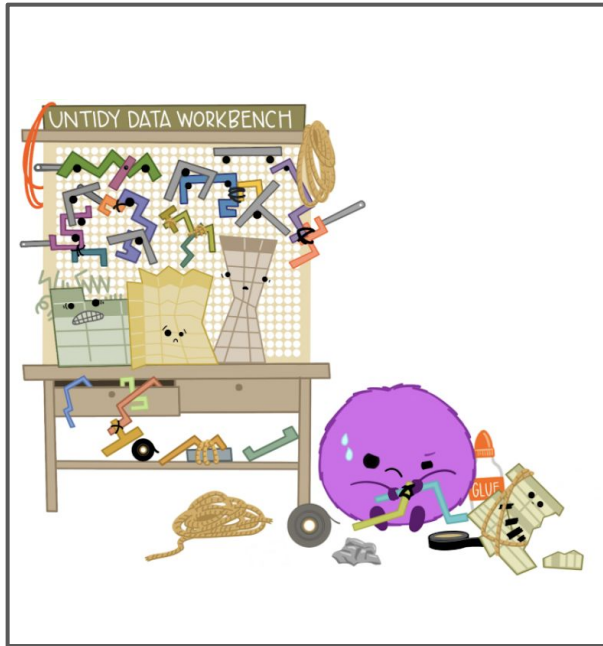
Not your traditional training/workshop

- Cohort-based remote sessions for teams: introduce concepts and workflows; facilitate teams to talk about problems then go and solve them, with accountability and support.
- It's about getting stuff done. It's about identifying and making progress on barriers
- "A process to help you build better lanes of communication" -Laura Waters, SE Regional Office

Sustainability and scalability built-in

- Strengthening a teaching & learning culture w/in teams & orgs. Not just for scientists: admin, IT staff, supervisors, etc, welcomed. Equitable.

Culture change = tech + human
Skills + mindset (in the same person!)
Continual learning & sharing



Openscapes values



- Open science is a process: it should inspire & empower
- "Future us" mindset
- Power of yet (growth mindset)
- Onboard learners as contributors
- Slow down to speed up
- Make the implicit explicit
- Reuse not reinvent
- Kindness (inclusion, creativity, art)

We'll discuss these through stories

stories cross all values • many more to share!

Inspired by Abby Cabunoc Mayes' talk [How to bring open source to a closed community](#) (Strangeloop 2016)



Openscapes values

- **Open science is a process: it should inspire & empower**
- "Future us" mindset
- Power of yet (growth mindset)
- Onboard learners as contributors
- Slow down to speed up
- Make the implicit explicit
- Reuse not reinvent
- Kindness (inclusion, creativity, art)





How it started

Disjointed work flow

- lost time
- lost data
- lots of frustration

Cohort Call Topics

1. Openscapes mindset, better science in less time
2. GitHub Clinic: publishing & project management
3. Team culture and data strategies for future us
4. Open communities and coding strategies for future us
5. Pathways share and next steps

Openscapes Champions Program 2021

Community and Instruction

- Learned skills to improve my workflow (e.g. Github)
- Built community around data and open science

BIMS WEEK SOCIAL EVENTS 6:30-7:30PM ET

11:00 DATA STRATEGIES FOR FUTURE US MIXER

Hosted by: Ileana Fenwick
Let's connect!
Twitter: @_ileanaf
Github: ileanaf

WELCOME! Let's talk data!
Check in using the link in the chat

Outline of Events

- Introductions
- Data Strategies for Future Us
- Data. The good, the bad and the ugly. Creating our community!
- Debrief

Thank you for joining us!

rstudio::conf(2022) TALK

A Journey to Data Science: Tools for Equity and Diversity in STEM

ILEANA FENWICK

July 25-28th | WASHINGTON, D. C.

Register at rstd.io/conf

How its going

Amplifying the Power of Open Science

- Leading my first Github clinic in 2 weeks
- 100+ Github contributions

Openscapes values

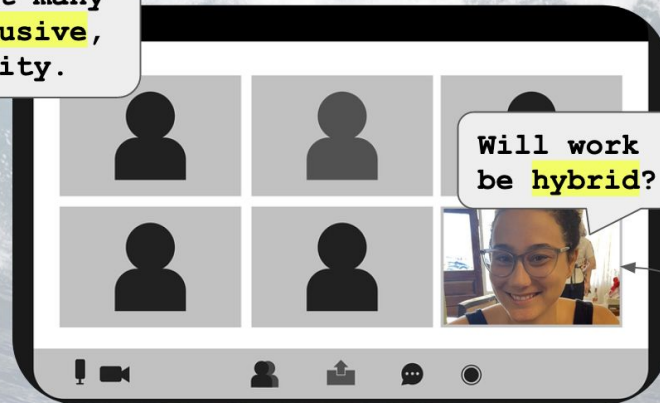
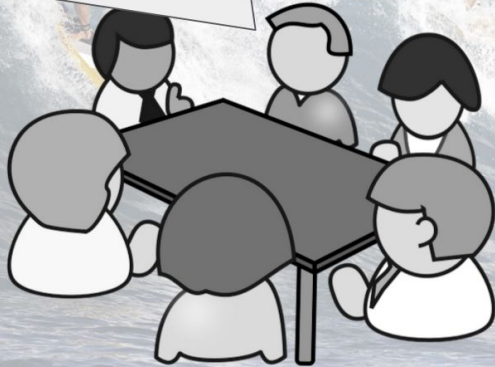
- Open science is a process: it should inspire & empower
- "Future us" mindset
- Power of yet (growth mindset)
- Onboard learners as contributors
- Slow down to speed up
- Make the implicit explicit
- Reuse not reinvent
- Kindness (inclusion, creativity, art)



Surf Sessions at SEFSC *Modeled after Openscapes “Seaside Chats”*

Goal: “Create digital and physical spaces where group members — despite having differing research questions and expertise — feel comfortable discussing data challenges and seeking, offering and accepting **guidance** from one another.”

We can offer and accept guidance about many tools and skills that promote an **inclusive**, **productive**, and **enjoyable** work community.



