Open Science in the Rockies - AMS Short Course 2023

Contents

ARM JupyterHub ACE Environment

This repository hosts content related to the AMS 2023 Short Course: Open Science in the Rockies: Working With ARM Data from the Surface Atmosphere Integrated Field Laboratory

- AMS Landing Page

Motivation

Open Science in the Rockies: Working With ARM Measurements from the Surface Atmosphere Integrated Field Laboratory. The water resources of the western United States are changing rapidly, and how the atmosphere respond. The ARM Mobile Facility (AMF) is nearing the end of a nearly two year deployment to Crested Butte, Colorado. The Surface Atmosphere Integrated Field Laboratory (SAIL) deployment involved a myriad of measurements documenting the earth system processes, extending from stratosphere through the bedrock, which control water resources in the West. This short course, aimed at a broad audience, will:

- Introduce students to the unique capabilities of the ARM program and the community of atmospheric scientists that use and produce ARM data.
- Educate attendees on ARM's measurement suite.
- Highlight the underlying science behind SAIL and the East River watershed.
- Show how to find and access ARM measurements.
- Using a number of open source tools, train attendees how to analyze ARM's open data in the Python programming language.

Authors

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Contributors

Course program (All times in Mountain Time)

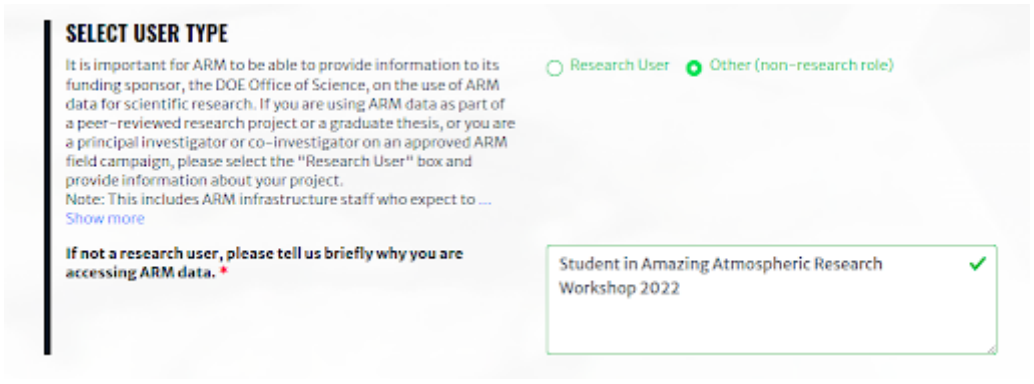
- 08:00 - 08:15 Welcome and getting started (Max Grover)
- 08:15 - 08:30 An Overview of ARM (Dr. Scott Collis)

- 08:30 - 09:00 SAIL Field Campaign Overview (Dr. Dan Feldman)
- 09:00 - 09:15 Ice Breaker! (Dr. Dan Feldman)
- 09:15 - 09:45 Accessing ARM Data + Compute (Monica Ilhi)
- 09:45 - 10:00 Break!
- 10:00 - 10:50 Radar Data with Py-ART (Max Grover)
- 11:00 - 11:50 Surface Observations with ACT (Joe O'Brien)
- 11:50 - 13:00 Lunch
- 13:00 - 13:50 Working with Aerosol Measurements (Dr. Allison Aiken)
- 14:00 - 14:50 Advanced Xarray + Visualization (Max Grover)
- 15:00 - 15:30 How to Contribute to Open Science (Dr. Scott Collis)
- 15:30 - 15:45 Closing (Dr. Dan Feldman)

