



NCAR
OPERATED BY UCAR

**Research Applications
Laboratory**

RAL/ACOM JOINT SEMINAR

Towards Air Quality Forecasting Systems for Resource-Constrained Settings: Scientific and Operational Lessons from Eastern and Southern Africa

SHIMA BAHRAMVASH SHAMS

Project Scientist

NSF National Center for Atmospheric Research



Tuesday, July 28, 2026

1-2 PM (MT) FL2-1001 or Virtual | [Watch Live](#)

Air quality challenges are intensifying across many low- and middle-income countries (LMICs) because of rapid urbanization, population growth, increasing energy demand, and diverse natural and anthropogenic emission sources. Air pollution, particularly exposure to particulate matter, is among the leading environmental risk factors of adverse health outcomes worldwide. Air quality forecasting systems can provide actionable information to help protect public health, yet many regions continue to face substantial scientific and operational challenges in developing and sustaining such capabilities.

This seminar presents the findings and lessons learned from the recently completed NASA SERVIR project, *Enhancing Air Quality Decision-Making in Eastern and Southern Africa*. The project developed a regional air quality forecasting framework based on the Weather Research and Forecasting model coupled with Chemistry (WRF-Chem) and the Gridpoint Statistical Interpolation (GSI) chemical data assimilation system. The system assimilates Suomi-NPP VIIRS aerosol optical depth (AOD) observations to initialize 48-hour air quality forecasts at 15 km spatial resolution across Eastern and Southern Africa. The seminar will highlight the development of Africa-specific observation error covariance estimates for Suomi-NPP VIIRS AOD, derived using co-located AERONET observations from 2020–2024, and discuss how these estimates allow better representation of satellite uncertainties in the regional retrieval uncertainties within the data assimilation system. This seminar will also present an evaluation of the Deep Blue and Dark Target retrieval algorithms and discuss their performance under different aerosol conditions across Africa.

Beyond the scientific results, we will discuss the practical challenges of implementing satellite-based data assimilation in regions with sparse monitoring networks, frequent cloud cover, and limited computational resources. We will also discuss the development of open-source tools for investigating long-term air quality trends using global datasets. The seminar will conclude with lessons learned from co-developing forecasting capabilities with regional partners and explore how open-source tools, computationally efficient workflows, and user-friendly interfaces can support more sustainable and operational air quality forecasting systems in resource-constrained settings.

[Event Website](#)