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ARM Data Workbench & Jupyter 101

Maxwell Grover
Argonne National Laboratory

Kyle Dumas
Oak Ridge National Laboratory

Kyle Dumas
Data Tools Lead

Will Provenza
System Admin

Wade Darnell
User Tools Lead

Michael Giansiracusa
DevOps Lead

Sujata Goswami
DevOps / HPC

Max Grover
Open Source Guru

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What is the ARM Data Workbench?

The ARM Data Workbench (ADW) is a revolutionary ecosystem for interacting with ARM data. It is intended to utilize the ARM Data Center's (ADC) full capabilities to improve users' experience in working with ARM data. A few of these capabilities include:

Seamless access to data and computing resources

Direct access to ARM and community-developed software packages

Jupyter notebook ecosystem for data access, analysis and sub-setting

Easy generation of standard and custom plots • Integration of external data sets

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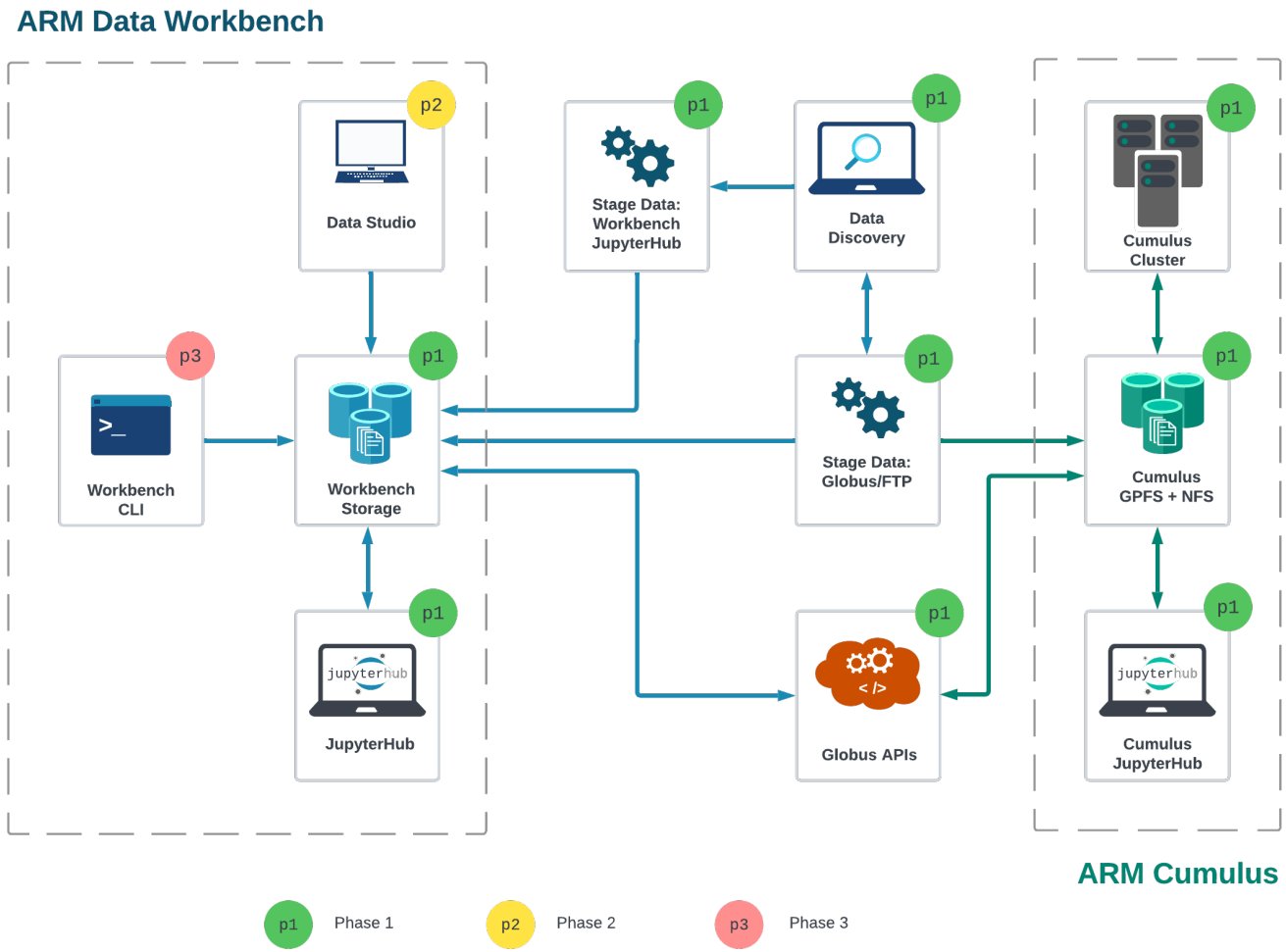
ARM Data Workbench Timeline



