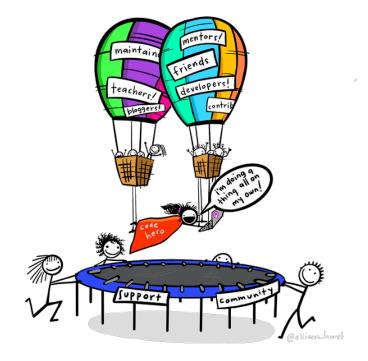# Evolving data science: advancing geophysics by embracing the open science and big data revolutions as a team

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Abstract

Alongside changes to the physical environment we inhabit and investigate, our tools, measurement capabilities, collaborations, technology, and datasets are quickly becoming bigger, more complex, and increasingly interdisciplinary. Adapting our social and technological tooling is critical for tackling current landscape and climate variable evolutions. In the US, 2023 is federally recognized as the Year of Open Science. Open science practices provide a useful set of flexible, adaptable tools and frameworks for addressing pressing scientific challenges. Through knowledge and equipment sharing, the GAGE/SAGE community has achieved important advances in these arenas. Similarly, affiliated communities are working to improve their ability to conduct open science using big data. Here I highlight several initiatives begun within the cryospheric community that are at the forefront of these efforts. Arising from a combined teaching/learning and hands-on hacking event ("hackweek"), the `icepyx` Python library and community was created to provide a simple, programmatic way to access and work with ICESat-2 data products and provide a supportive space for researchers to learn and practice collaborative development skills. This initiative reduces data discovery and handling timeframes while enabling members to incorporate time-and-effort-saving open science best practices into their daily routines. The CryoCloud initiative provides a managed cloud hub environment and community for cryospheric researchers. This computational infrastructure was created and is maintained by professional software engineers and not only provides a stable platform for transitioning workflows to the cloud but provides trainings, tutorials, and a supportive community to collaboratively tackle technical challenges. Together, these initiatives (along with many others) are changing the landscape of how we do science: by building and nurturing supportive, collaborative teams at multiple scales, the researchers in these communities are able to ask increasingly complex, challenging questions of their data while receiving real-time feedback from their colleagues, rapidly advancing their science.

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