Paper ID: 34201
student

EARTH OBSERVATION SYMPOSIUM (B1)
Interactive Presentations (IP)

Author: Mr. William Battye
North Carolina State University, United States, whbattye@ncsu.edu

EVALUATING AMMONIA (NH3) PREDICTIONS IN THE NOAA NATIONAL AIR QUALITY FORECAST CAPABILITY (NAQFC) USING GROUND-BASED AND SATELLITE-BASED MEASUREMENTS

Abstract

Ammonia (NH3) gas in the atmosphere contributes to the formation of airborne fine particulate matter (PM2.5), which is linked to adverse health effects. Atmospheric NH3 also deposits into terrestrial and aquatic ecosystems, potentially contributing to eutrophication and impacts on species diversity. The National Oceanic and Atmospheric Administration (NOAA) is responsible for forecasting elevated levels of PM2.5 under the of National Air Quality Forecast System (NAQFS), and these forecasts require reliable estimates of precursor NH3 concentrations. The Community Multiscale Air Quality (CMAQ) model is used to simulate atmospheric emissions and transport and conversion of NH3 to PM2.5; however, emissions and transport processes for NH3 are subject to considerable uncertainty. The objective of the current research is to design a framework for using satellite-based measurements to improve CMAQ predictions of NH3. Measurements of NH3 by the Tropospheric Emission Spectrometer (TES) on the Aura satellite were compiled for the continental U.S. over the entire operational period of the instrument (2004 through the present). These were compared with available ground-based measurements from the Ammonia Monitoring Network (AMoN) and other sources. Both of these data sets were used to evaluate CMAQ NH3 predictions for a two case study periods in the summers of 2011 and 2014. For the TES comparisons, model predictions were compared with satellite retrievals of ground level concentrations, total column concentrations, and concentrations at the altitude of maximum satellite sensitivity. Model biases were computed, and regional patterns in bias were evaluated using cluster analysis.