OpenScapes Supplement

Julie Lowndes, email 6/6/2024

3. Yes, this will be Julia Lowndes

4. Alternate: Stefanie Butland

7. . Please describe your organization's Earth science data/technology activities.

From our 3-year Report Summary:

Years 1-3 Summary: Project Impact

NASA Openscapes is a multi-year effort to grow a cross-DAAC Mentor community supporting Open NASA Earth Science in the Cloud. Looking back from where we started in February 2020: we have changed the way NASA teaches Cloud. There is now a way to teach Cloud, and we have built and supported a growing community of learner-oriented empathetic teachers who are user-support staff from across 11 DAACs. These "NASA Openscapes Mentors" practice open science daily to create a common set of tutorials, organize and lead virtual, hybrid, and in-person workshops, and have a feedback & review process for tutorial creation and teaching. The successes and momentum of NASA Openscapes is due to the Mentors having **paid time as part of their jobs** to collaborate and learn together. NASA Openscapes work is not extra: it is the "how" to do the work aligned with DAAC and broader NASA goals. We are appreciative of DAAC Managers and NASA leadership for supporting Mentors' time.

In Year 3, we have focused on "operational hardening" to formalize processes, move toward sustainability, communicate impact, and engage more expansively with the broader open community. We report on this as a new first section, adding to the sections included in Year 1&2 Annual Reports. 2023 is the Year of Open Science, and we have continued to be active members of the global open science community, amplifying NASA work and connecting with and amplifying collaborator efforts. Throughout this project, we have not only used technology, but we've collaborated with technology builders to improve the user/learner experience for these technologies for Open science and Cloud. This includes 2i2c and Jupyter, Quarto from Posit/RStudio; OPeNDAP, MATLAB from Mathworks, the R community, Coiled, as

well as connected communities across NASA Earthdata, NOAA Fisheries, EPA, Black in Marine Science (BIMS), Black Women in Ecology, Evolution, and Marine Science (BWEEMS), Fred Hutch Cancer Center, RLadies, and beyond.

We approach this work as movement building. We developed the Openscapes Flywheel, an open source tool – we reach for this tool for planning, progress, and impact tracking as we would reach for R and Quarto for data analysis and documentation. We developed it with NASA Earth science Mentors, using the concept where transformations occur from consistently doing key activities that add up over time (Collins). The Flywheel supports teams across NASA DAACs to to grow morale and technical capacity across their organizations by (1) Engage bright spots, through welcoming them and creating space and place; (2) Empower a learning culture through investing in learning and trust and working openly (3) Amplify Open science leaders, through leveraging the common and inspiring the bigger movement (Robinson & Lowndes 2022).

Through this work, some highlights of impact to date:
(1 Engage): 11 DAACs participating (NSIDC, PO.DAAC, LP DAAC, GES DISC, ASDC, ASF, ORNL, SEDAC, GHRC, OB.DAAC, LAADS) (and we will join the 12th CDDIS's first User Working Group in January 2024); have a JupyterHub and Notebook-Quarto-GitHub workflow for documentation and publishing; have co-created a consistent set of tutorials, teaching style, and mindset; co-led the 2021 Cloud Hackathon and 2022+2023 Champions programs; have documented our work through the Flywheel publication and Approach Guide; and have given many "imagine what's possible" talks & keynotes about NASA Openscapes work – including the global announcement of Quarto and a talk on Documenting Things that describes 3 approaches to onboarding NASA Mentors. **(2 Empower)**: Mentors have led 10+ workshops internally with DAAC staff and externally with researchers; developed the Earthdata Cloud Cookbook; Reused tutorials, slides, graphics and facilitation and open practices; were more aware cross-DAAC, less recreating; from user feedback developed Cheatsheets and the earthaccess python library; wrote the Value of Hosted JupyterHubs (White paper RFI); Collaborating on Hackweeks, developed a 2i2c access policy and onboard/offboard approach; and also started meeting regularly with Openscapes Mentors from NASA, EPA, Fred Hutch, and Pathways to Open Science, connecting about challenges and opportunities beyond NASA – we developed coaching skills that make us better open data science mentors and co-authored a preprint called Shifting institutional culture to develop climate solutions with

[Open Science](#) that was published in May 2024. We now support R and MATLAB users in 2 ways (as we do python users): Python, R, and MATLAB part of the 2i2c JupyterHub (via corn environment); and we teach how to work in these languages: partnering with Mathworks and Carl Boettiger, who have created `earthaccess` equivalent approaches and identifying needs for dev and teaching to support. **(3 Amplify)**: Mentors are amplifying across-DAACs and beyond: Career advancement & bringing mindset to new places; Speaking up in other meetings (User Needs TIM, TRAIN, Cloud Playground conversations); Connecting & consulting based on experiences - Pathfinder for 2i2c, comparing w/ SMCE; AWS; Engaging beyond (Pangeo Forge, Ladies of Landsat, pyOpenSci).

9. Describe current or anticipated users of your products and services and how you think ESIP can help you better serve this population

NASA is migrating its Eartadata holdings to the cloud, and thus the user support (in the form of teaching style, notebook tutorials, software, cheatsheets videos) the NASA Mentors do develop will support users as they shift to this new paradigm.

11. Describe how you can contribute to the efforts of one or more standing committees, working groups and/or clusters.

Cloud Computing Committee