Phase 1: (COMPLETE)
JupyterLab integration with Discovery and ordering

Phase 2:
Initial UI to support querying, filtering, and data management functionality

Phase 3:
Expanding support for APIs and CLI capabilities

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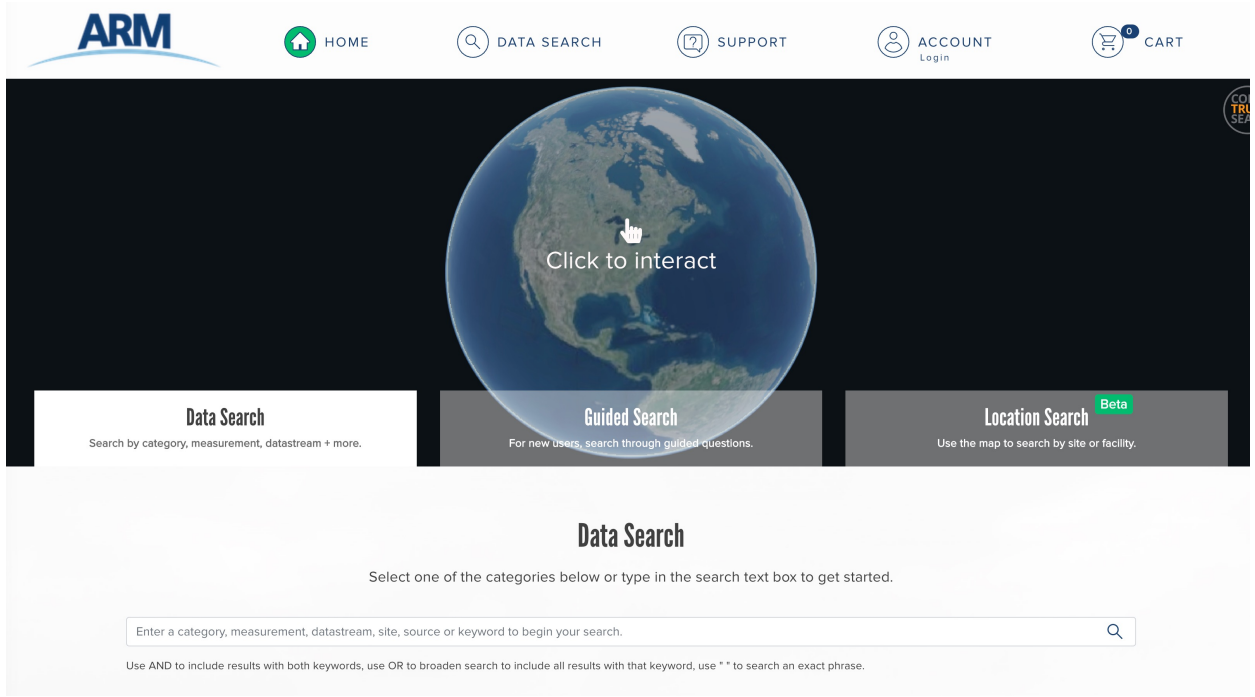
What does this mean in practice?



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How familiar are you with Jupyter?

How many of you have written a Jupyter notebook?

How many people use JupyterLab?

How many people have heard of Jupyter Book?

How many people have documented their notebook with markdown?

