



Estimating Surface $PM_{2.5}$ using Satellite Data and Other Information Sources

July 8, 15, & 22, 2026

10:00-12:00 (English) or 15:00-17:00 (Spanish) EDT (UTC-4)

This training covers the theoretical approaches and key datasets for estimating the near-surface concentration of particulate matter smaller than 2.5 micrometers in diameter ($PM_{2.5}$) by utilizing satellite aerosol optical depth (AOD) along with other data sources (ground based monitors, model estimates). Participants will acquire knowledge about different methodologies and their strengths and limitations for inferring surface $PM_{2.5}$ from satellite AOD. They will be able to identify access methods for using existing datasets of surface $PM_{2.5}$ estimated from satellite sensors and other data sources. Participants will also learn how to compare satellite-based estimates of $PM_{2.5}$ to in-situ measurement data through hands-on coding exercises employing a generic code template and suitable co-location methodology. This would be the first step in evaluating the suitability of these datasets for the users' applications and regions.

Part 1: AOD versus $PM_{2.5}$ – When they Are and Are Not Related

ARSET Instructor: Carl Malings

- About ARSET
- Training Overview
- Part 1 Introduction
- The Pieces – Ground-Based Measurements, AOD, and CTM
- Why (or when) is AOD related to $PM_{2.5}$?
- Simple Relations of AOD to $PM_{2.5}$
- Part 1 Summary
- Q&A Session

Part 2: Estimation of $PM_{2.5}$ from AOD – Methodologies and Available Datasets

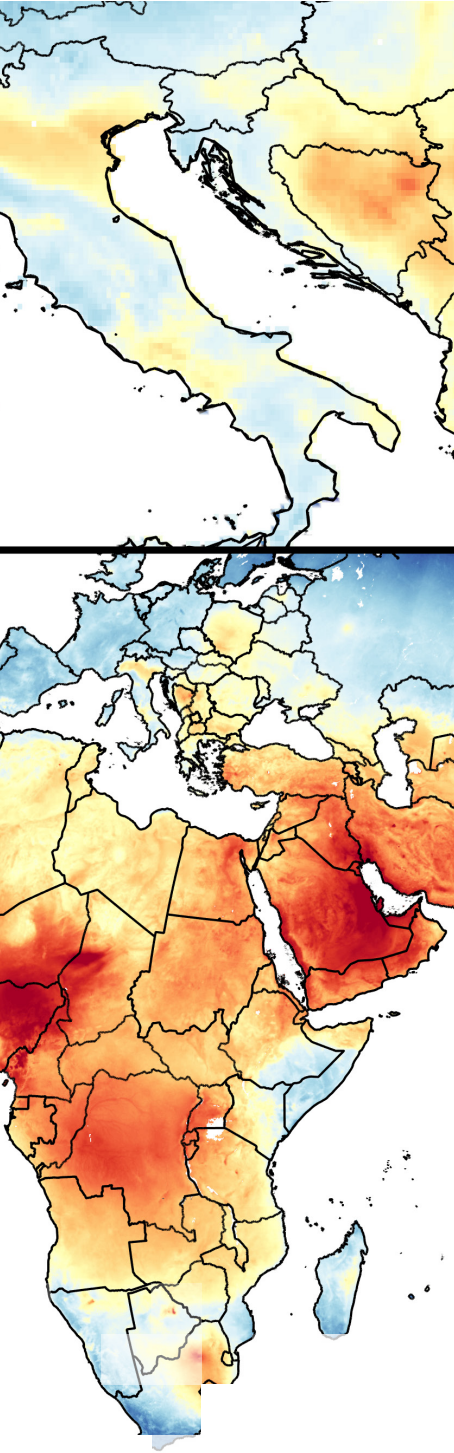
ARSET Instructors: Carl Malings, Pawan Gupta

Guest Instructors: Aaron van Donkelaar, Junhyeon Seo

- Part 1 Review
- Part 2 Introduction
- Geophysical and Hybrid Models
- Sat $PM_{2.5}$ at ACAG Washington University in St. Louis
- Machine Learning Methods
- Bias-Corrected MERRA-2
- Part 2 Summary
- Q&A Session



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Part 3: Case Study – Comparing Available Satellite-Derived PM_{2.5} Products to Ground-Based Measurements

ARSET Instructor: Carl Malings

Guest Instructor: Sebastian Diez

- Part 2 Review
- Part 3 Introduction
- Overview of the Case Study Exercise
- Orientation to Google Colab
- Accessing the SatPM Dataset
- Accessing Bias-Corrected MERRA-2 CNN
- Accessing Ground-Based Data
- Basic Evaluation
- Training Summary
- Q&A Session



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