EMS Annual Meeting Abstracts
Vol. 16, EMS2019-215-1, 2019

Development of the Joint NOAA-NASA Aerosol Reanalysis. Progress and Plans

Mariusz Pagowski (1,2), Arlindo da Silva (3), Sarah Lu (4), and Shih-Wei Wei (4)

(1) CIRES/CU, Boulder, CO, United States (mariusz.pagowski@noaa.gov), (2) NOAA/ESRL/GSD, Boulder, CO, United States, (3) NASA/GMAO, Greenbelt, MD, United States, (4) SUNY at Albany, Albany, NY, United States

Recently, NOAA embarked on a major redesign of its environmental prediction system that includes a new dynamical core of a numerical model and a new data assimilation system. The dynamical core is based on FV3 model from NOAA's Geophysical Fluid Dynamics Laboratory (GFDL) while data assimilation development relies on the Joint Effort for Data assimilation Integration (JEDI) framework that is being developed nearly from scratch with a paradigm of flexibility based on object oriented design of computer codes.

In 2018 a joint NOAA, NASA, and SUNY at Albany team was awarded a three-year NOAA's Climate Prediction Ofiice grant to develop a new global aerosol assimilation system that will rely on these two elements with the purpose to produce aerosol reanalysis.

The chemical model under development couples FV3 meteorology with Goddard Global Ozone Chemistry Aerosol Radiation and Transport (GOCART) aerosol parameterization through the National Unified Operational Prediction Capability (NUOPC) interface. Assimilation relies on a hybrid variational/Ensemble Kalman Filter (EnKF) methodology with stochastic perturbations to meteorology and emissions. Observations include multi-channel Aerosol Optical Depth (AOD) derived from Moderate Resolution Imaging Spectroradiometer (MODIS) and AErosol RObotic NETwork (AERONET) direct sun measurements.

Assimilation of multichannel AOD presents series of challenges that require departure from the standard operational procedures, most prominently among them non-Gaussian observation and model errors, cross-channel error correlations, and positive-definiteness of tracers. We are in the process of devising methods to consistently address those and comparing our product against NASA's MERRA and ECMWF's CAMSiRA reanalyses. We will present the results so far and outline future steps towards producing aerosol reanalysis.