Openscapes values

- Open science is a process: it should inspire & empower
- "Future us" mindset
- **Power of yet (growth mindset) - Carol Dweck**
- Onboard learners as contributors
- Slow down to speed up
- Make the implicit explicit
- Reuse not reinvent
- Kindness (inclusion, creativity, art)



Maps & figures from R

Automation, reproducibility, shareability
 “Before, everyone making their own maps”

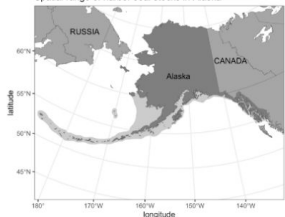
Reports as html/.docx/.pdf/etc with Quarto

Code+text+outputs together
 Collaborate across responsibilities & skills

```
39-'' {r}
40 # dist-map, echo = FALSE, dpi=300, fig.height=5, fig.width=6.5,
41 # fig.cap = "Approximate extent of harbor seals in Alaska waters (shaded
42 # coastline area)."
43
44 pv_stocks <- sf::read_sf(here("spatial_data", "harbor-seal-stocks.gpkg")) %>%
45 sf::st_transform(3338)
46 alaska_base <- rnaturalearth::ne_states("United States of America", return = "sf") %>%
47 dplyr::filter(name == "Alaska") %>%
48 sf::st_transform(3338)
49 russia_base <- rnaturalearth::ne_states("Russia", return = "sf") %>%
50 sf::st_transform(3338)
51 canada_base <- rnaturalearth::ne_states("Canada", return = "sf") %>%
52 sf::st_transform(3338)
53
54 ggplot() +
55   geom_sf(data = pv_stocks, fill = "gray80", size=0) +
56   geom_sf(data = alaska_base, fill = "gray50", size=0.1) +
57   geom_sf_text(data = alaska_base, aes(label = name)) +
58   geom_sf(data = russia_base, fill = "gray65", size=0.1) +
59   geom_sf_text(data = russia_base %>% filter(gn_id == 2120899), aes(label = toupper(admin))) +
60   geom_sf(data = canada_base, fill = "gray65", size=0.1) +
61   geom_sf_text(data = canada_base %>% filter(gn_id == 6185811), aes(label = toupper(admin))) +
62   geom_text_repel(data = pv_stocks, aes(label = stockname, geometry = geom,
63     stat = "sf_coordinates",
64     size=2)) +
65   coord_sf(xlim = c(-2.25e+06, 1.75e+06), ylim = c(-0.5e+06, 2.6e+06),
66     expand = FALSE) +
67   scale_x_continuous(breaks = c(180, -170, -160, -150, -140)) +
68   labs(x = "longitude", y = "latitude") +
69   ggtitle("Spatial range of harbor seal stocks in Alaska") +
70   theme_bw()
71
72-''
```



Spatial range of harbor seal stocks in Alaska



STELLER SEA LION (*Eumetopias jubatus*) Western U.S. Stock

PUBLISHED
 December 30, 2020

STOCK DEFINITION AND GEOGRAPHIC RANGE

Steller sea lions range along the North Pacific Rim from northern Japan to California (Loughlin, Rugh, and Fouts 1984) (Fig. 1). Outside of the breeding season (late May to July), large numbers of individuals, especially juveniles and males, disperse widely, probably to access seasonally important prey resources (Jemison et al. 2018). This results in marked seasonal patterns of abundance in some parts of the range and potential for intermingling of animals that were born in different regions (Scaze and York 2003; Baker et al. 2005; Jemison et al. 2013, 2018; Hastings et al. 2019). During the breeding season, sea lions, especially adult females, typically return to their natal rookery or a nearby breeding rookery to breed and pup (Raum-Suryan et al. 2002; Hastings et al. 2017).

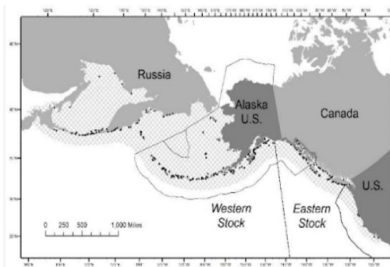


Figure 1. Generalized distribution (crosshatched area) of Steller sea lions in the North Pacific and major U.S. haulouts and rookeries (50 CFR 226.202, 27 August 1993), as well as active Asian and Canadian (British Columbia) haulouts and rookeries (points: Burkanov and Loughlin 2005, Olesiak 2008). A black dashed line (144°W) indicates the stock boundary (Loughlin 1997) and a black line delineates the U.S. Exclusive Economic Zone.



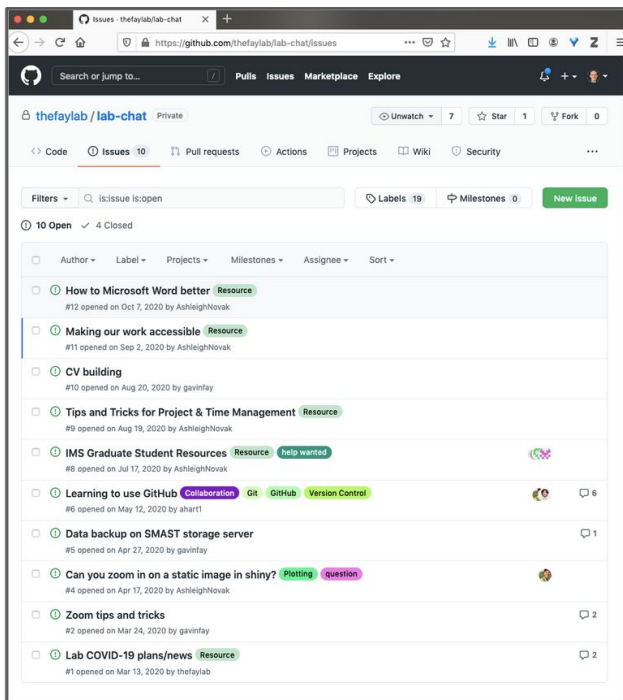
Google Docs

Openscapes values

- Open science is a process: it's a daily mindset & practice
- "Future us" mindset
- Power of yet (growth mindset)
- Onboard learners as contributors
- Slow down to speed up
- Make the implicit explicit
- Reuse not reinvent
- Kindness (inclusion, creativity, art)



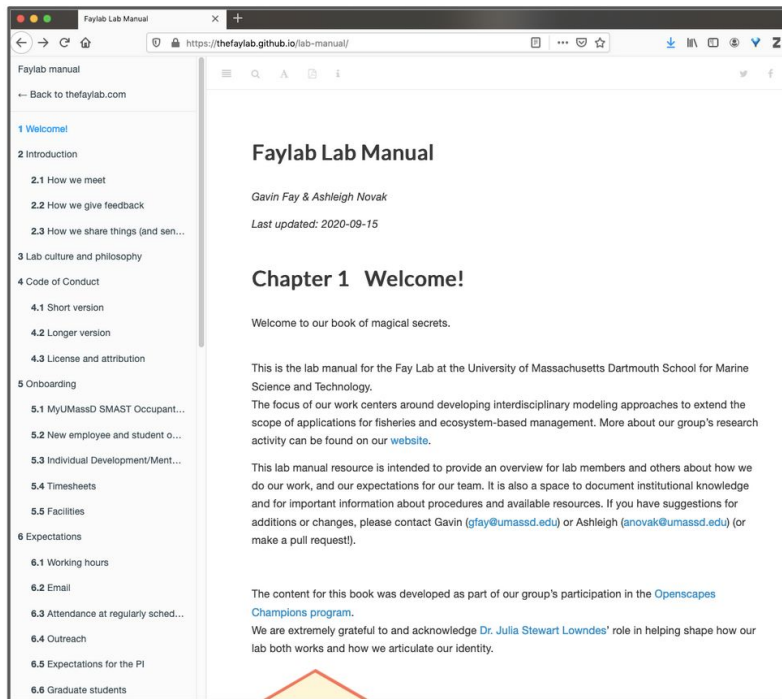
Lab chat searchable repository for tips/tricks & group knowledge