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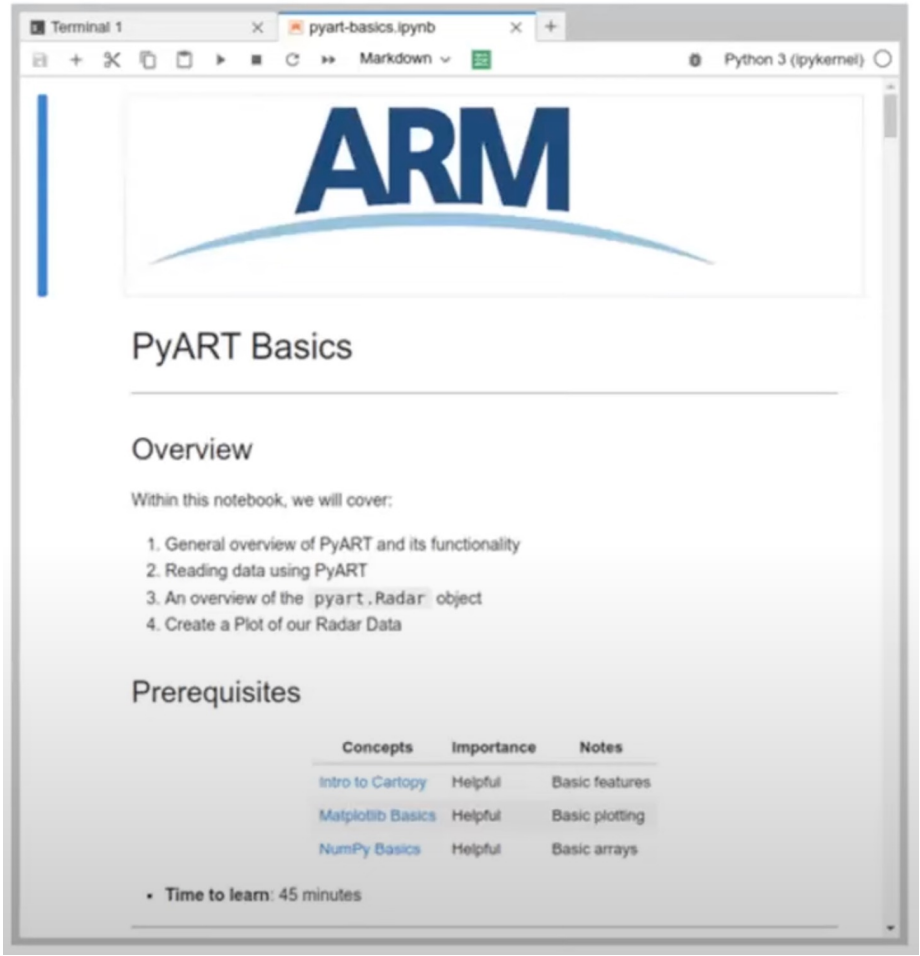
Jupyter Notebook (The Basic Building Block)

- A development environment for creating and sharing computational documents.
- Supports a variety of langauges (ex. Python + R)
- Interactive code based around notebooks
- Easy to see and communicate how a program unfolds since the outcome of each cell/block is cached
- Notebooks are the individual files that can be created, edited, and shared. (.ipynb files)
  - They can rendered online using JupyterBook (we will see this later…)



