NCAR

Atmospheric Chemistry Observations & Modeling Laboratory

SEMINAR

WRF-Chem Modeling of Lake Michigan Summertime Ozone Air Quality: Impact of meteorology and emissions

Maryam Abdi-Oskouei
National Center for Atmospheric Research (NCAR)

Ozone concentrations in excess of health-based standards occur along the coastline of Lake Michigan. A complex pattern of ozone precursor emissions interfaces with a complex meteorological environment, presenting a challenge for air quality management and simulation. Precursors are transported into a shallow, stable boundary layer over the lake. This is followed by ozone formation and transport back onshore through a combination of synoptic and lake breeze winds.

In this study, we use measurements during the Lake Michigan Ozone Study 2017 (LMOS) to quantitatively evaluate the Weather Research and Forecasting with Chemistry (WRF-Chem) model at 4 km horizontal resolution for key features of high ozone episodes over Southern Lake Michigan. WRF-Chem showed good performance and successful reproduction of meteorological fields and clouds. Lake breeze model skill was inconsistent, with both good and poor performance depending on site and day. The combination of Noah land surface model and High-Resolution Rapid Refresh (HRRR) meteorology gave the best. For ozone, WRF-Chem was biased low and underestimated hourly peak ozone. In some cases, ozone bias can be attributed to transport and lake breeze errors. Average ozone concentration showed minor sensitivity to changes to meteorology initial and boundary conditions or the land surface model. Increases in hydrocarbon emissions increased ozone production especially over the Lake Michigan, which led to reduction in model errors.

Monday, August 17, 2020, 3:30 p.m
Virtual refreshment 3:15 p.m
Live webcast: meet.google.com/qym-ppvv-vov
Phone: (US) +1 256-548-3184 PIN: 382 874 157#

For more information please contact Bonnie Slagel, bonnie@ucar.edu, phone 303-497-8318.