The screenshot shows the GitHub Issues page for the repository 'thefaylab/lab-chat'. The page is filtered to show 10 open issues. The issues listed are:

- How to Microsoft Word better (Resource) #12 opened on Oct 7, 2020 by AshleighNovak
- Making our work accessible (Resource) #11 opened on Sep 2, 2020 by AshleighNovak
- CV building #10 opened on Aug 20, 2020 by gavinfay
- Tips and Tricks for Project & Time Management (Resource) #9 opened on Aug 19, 2020 by AshleighNovak
- IMS Graduate Student Resources (Resource) (help wanted) #8 opened on Jul 17, 2020 by AshleighNovak
- Learning to use GitHub (Collaboration) (Git) (GitHub) (Version Control) #6 opened on May 12, 2020 by ahart1
- Data backup on SMASST storage server #5 opened on Apr 27, 2020 by gavinfay
- Can you zoom in on a static image in shiny? (Plotting) (question) #4 opened on Apr 17, 2020 by AshleighNovak
- Zoom tips and tricks #2 opened on Mar 24, 2020 by gavinfay
- Lab COVID-19 plans/news (Resource) #1 opened on Mar 13, 2020 by thefaylab

Lab manual (made in R!) sharing our lab culture, code of conduct, & shared expectations for how we work together



The screenshot shows the 'Faylab Lab Manual' website. The page has a table of contents on the left and the main content on the right. The table of contents includes:

- 1 Welcome!
- 2 Introduction
 - 2.1 How we meet
 - 2.2 How we give feedback
 - 2.3 How we share things (and sen...
- 3 Lab culture and philosophy
- 4 Code of Conduct
 - 4.1 Short version
 - 4.2 Longer version
 - 4.3 License and attribution
- 5 Onboarding
 - 5.1 MyUMassd SMASST Occupant...
 - 5.2 New employee and student o...
 - 5.3 Individual Development/Ment...
 - 5.4 Timesheets
 - 5.5 Facilities
- 6 Expectations
 - 6.1 Working hours
 - 6.2 Email
 - 6.3 Attendance at regularly sched...
 - 6.4 Outreach
 - 6.5 Expectations for the PI
 - 6.6 Graduate students

The main content area shows the start of Chapter 1, 'Welcome!'. It includes the authors' names, 'Gavin Fay & Ashleigh Novak', and the last updated date, '2020-09-15'. The text begins with 'Welcome to our book of magical secrets.' and 'This is the lab manual for the Fay Lab at the University of Massachusetts Dartmouth School for Marine Science and Technology. The focus of our work centers around developing interdisciplinary modeling approaches to extend the scope of applications for fisheries and ecosystem-based management. More about our group's research activity can be found on our website.'

Openscapes values

- Open science is a process: it's a daily mindset & practice
- "Future us" mindset
- Power of yet (growth mindset)
- Onboard learners as contributors
- **Slow down to speed up**
- Make the implicit explicit
- Reuse not reinvent
- Kindness (inclusion, creativity, art)



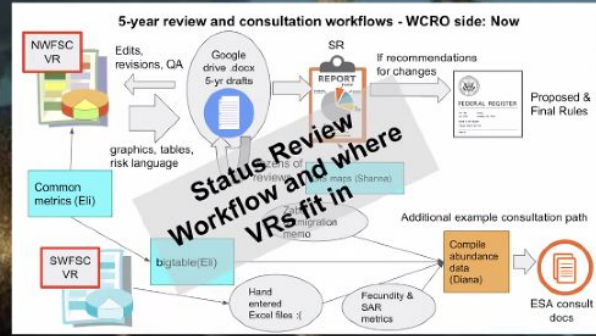
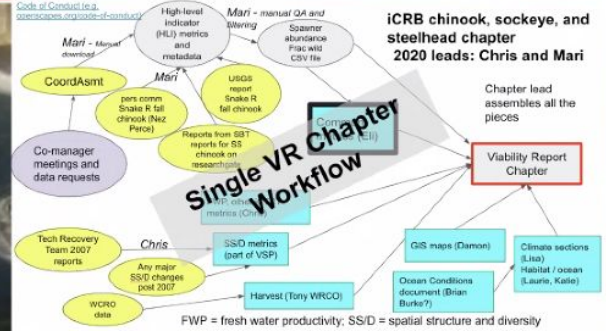
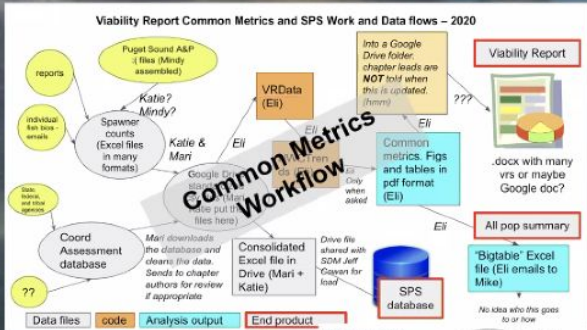
Viability Report Team

NOAA Fisheries, Northwest Fisheries Science Center (NWFSC)
<https://nmfs-openscapes.github.io> (2021-nwpsc & nmfs; 2022-nwpsc-fall)
Eli Holmes et al: NOAA Resource Book & Tutorials, Youtube Videos, Templates:
<https://nmfs-opensci.github.io/ResourceBook>; <https://rverse-tutorials.github.io>



Goal 1: Team Awareness

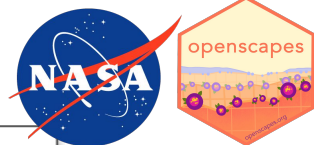
Hmm, there are still a bunch of pieces that are a mystery.



Openscapes values

- Open science is a process: it's a daily mindset & practice
- "Future us" mindset
- Power of yet (growth mindset)
- Onboard learners as contributors
- Slow down to speed up
- **Make the implicit explicit**
- Reuse not reinvent
- Kindness (inclusion, creativity, art)





NASA Openscapes: Supporting Open NASA Earth Science in the Cloud

NASA Openscapes: Lessons Learned 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.

