CryoCloud: Accelerating scientific discovery for Cryosphere communities with the open cloud infrastructure

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Science is not composed of isolated groups of practitioners, but is rather an interconnected network of communities of practice, with members who fluidly move between them. Infrastructure for scientific research and collaboration should embrace this structure to make science more productive and inclusive. For the Year of Open Science, NASA and other federal funding agencies have begun to transition their data stores and computing into the cloud to make them more transparent, reproducible, and accessible. However, to accomplish research goals and fully leverage new cloud capabilities, substantial barriers exist for individual users to make the transition from their local systems to the cloud, including: estimating cloud costs, infrastructure deployment complexity, and a general lack of community awareness and knowledge.

To address these challenges, we have built, in partnership with the International Interactive Computing Collaboration and funded by the NASA Transform to Open Science (TOPS) mission and NASA ICESat-2 Project Science Office, a persistent

JupyterHub called CryoCloud (cryointhecloud.com) designed for cryosphere science research communities. We rolled out our persistent hub space across a series of conference, workshop, and hackathon events to help the NASA ICESat-2 Science Team and other cryosphere researchers build community and transition to a collaborative cloud workspace. We gathered user data from over 180 scientists in the first ten months of the project to understand the cloud needs of researchers. Our community is enabled by cloud and software expertise provided as a service. Familiar, easy-to-use, and modular software enables the infrastructure customization required to meet the needs of a specialized community of practice. Openly shared knowledge and code reduce research and computing overhead while accelerating collaboration and feedback among scientists. We share examples of how these cloud tools and community best practices make scientific computing more intuitive, cost- and time-efficient, and open for all. CryoCloud provides a transferable community model for building a research community while enabling learning and curation of the technical knowledge required to facilitate NASA’s open-source, interconnected, and science-accelerated vision of the future.

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