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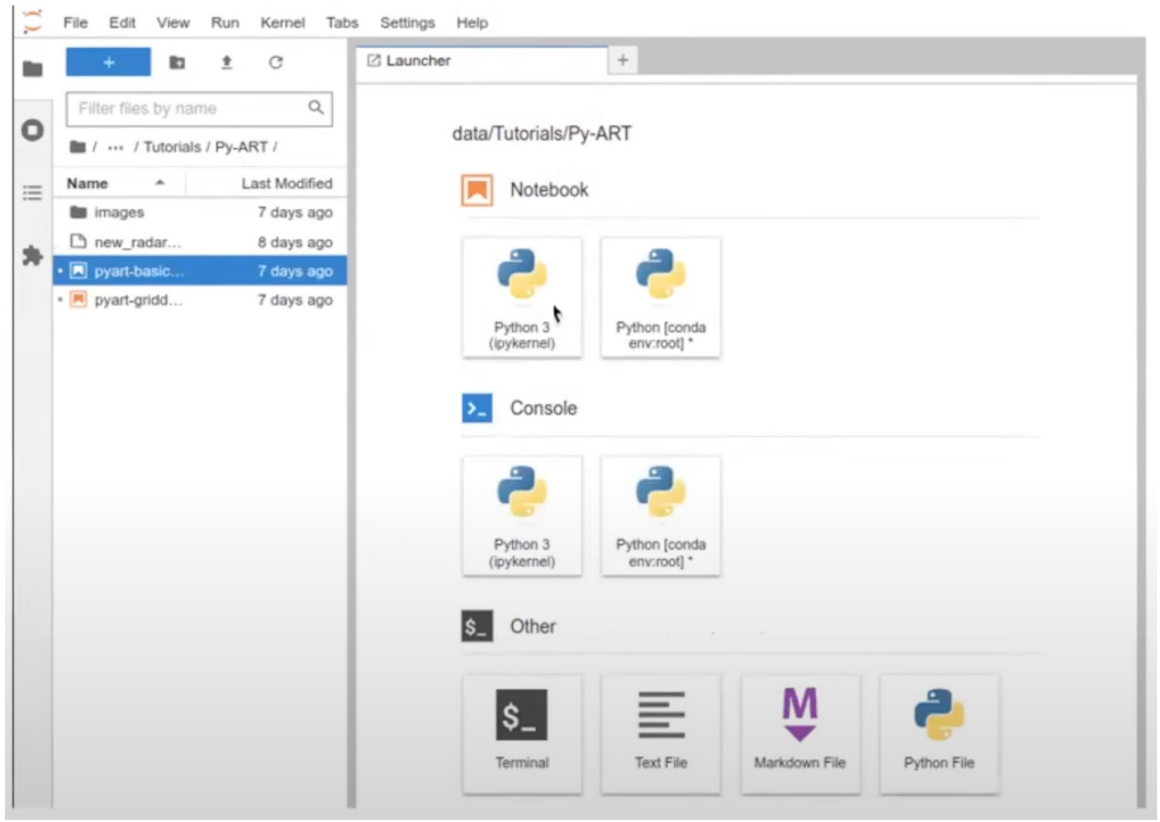
JupyterLab (Where to Run Notebooks)

A web-based interactive development environment for notebooks.

Includes file system navigation, the ability to edit notebooks, open a console, and terminal options.

Note that JupyterLab and Jupyter Notebooks can be installed on your local machine.



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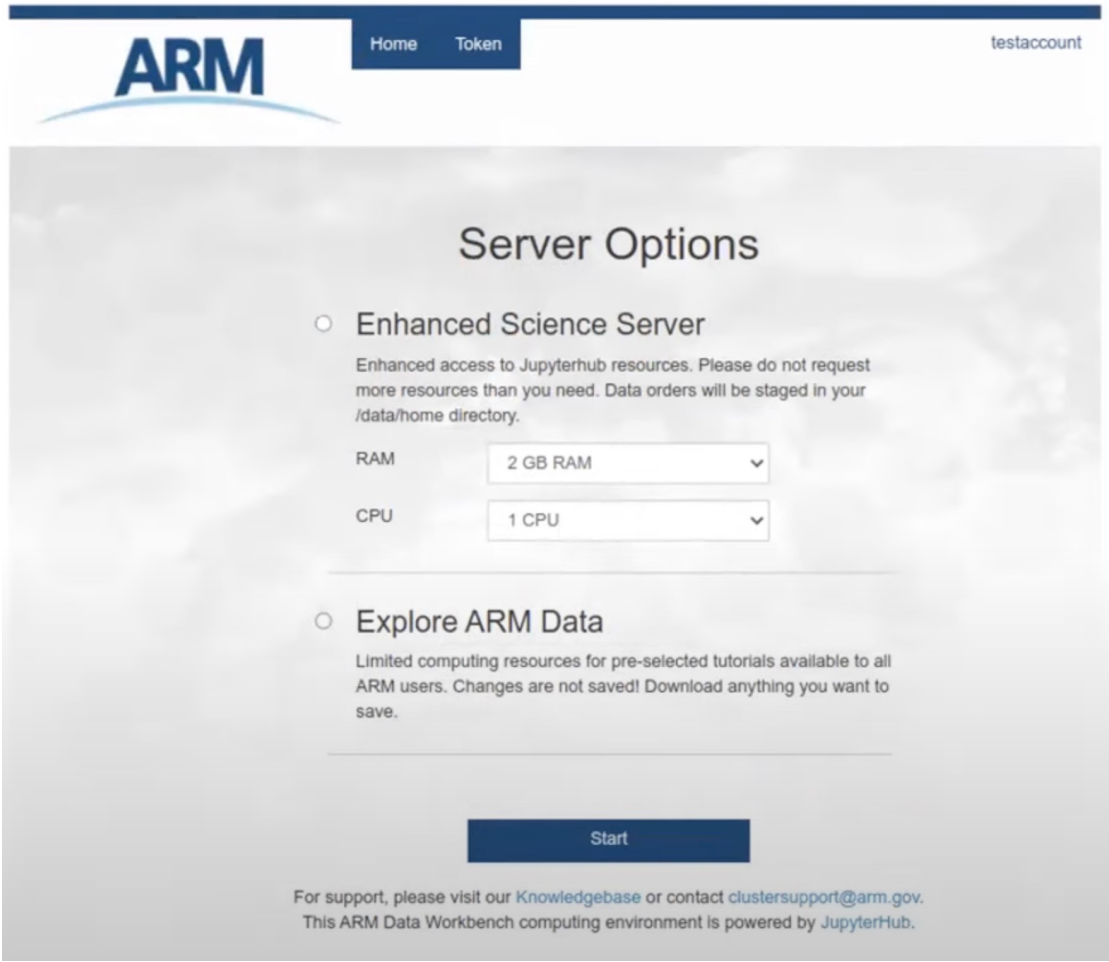
JupyterHub (Where to Run Notebooks Remotely)