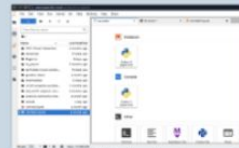


nasa-openscapes.github.io

Lessons Learned

DAAC Staff

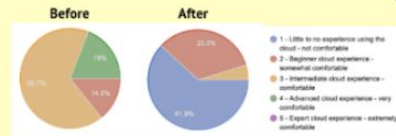
- Lay a foundation with **cloud terminology and concepts**
- Provide resources that are **easy to revisit**
- **Continued support** and education are critical
- Significant **learning curve and time investment** required for cloud adoption



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 values

- Open science is a process: it's a daily mindset & practice
- "Future us" mindset
- Power of yet (growth mindset)
- Onboard learners as contributors
- Slow down to speed up
- Make the implicit explicit
- Reuse not reinvent
- Kindness (inclusion, creativity, art)




Anna Holder & Corey Clatterbuck

California EPA WaterBoards


<https://openscapes.org/blog/2022/12/02/swrcb-2022>


(2021-nmfs, 2022-epa)


Pre-program engagement

 Instructor:Team 1:1s, 30 minutes.
Teams meet with instructors to address program questions


Openscapes Champions Program

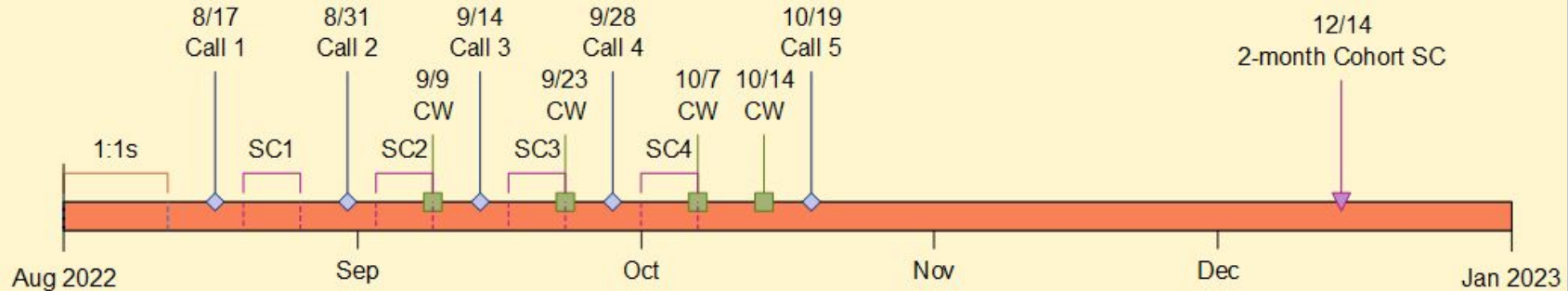
 Cohort Call, 1:30-3:30pm on Wednesdays

 Seaside Chat (SC), 1 hour. Teams schedule and lead their own call in the week between Cohort Calls

 Co-working Session (CW, optional), 10:00-11:00am on Fridays

Post-program follow-up

 2-Month Cohort Seaside Chat, 1 hour



Openscapes values

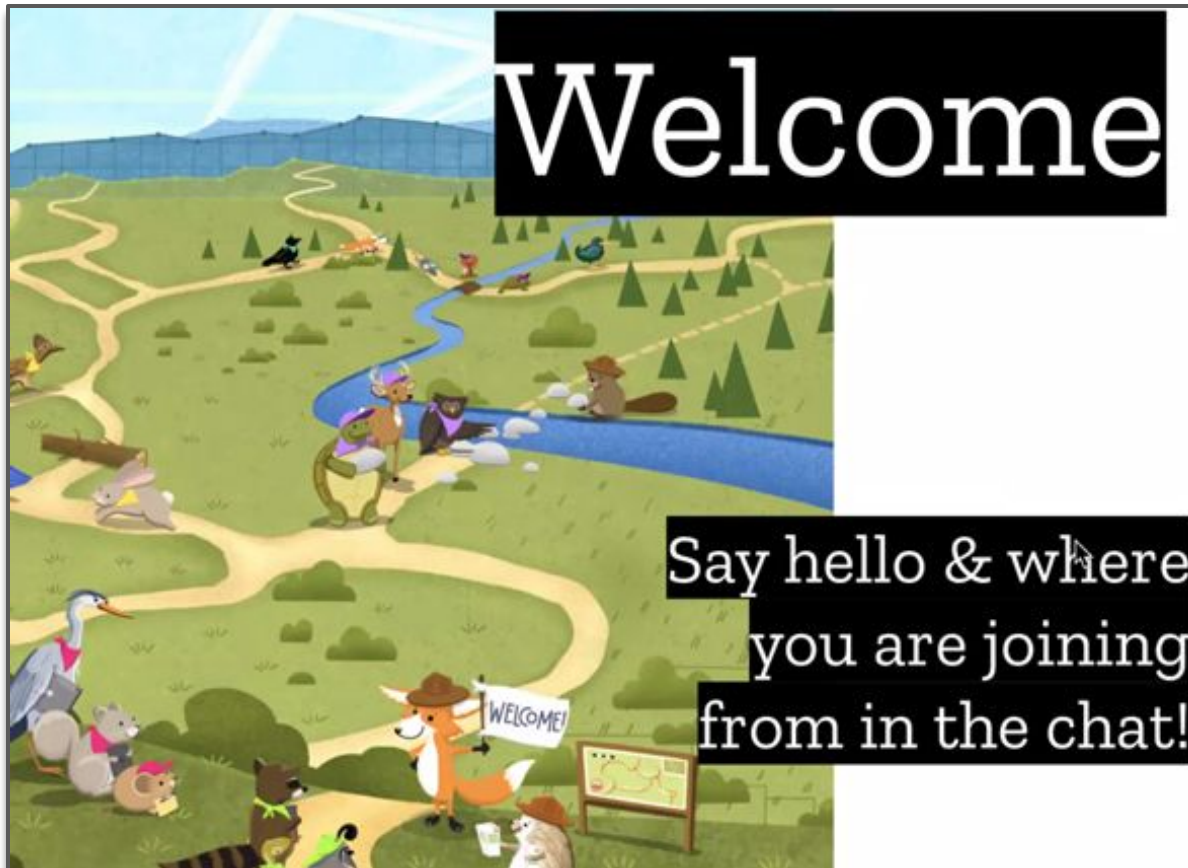
- Open science is a process: it's a daily mindset & practice
- "Future us" mindset
- Power of yet (growth mindset)
- Onboard learners as contributors
- Slow down to speed up
- Make the implicit explicit
- Reuse not reinvent
- Kindness (inclusion, creativity, art)



