

Building a Comprehensive Scientific Computing Workflow with the CryoCloud JupyterHub

Joanna Millstein¹, Tasha Snow², Wilson Sauthoff¹,
Jessica Scheick³, Wei Ji Leong⁴, James Colliander^{5,6},
James Munroe⁶, Fernando Perez⁷, Denis Felikson²,
Tyler Sutterley⁸, Matt Fisher⁹, Facundo Sapienza⁷,
Ellianna Abrahams⁷, Whyjay Zheng¹⁰,
Matthew Siegfried¹



CryoCloud

<https://bit.ly/3Tykbr4>



¹Mines

²NASA GSFC

³UNH

⁴Development Seed

⁵2i2c



⁶UBC

⁷Berkeley

⁸APL, UW

⁹NSIDC

¹⁰National Central University





EARTH FLEET

INVEST/CUBESATS

- NACHOS 2022
- CTIM 2022
- NACHOS-2 2022
- MURI-FD 2023
- SNOOPI* 2024
- HYTI* 2024
- ARGOS* 2024

JPSS INSTRUMENTS

- OMPS-LIMB 2022 +
- LIBERA 2027 +
- OMPS-LIMB 2027 +
- OMPS-LIMB 2032 +

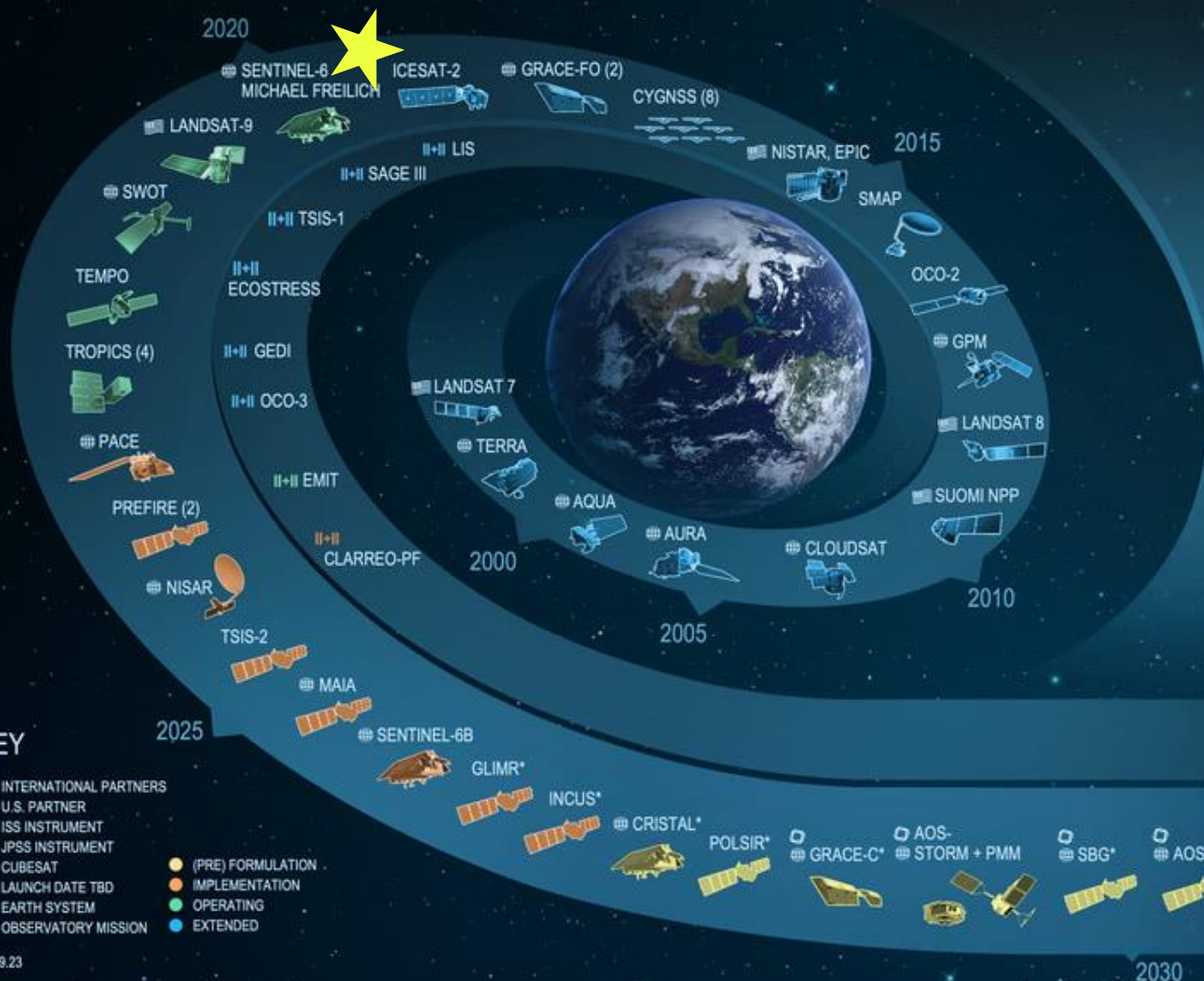
ISS INSTRUMENTS

MISSIONS

KEY

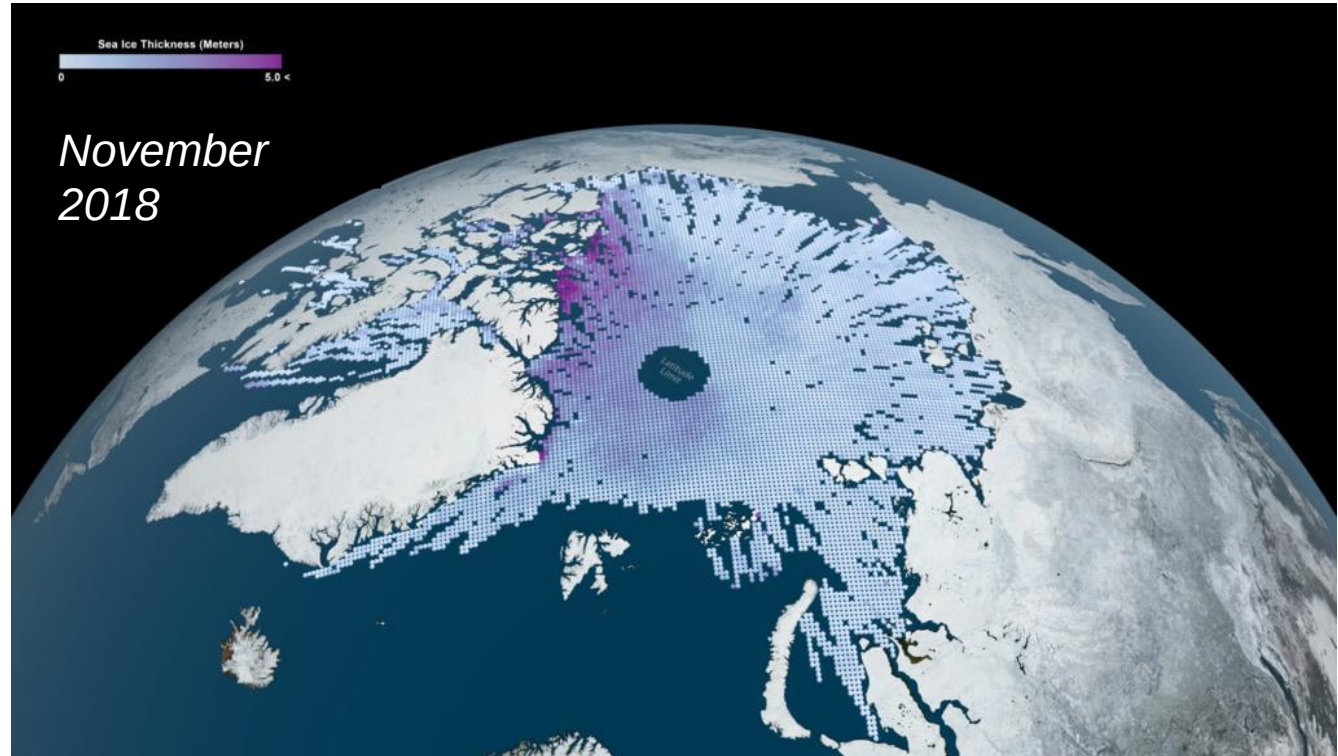
- INTERNATIONAL PARTNERS
- U.S. PARTNER
- ISS INSTRUMENT
- JPSS INSTRUMENT
- CUBESAT
- LAUNCH DATE TBD
- EARTH SYSTEM
- OBSERVATORY MISSION