A application for making JupyterLab and notebooks available in a multi-tenant environment.

Each user spawns their own private JupyterLab web server.

Benefits include:

- Don’t have to setup environment.
- Give users consistent access to same dependencies and packages.
- For ARM users, mount personal and shared project storage from NFS.
- Integration with ARM Data Discovery.



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Service Levels

Explore ARM Data (Everyone)
Default access with limited resources without persistent file storage.

Enhanced Science Server (Requestable)
Scalable resources with persistent private & shared project spaces.

Research System Server (ARM Infrastructure Users)
Same as the enhanced with additional mounts to internal resources (datastream, archive).

Workshop & Tutorial Access (NEW)
A custom implementation of JupyterHub tailored to the needs of workshops. Instructors can get access to participants JupyterLab instances.

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The COMBLE-MIP Repository: A JupyterBook Demo Time!

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jupyter {book}

JupyterBook: Binding your notebooks Together and creating webpages!

ARM

COMBLE Model-Observation Intercomparison Project Cookbook

Participants

List of Planned Participants

How-To

Apply for Elevated JupyterHub Access

Contributers Guide

Model Setup & Timeline

Main Model Configuration

Requested Model Outputs

Timeline

Input Conversion Notebooks

Example: convert DEPHY forcing to DHARMA and ModelE3 formats

Example: convert DEPHY forcing to WRF-LES forcing

Output Conversion Notebooks

Example: convert DHARMA LES output to DEPHY format

Example: convert WRF-LES output to DEPHY format

COMBLE Model-Observation Intercomparison Project Cookbook

ARM JupyterHub | ACE Environment

13 March COMBLE CAO Case

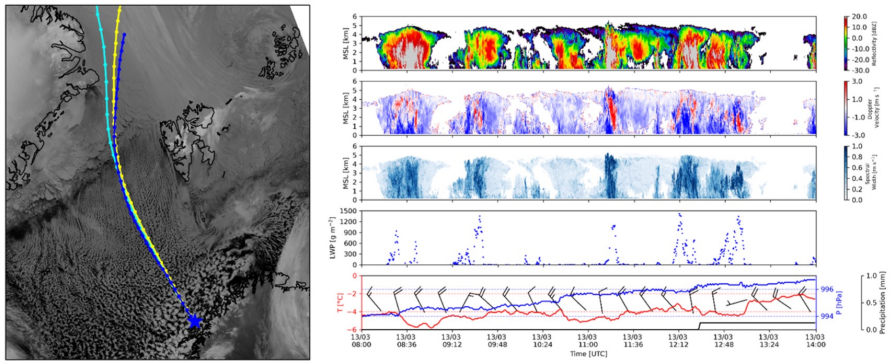

Fig. 1 (Left) MODIS visible satellite image over the Norwegian Sea region on 13 March 2020. Colored lines show backward trajectories from 18 UTC at Andenes, Norway (denoted by the blue star) at altitudes of 500, 1000, and 2000 m ASL in cyan, yellow, and blue, respectively. (Right) Vertically pointing radar, lidar, microwave radiometer, and meteorological measurements at Andenes highlight the convective nature of cellular clouds, characterized by high reflectivity, strong vertical motions, liquid water pockets, and intense turbulence structures.