Dawn Wright

ESRI Chief Scientist

<https://openscapes.org/blog/2021/03/25/rebel-alliance-dr-dawn-wright>
(community-call-1)



Openscapes values

- Open science is a process, not only products
- "Future us" mindset
- Power of yet (growth mindset)
- Onboard learners as contributors
- Slow down to speed up
- Make the implicit explicit
- Reuse not reinvent
- Kindness (inclusion, creativity, art)

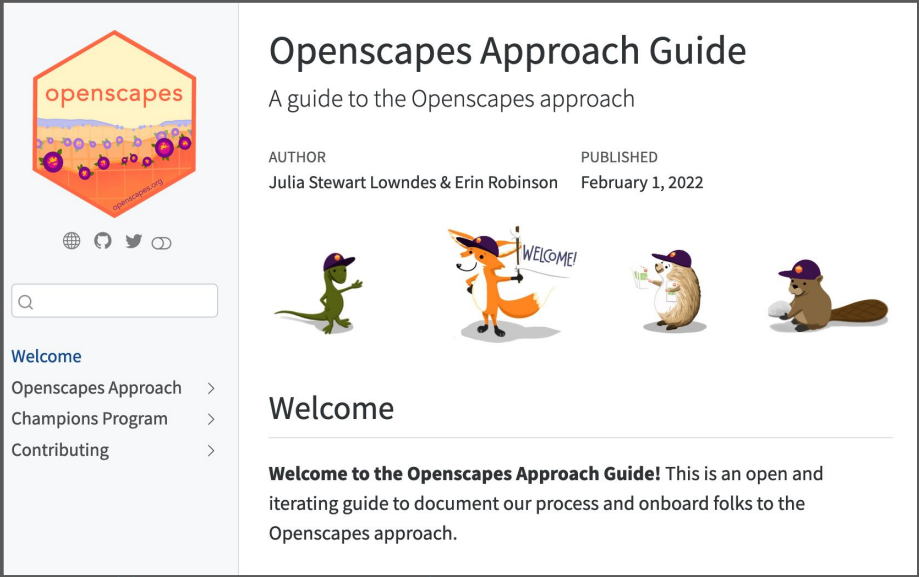
Psychological safety (Amy Edmondson)
Paid time to learn/teach/experiment
Many little things (not one big thing)



Open documentation is key

For science, storytelling, and far, far beyond

Not pictured: main website!
<https://openscapes.org>



Openscapes Approach Guide
A guide to the Openscapes approach

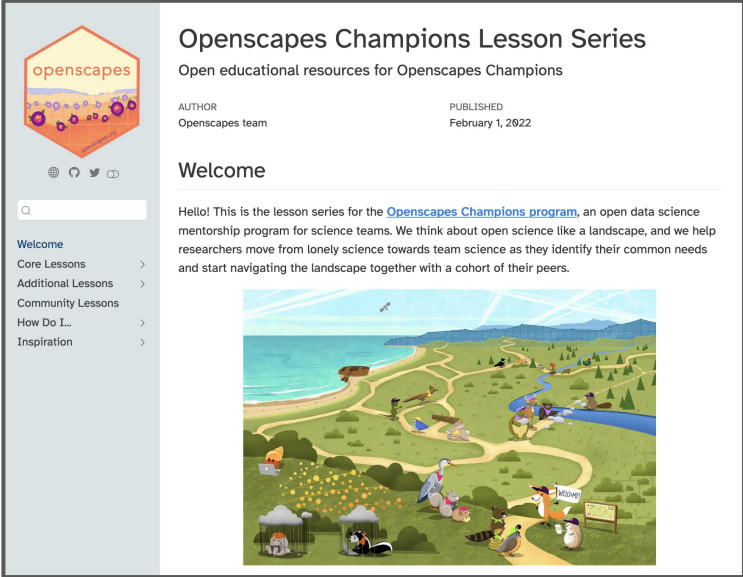
AUTHOR
Julia Stewart Lowndes & Erin Robinson

PUBLISHED
February 1, 2022

Welcome

Welcome to the Openscapes Approach Guide! This is an open and iterating guide to document our process and onboard folks to the Openscapes approach.

<https://openscapes.org/approach-guide>



Openscapes Champions Lesson Series
Open educational resources for Openscapes Champions

AUTHOR
Openscapes team

PUBLISHED
February 1, 2022

Welcome

Hello! This is the lesson series for the [Openscapes Champions program](#), an open data science mentorship program for science teams. We think about open science like a landscape, and we help researchers move from lonely science towards team science as they identify their common needs and start navigating the landscape together with a cohort of their peers.

<https://openscapes.org/series>

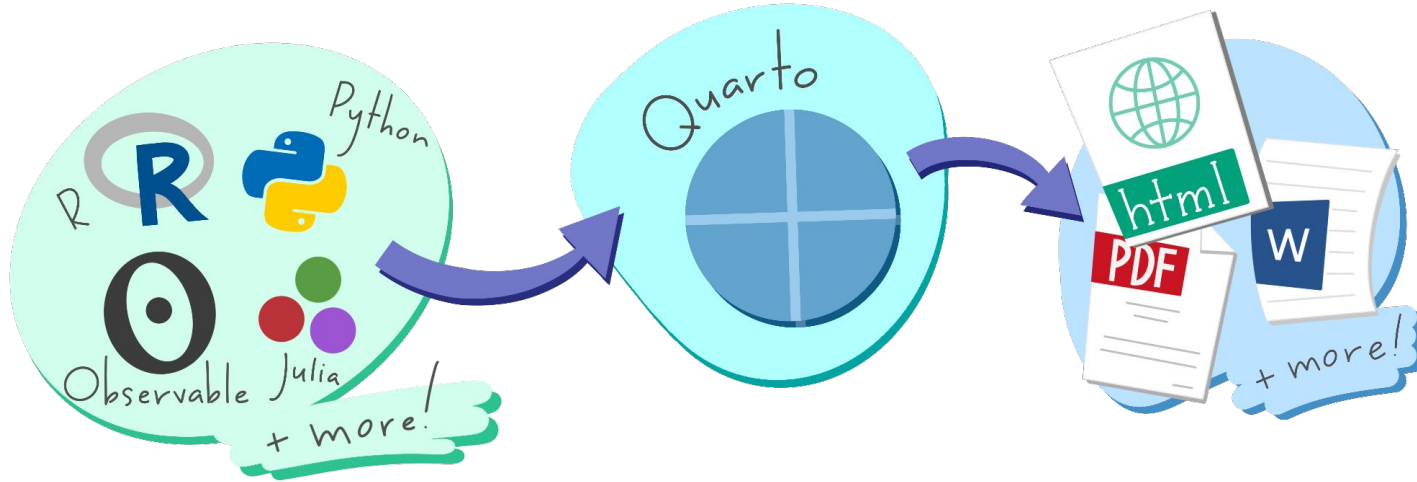
Web-first mindset enabled by technology:

