
Developing Aerosol Reanalysis at NOAA Version 1.0: Methodology and Results

Mariusz Pagowski*^{†1}, Arlindo Da Silva², Bo Huang¹, Sarah Lu³, and Shih-Wei Wei⁴

¹CIRES, CU Boulder and NOAA/ESRL/GSL – Boulder, CO, United States

²NASA/GMAO – Greenbelt, MD, United States

³JCSDA and SUNYA – Boulder, CO, United States

⁴SUNYA – Albany, NY, United States

Abstract

In collaboration with the Global Modeling and Assimilation Office at NASA and State University of New York at Albany, NOAA is developing capability to assimilate observations to create the first ever aerosol reanalysis at this institution. The observations include Aerosol Optical Depth (AOD) derived from Moderate Resolution Imaging Spectroradiometer (MODIS) and AErosol RObotic NETwork (AERONET) direct sun measurements. The model relies on Finite-Volume Cubed-Sphere (FV3) dynamical core, Global Forecast System (GFS) physics and the aerosol parameterization based on the Goddard Chemistry Aerosol Radiance and Transport (GOCART). The assimilation tools are from the Joint Effort for Data assimilation Integration (JEDI); the forward operator uses aerosol scattering tables from NASA/GMAO and the assimilation approach combines the variational solver and the Local Ensemble Transform Kalman Filter (LETKF). Reanalysis for year 2016 is compared to NASA's Modern-Era Retrospective analysis for Research and Applications Two (MERRA-2) and ECMWF's Copernicus Atmosphere Monitoring Service interim Reanalysis (CAMSiRA) and evaluated against multiwavelength observations from AERONET, attenuated backscatter from Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO), and other independent satellite AOD retrievals.

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*Speaker

[†]Corresponding author: mariusz.pagowski@noaa.gov