Contents

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How to Access These Resources

Directly

https://jupyterhub.arm.gov

*Workshops have a dedicated link

Data Discovery

https://adc.arm.gov/discovery

Homepage

When Ordering

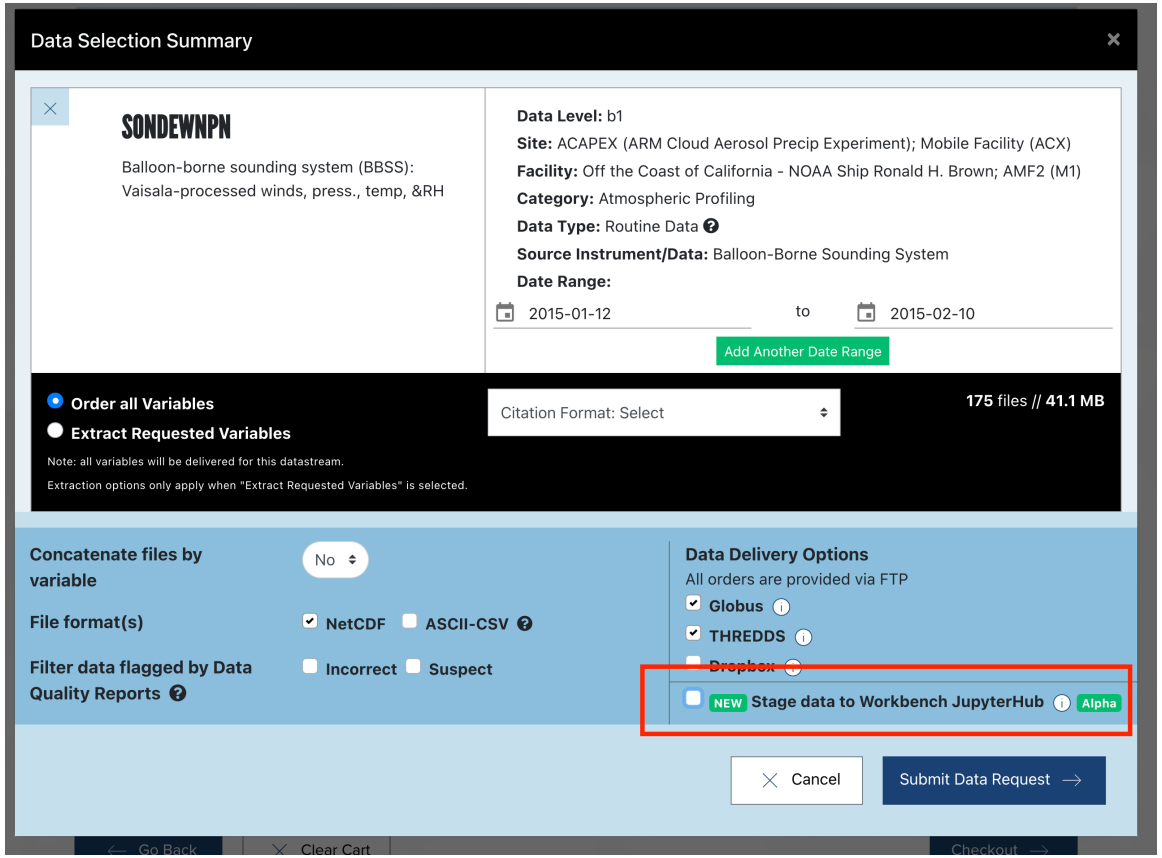
Your Account

ARM.gov

https://arm.gov

Go to Capabilities > Computing Resources >

JupyterHub & ARM Data Workbench



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