Quarto*

* and for last 10 years: RMarkdown

Quarto is a new, open-source, scientific and technical publishing system

Goal: to make the process of creating & collaborating dramatically better



I keynoted the global launch of Quarto

- Cetinkaya-Rundel & Lowndes, July 2022
- NASA Openscapes: first Quarto external users
- [slides](#), [video](#), [blog](#)



Quarto Live Demo

- In RStudio IDE: Develop a small website with **.qmd** files & **R** code
- In JupyterHub: Add to website with **.ipynb** file and **python** code
- With GitHub: Sync between RStudio & JupyterHub

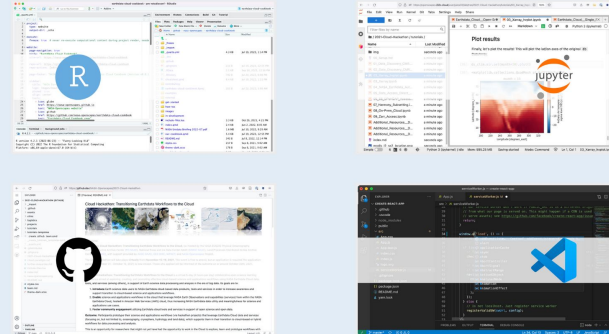
Quarto Live Demo

- In RStudio IDE: Develop a small website with **.qmd** files & **R** code
- In JupyterHub: Add to website with **.ipynb** file and **python** code
- With GitHub: Sync between RStudio & JupyterHub

Quarto enables collaborating
across coding languages

```
1 contents:
2   - section: in-development/index.qmd
3   contents:
4     - in-development/earthdata-access-demo.ipynb
5     - in-development/nsidc/icesat2-cmr-onprem-vs-cloud.ipynb
6     - in-development/lpdaac/lpdaac_ecostress_lste_kerchunk.ipynb
7     - in-development/matlab-aws.qmd
8     - in-development/earthdata-python-r-handoff.rmd
9   - section: contributing/onboarding.qmd
10  contents:
11    - contributing/quarto-website-tutorial.md
```

Quarto enables contributing
from our current tools



Hello Quarto: share, collaborate, teach, reimagine ([Cetinkaya-Rundel & Lowndes 2022](#))
DOI for live demo: 10.1371/journal.pone.0090081

Movement building

What's possible because all this

- **More time on science & solutions**
 - It's not just about time saved; it's better products & less lost day-to-day, during succession, "bus factor"
- **Improved morale**
 - Help get unstuck, intentionally redirect time. Real relationships
- **Climate and social change**
 - Connecting our biggest challenges with our daily work



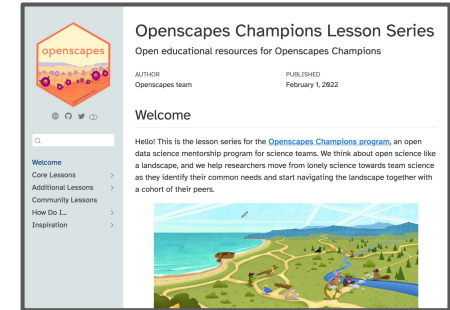
Join and amplify the open movement

Open educational resources – for reuse/remix

- Curriculum, code, slides, demos, art, onboarding
openscapes.org, openscapes.org/series, openscapes.org/approach-guide
- Supercharge your research: a 10-week plan
[Lowndes et al. 2019](#)

Open science as a daily practice

- Reuse not reinvent (practices, products)
- “Learn together first” (higher morale, onboarding, succession planning)
- “Show not tell” (screensharing, art, stories)
- Grassroots <> leadership
- Ask your colleagues how they are doing. Where are they stuck? Listen.
- Listen, learn, borrow what works, reimagine



Reimagining



[The Lady and the Octopus](#) (Staaf 2022)

The story of the argonaut who wanted to do things differently so built a container to do so...and the scientist who did the same

Thank you!

Julia Stewart Lowndes, PhD

@juliesquid



Diverse, inclusive teams and communities are key

Join us:

Twitter, Mastodon: @openscapes

openscapes.org

nasa-openscapes.github.io

openscapes.github.io/approach-guide

Upcoming events: openscapes.org/events

- ESIP (Earth Science Information Partners), January 24+, virtual
- WiDS (Women in Data Science), March 8, Stanford and virtual
- Community Calls upcoming!



Thanks to the people who made this possible!
Not pictured: more people!

Slides: openscapes.org/media

Further resources (incomplete list):

- [White Paper: The Value of Hosted JupyterHubs in enabling Open NASA Earth Science in the Cloud](#) - Friesz, Robinson et al 2022
- [Openscapes Flywheel: A framework for managers to facilitate & scale inclusive Open science practices](#) - Robinson & Lowndes 2022 (preprint, in review)
- [NASA-Openscapes.github.io](#) - NASA Openscapes Mentors
- [Hello Quarto: share • collaborate • teach • reimagine](#) - Lowndes & Çetinkaya-Rundel 2022 Keynote ([video](#))
- [A Journey to Data Science: Tools for Equity and Diversity in STEM](#) - Fenwick 2022 ([video](#))
- [Open software means kinder science](#) - Lowndes 2019
- [Supercharge your research: a ten-week plan for open data science](#) - Lowndes et al. 2019
- [Our path to better science in less time using open data science tools](#) - Lowndes et al. 2017
- [3 lessons from remote meetings we're taking back to the office](#) - Cabunoc Mayes et al. 2020
- [Toolkit for Incentivizing Open Science](#) - National Academies (NASEM) Report; [Openscapes blog post](#)
- [All We Can Save](#) - Johnson & Wilkinson 2020, eds
- [Braiding Sweetgrass](#) - Kimmerer, 2013
- [From Open Data to Open Science](#) - Ramachandran, Bugbee, & Murphy 2021
- [Unmet needs for analyzing biological big data](#) - Barone et al. 2017
- [How to bring open source to a closed community](#) - Cabunoc Mayes 2016
-

Open Science happening globally across all of science

"We have to tackle a really hard problem: changing the cultural norms that are preventing us from embracing new ideas, truly working together and moving forward."