Getting Started

Register for Access to the Tutorial Platform

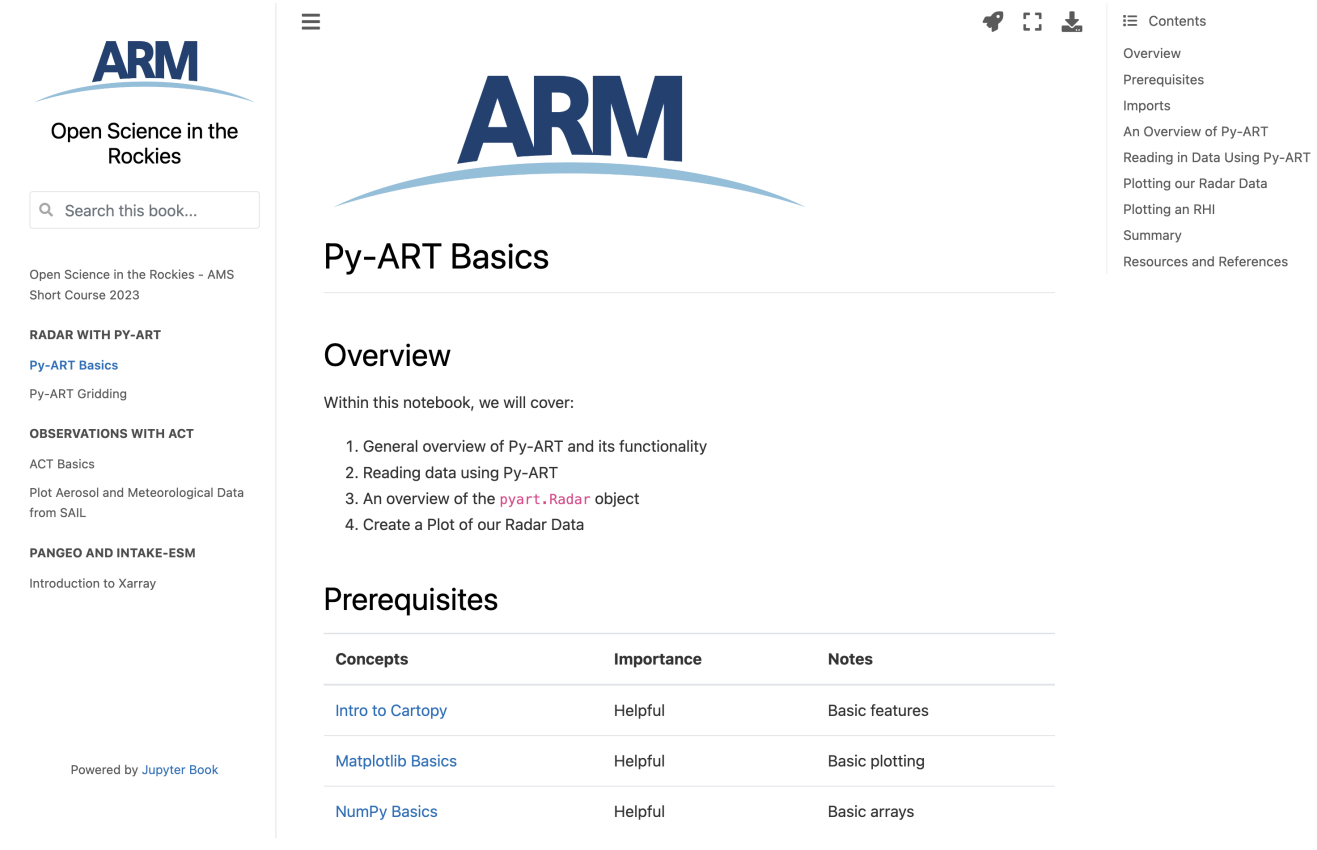
Participants who do not already have one should first register for an ARM account. When filling out the form, indicate that you are affiliated with the particular workshop or course (AMS Open Science in the Rockies):



If you already have an ARM account, email clustersupport@arm.gov that you need to be granted access to the workshop or course materials.

Investigate Tutorial Materials and Follow Prerequisites

The tutorial materials are available online (https://arm-development.github.io/open-science-rockies-2022), and we encourage participants to investigate the materials before attending the workshop. For example, in one of the first examples (the radar example), we encourage participants to investigate the prerequisites, and ensure they are familiar with the material. While this is not required for participants, it is highly encouraged.



Structure

Radar Data with Py-ART

Within this section, we cover the basics of Py-ART and apply it to a sample analysis workflow.

Weather Observations with ACT

The Atmospheric data Community Toolkit (ACT) is a helpful tool when working with atmospheric observations! This portion will focus on reading, visualizing, and analyzing observational datasets from the Atmospheric Radiation Measurement user facility.

Xarray and Pangeo

Our last section covers how to use the Pangeo stack, Xarray and other components to inspect and visualize earth system model data.

Running the Notebooks

You can either run the notebook using Binder or on your local machine.

Running on Jupyter

The simplest way to interact with a Jupyter Notebook is through the ARM Jupyter, which enables the execution of a Jupyter Book on ARM infrastructure. The details of how this works are not important for now. Navigate your mouse to the top right corner of the book chapter you are viewing and click on the rocket ship icon, (see figure below), and be sure to select “launch Jupyterhub”. After a moment you should be presented with a notebook that you can interact with. I.e. you’ll be able to execute and even change the example programs. You’ll see that the code cells have no output at first, until you execute them by pressing `Shift` + `Enter` . Complete details on how to interact with a live Jupyter notebook are described in Getting Started with Jupyter.

Running on Your Own Machine

If you are interested in running this material locally on your computer, you will need to follow this workflow:

(Replace “arm-cookbook-example” with the title of your cookbooks)

1. Clone the `https://github.com/ARM-Development/arm-cookbook-example` repository:

```
git clone https://github.com/ProjectPythiaCookbooks/cookbook-example.git
```

2. Move into the `arm-cookbook-example` directory

```
cd arm-cookbook-example
```

3. Create and activate your conda environment from the `environment.yml` file

```
conda env create -f environment.yml
conda activate arm-cookbook-example
```

4. Move into the `notebooks` directory and start up Jupyterlab

```
cd notebooks/
jupyter lab
```

By ARM Development Team