- (PRE) FORMULATION
- IMPLEMENTATION
- OPERATING
- EXTENDED



Growing capability for Earth observation is accompanied by an expanding data volume

To accommodate the influx of data, researchers must be prepared for flexible computing structures that unify disparate data structures, formats, and computing languages





: A cloud-computing platform with *bumpers*

Goal: Simple and cost effective managed cloud environment for training and transitioning new users to cloud workflows and determining community best practices

Built and developed for cryosphere scientists by software professionals at **2i2c (The International Interactive Computing Collaboration Nonprofit)** to make it possible to:

- Process data faster
- Minimize downloading
- Democratize science





Cryo**Cloud**

: A cloud-computing platform with *bumpers*

- Persistent for (at least) three years
- Small servers (32 Gb / 4 CPU) for all users, option to bring own cloud credits to access larger servers
- New tool development
 - Personal cost-monitoring tool
 - Intra- and inter-hub collaboration tools
- Helping 2i2c scale with community surveys, feedback, and guidance



CryoCloud documentation & community building

cryointhecloud.com

- CryoCloud Github:
github.com/cryointhecloud

- CryoCloud Slack
- Community office hours
- Training, tutorials, and resources
- Bring in NASA Cryosphere communities and share in infrastructure ideation and construction



CryoCloud JupyterBook

All the content! More about us, resources, training, and tutorials all found here!