- NASA Transform to Open Science (TOPS) Initiative

Open Science is related to work on organization change and team culture but tailored to science

- "Good to Great" concepts – Jim Collins
- Agile Movement in software development
- Lean movement in manufacturing

Open does not mean public!

"Open" means open within the team, center, agency. It's intentional team collaboration, helps break down silos, and used in **banks** and private industries too.

At NMFS, successful examples of these ideas can be seen in our stock assessment communities: SS3 development, [FIMS tools for next generation stock assessment](#), the [joint NMFS - DFO stock assessment of Pacific hake](#) (NWFSC), ecosystem status reports for the [Mid-Atlantic](#) and [New England Fishery Management Councils](#) (NEFSC).

“As fisheries scientists, we know that when we’re in rough seas, it’s important to keep the ship afloat AND get out of the storm.

Openscapes helps teams steer out of the storm of email chains with 37 versions of the same spreadsheet and to the calmer waters of open science and meaningful collaboration, using tools like R.”

Adyan Rios

NOAA Southeast Fisheries Science Center





Because of Openscapes, I have renewed hope in how we can bring about a kinder future in science.

I see a commitment in the open science community to bridging the gaps where we've left members of our community behind, and it inspires me.

Ileana Fenwick

University of North Carolina,
Openscapes

Why Openscapes at NOAA Fisheries?

Our agency is experiencing a number of pressures that affect agency science:

- **New risks** (cascading effects of climate change) that affect the kind of science we do. This requires new analyses, new models, new type of data.
- **Flat budgets** amidst rising operation costs and increasing costs.
- **A distributed and hybrid workforce**
- **Retirements in the workforce** are leading to loss of data and institutional knowledge.
- **Need for transparency** to enhance public trust in agency science and decisions

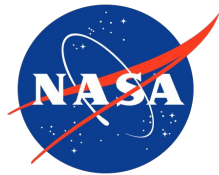
NMFS Openscapes is a cross-center Open Science initiative with Openscapes to address these challenges and pressures (2-pager)

**NOAA
FISHERIES**

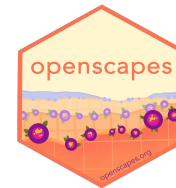


“From an IT perspective, we have talked about culture, without knowing specifically what that means. Openscapes is an opportunity to do reproducible transparent science but also to establish collaborative best practices. To truly take steps to create a new culture, a new way of doing things.”

James Primrose
SEFSC, IT, Infrastructure

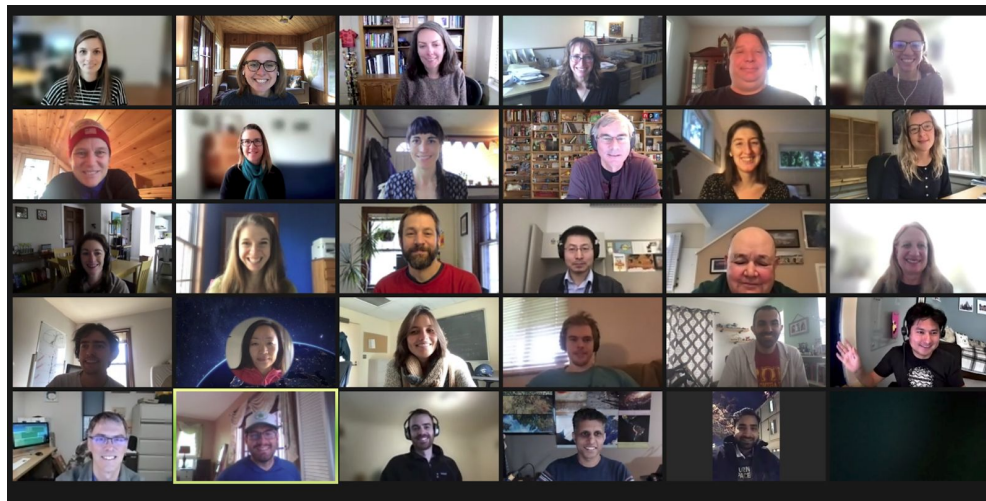


NASA Openscapes



We are a mentor community across NASA Earth science data centers (DAACs)

We are co-creating and teaching common tutorials to support researchers as they migrate analytical workflows to the Cloud

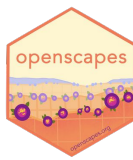


NASA Award# 20-TWSC20-2-0003 Leads: Julia Stewart Lowndes & Erin Robinson
Openscapes artwork by Allison Horst; @allison_horst
slides: <https://nasa-openscapes.github.io/about>

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

In-depth example: 2021 Cloud Hackathon

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



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.jpl.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](#).

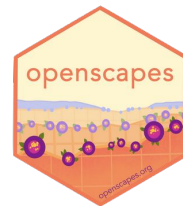
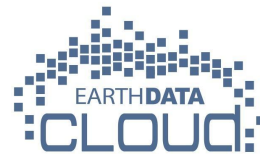
The Cloud Hackathon will take place **virtually** from **November 15-19, 2021**. The event is free to attend, but an application is required. The application period (September 21 - October 12, 2021) is now closed. Those who applied will be informed of the outcome on or around October 20th, 2021.

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:

10+ talks & workshops led by Mentors, reusing tutorials & role-modeling Open Science + Cloud

earthaccess: simplifying access



Overview

TL;DR: **earthaccess** is a Python package to search, preview and access NASA datasets (on-prem or in the cloud) with a few lines of code.

```
from earthaccess import Auth, DataGranules, Store

# first we authenticate with NASA EDL
auth = Auth().login(strategy="netrc")

# Then we build a Query with spatiotemporal parameters
GranuleQuery = DataGranules().concept_id("C1575731655-LPDAAC_ECS").bounding_box(-134.7,58.9,-133.9,59.2)

# We get the metadata records from CMR
granules = GranuleQuery.get()

# Now it's time to download (or open) our data granules list with get()
files = Store(auth).get(granules, local_path='./data')

# Now to the important science!
```

See it in action!!  [Analyzing Sea Level Rise Using Earth Data in the Cloud](#)

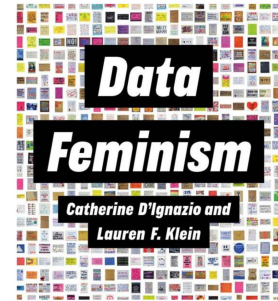
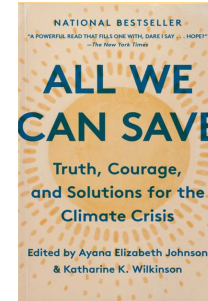
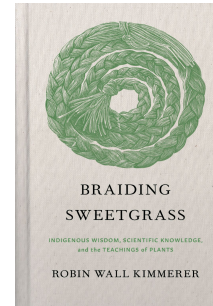
Continual learning



NCEAS
National Center for Ecological Analysis and Synthesis

Winter/Spring 2021 Seminar Series

Advancing Ecology and Environmental Data Science for a More Just and Equitable Future



“Perfection is a colonial conditioning. Worrying that you’re going to get it wrong holds you back from trying, and that erases.”

