Modeling for the Extreme Ozone Attainment Demonstration Plan

Evan M. Shipp

evan.shipp@valleyair.org
EOADP Modeling Overview

- Simple Model Description
- Modeling Inventory
- Model Emissions Development
- Meteorology Inputs
- Model Performance
- Model Episode Issues
- Application to Plan
Why Use Ozone Models For the EOADP?

- Used to estimate the amount of emissions reductions needed to achieve the health standards
- Atmospheric chemistry and meteorology producing ozone is very complex
- Reductions in emissions do not result in proportional decreases in ozone
Organizations Involved in Central CA SIP Modeling

- Air Resources Board
- Sacramento Metropolitan AQMD
- San Joaquin Valley APCD
- Bay Area AQMD
- University of Riverside
- Desert Research Institute
- National Oceanic and Atmospheric Administration
- ENVIRON Corporation
Model Episodes

- July 29-August 2, 2000
- September 16-20, 2000
- July 8-13, 1999
- June 14-15, 2000
- August 11-16, 2002
Episode Characteristics
July 30-August 2, 2000

- Measured Concentration at Edison 151 ppb w/ Design Value 142 ppb
- Measured Concentration at Parlier only 129 ppb w/ Design Value 151 ppb
- Latest Simulation Peak about 140 ppb in Kern and Fresno County using hybrid meteorology
- Manter Fire in the vicinity of the peak concentration in southern region
Photochemical Grid Model
Photochemical Modeling Process

- Gather Inputs
- Run the Model
- Validate the Model
- Run Future Year Inventories
- Determine the amount of reduction needed to achieve the NAAQS
Components of Photochemical Modeling System

- Photochemical Model (CAMx)
- Meteorological Model (MM5 Hybrid)
- Emissions Inventory Model (EMS95)
- Chemistry (SAPRAC)
Modeled Wind Field Morning and Afternoon
Modeling Emission Inventory

- Gridded and chemically speciated inventory
- Temporally resolved
- 11,000 Individual Point Sources
- 100 categories of aggregated sources
- Chemical mechanism (SAPRAC)
Model Performance

Most Areas Meet Performance Criteria on July 30

Maximum Concentrations in Fresno and Bakersfield Regions are Near Design Values
Model Sensitivity to Natural Sources

- Wildfires
- Increase biogenics 25%
- Remove all biogenics
Wildfires

- Large Fires Evident in Base Case
- Model Has Some Sensitivity Fires
- Future Years Do Not Have Fires
- Solution Was to Use a Day That Was Not Effected by Wildfires (July 30)
O3 Change with Fires

Compare with MODIS Terra Satellite Image

O3 Concentration with Fires

Compare with MODIS Terra Satellite Image
CAMx v4.02 CCOS Domain July 29 - August 2, 2000

July 31, 2000 12:35 PDT
Base Case Ozone and 2010 Forecast

Maximum Ozone Concentration
2000 CCOS Episode
July 30

Maximum Ozone Concentration
2010 Without Additional Controls
July 30
Bakersfield Carrying Capacity Diagrams for July 30, 2000, with 2010 Projected Emissions
Summary of EOADP Photochemical Modeling

- Model Performance Meets Performance Criteria in Most Areas
- Fire and Biogenic Emissions Issues
- Hybrid Meteorological Model Issues