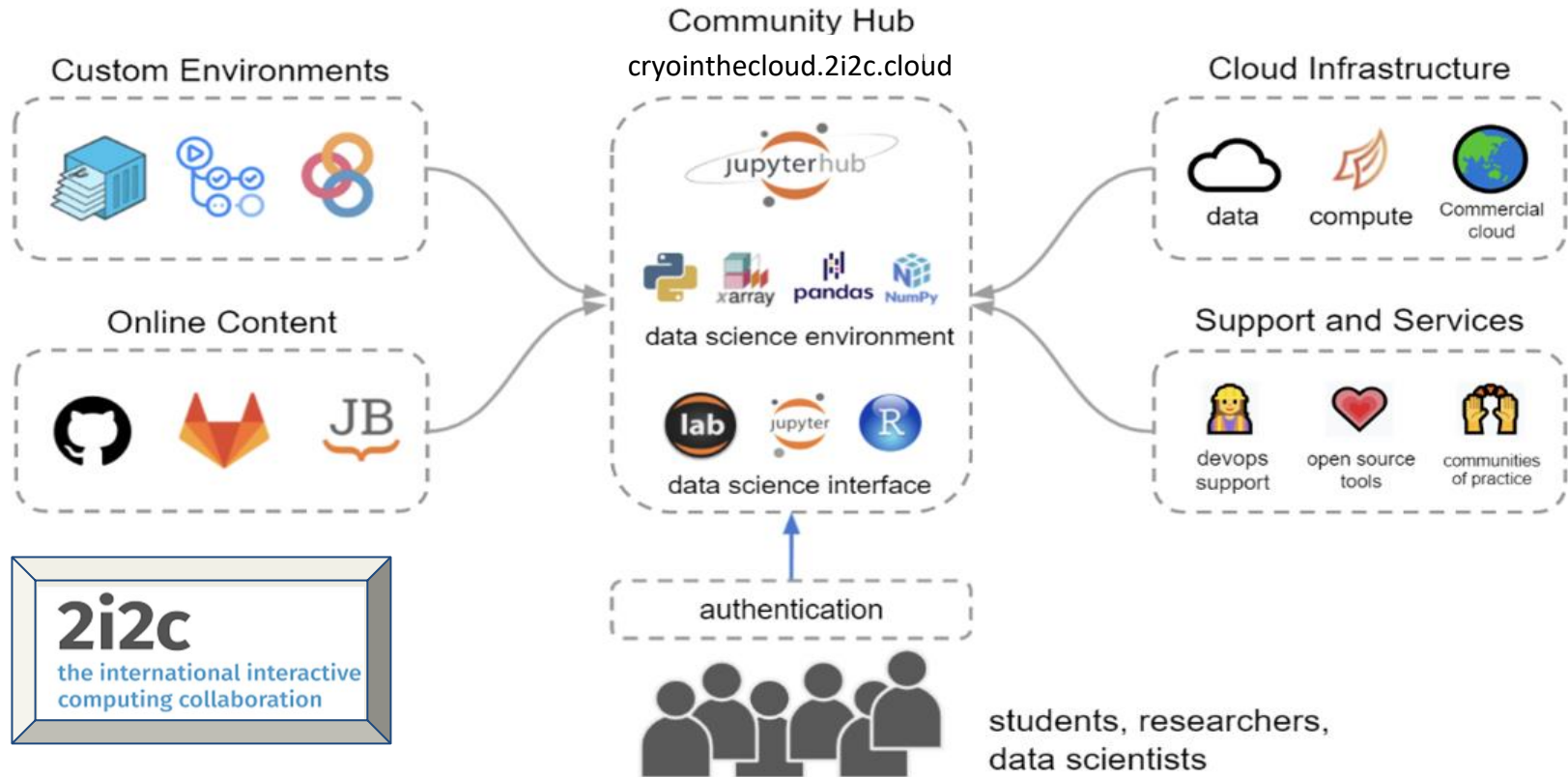


CryoCloud

CryoCloud JupyterHub

Get onto the cloud. Our shared cloud platform for NASA Cryosphere communities.

A community-empowered and community-sustaining scientific ecosystem



A scientific community ~~ies~~ without boundaries





Ensure you have access to the hub.cryointhecloud.com and fill out the onboarding survey

You will also need to fill out the Getting Started Survey, if you haven't done so, to gain access to the hub: <https://forms.gle/TFPzWQkwBPV8nUzY9>



CryoCloud Onboarding Survey:
<https://forms.gle/aFAiXRvH6hqxR2jC6>

Versatile choice of computer language and server size

Server Options

● Small: up to 4 CPU / 32 GB RAM

Start a container with at least a chosen share of capacity on a node of this type

Image

R



Node share

~1 GB, ~0.125 CPU



Julia (soon!)

Matlab

✓ Python

R

Other...

✓ ~1 GB, ~0.125 CPU

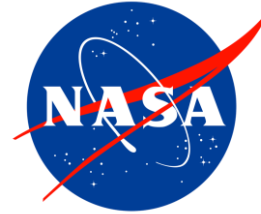
~2 GB, ~0.25 CPU

~4 GB, ~0.5 CPU

~8 GB, ~1.0 CPU

~16 GB, ~2.0 CPU

~32 GB, ~4.0 CPU



cryointhecloud.com



CryoCloud

Thank You!

 @jdmillstein

 @jdmillstein

 joanna.millstein@mines.edu

 @tsnow03

 @TashaMSnow

 tsnow@mines.edu