- Ta7taliya Michelle Nahanee, Nahanee Creative
Territorial Acknowledgements Interactive Workshop

A map of California showing various colored regions (red, yellow, green, blue) representing different levels of environmental justice or redlining. The map is overlaid with a grid and various labels.

Pollution and Prejudice

Redlining and Environmental Injustice in California

CalEPA
April 19, 2021

Further resources (incomplete list):

- [Open software means kinder science](#) - Lowndes 2019
- [Supercharge your research: a ten-week plan for open data science](#) - Lowndes et al. 2019
- [Our path to better science in less time using open data science tools](#) - Lowndes et al. 2017
- [3 lessons from remote meetings we're taking back to the office](#) - Cabunoc Mayes et al. 2020

- [Toolkit for Incentivizing Open Science](#) - National Academies (NASEM) Report; [Openscapes blog post](#)
- [All We Can Save](#) - Johnson & Wilkinson 2020, eds
- [Braiding Sweetgrass](#) - Kimmerer, 2013
- [A Practical Guide to Mentoring Across Intersections](#) - Harriot, 2020
- [Respectful Design: Models for Diversity, Inclusion, & Decolonization](#) - Tunstall 2020
- [Unmet needs for analyzing biological big data](#) - Barone et al. 2017
- [Barriers to integration of bioinformatics into undergrad life sci education](#) - Williams et al. 2019
- [Skills and knowledge for data-intensive environmental research](#) - Hampton et al. 2017
- [Data-intensive ecological research is catalyzed by open & team science](#) - Cheruvilil & Soranno 2018
- [Open science is a behavior](#) - Corker 2018
- [Career paths and prospects in academic data science](#) - Geiger et al. 2018

Learn more, listen, reflect, and act:

Schell et al (2020). Recreating Wakanda by promoting Black excellence in ecology and evolution <https://www.nature.com/articles/s41559-020-1266-7>

Carpenter (2020). Get it wrong for me: What I need from allies www.linkedin.com/pulse/get-wrong-me-what-i-need-from-allies-megan-carpenter

Harriot (2020)- A Practical Guide to Mentoring Across Intersections <https://conversations.vanguardstem.com/a-practical-guide-to-mentoring-across-intersections-c596496ee334>

Ariel (2017). For Our White Friends Desiring to Be Allies <https://sojo.net/articles/our-white-friends-desiring-be-allies>

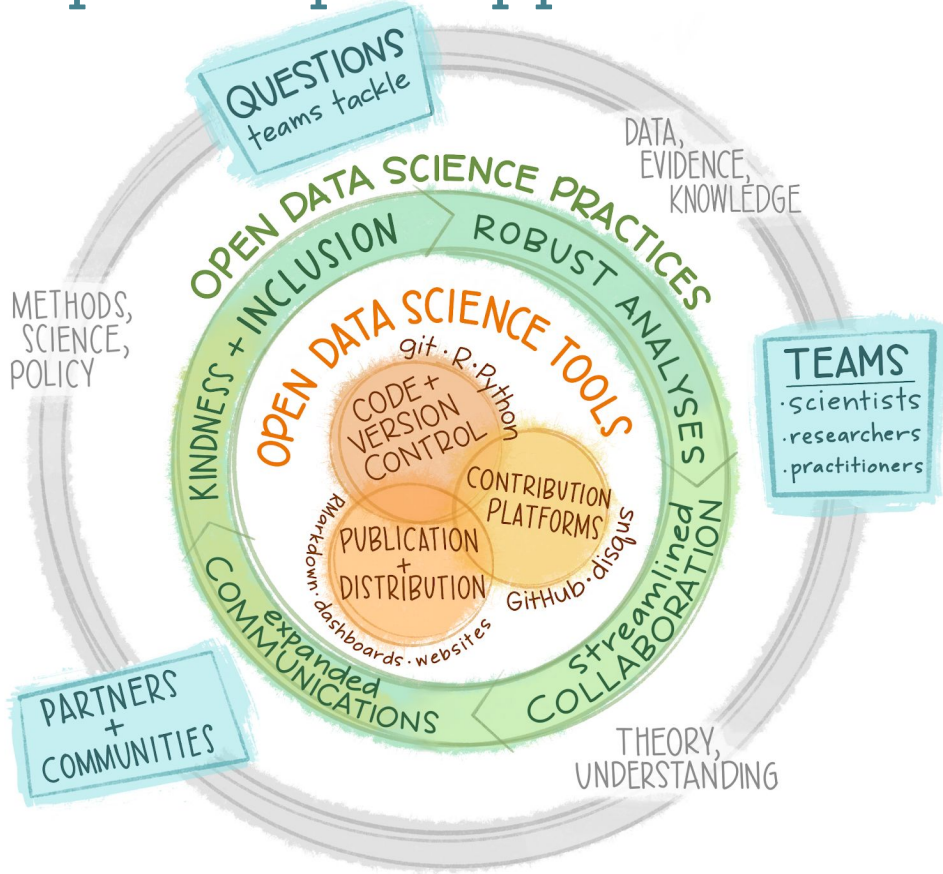
Tunstall (2020). Dr. Dori Tunstall on Respectful Design: Models for Diversity, Inclusion, & Decolonization www.youtube.com/watch?v=oaesVb7O38s

Witze (2018). Sexual harassment is rife in the sciences, finds landmark US study www.nature.com/articles/d41586-018-05404-6

Johnson & Wilkerson (2020). All We Can Save. www.allwecansave.earth

Kimmerer (2013). Braiding Sweetgrass. <https://milkweed.org/book/braiding-sweetgrass>

Openscapes approach



- **Researcher-centered, focused on teams.**
Practice and feel safe working openly with yourself and your team; then ease into more.
- **Create space & place to explore & learn.**
Cohort Calls, Seaside Chats, Co-Working; GitHub, R, Python, Quarto, Google Drive, JupyterHub, Slack; Efficiency & Inclusion Tips.
- **Cultivate relationships & real connections.**
Welcoming folks with diverse backgrounds; meeting where they are; skills to empower immediate work; kinder science.
- **Open culture: Learning, teaching, iterating.**
Not a checklist - a continual practice; invest in trust, psychological safety, growth mindset; Imperfect, messy. Takes time. Role-modeling.

