

Slide 1

North American Background Ozone PA Comments

Sam Oltmans

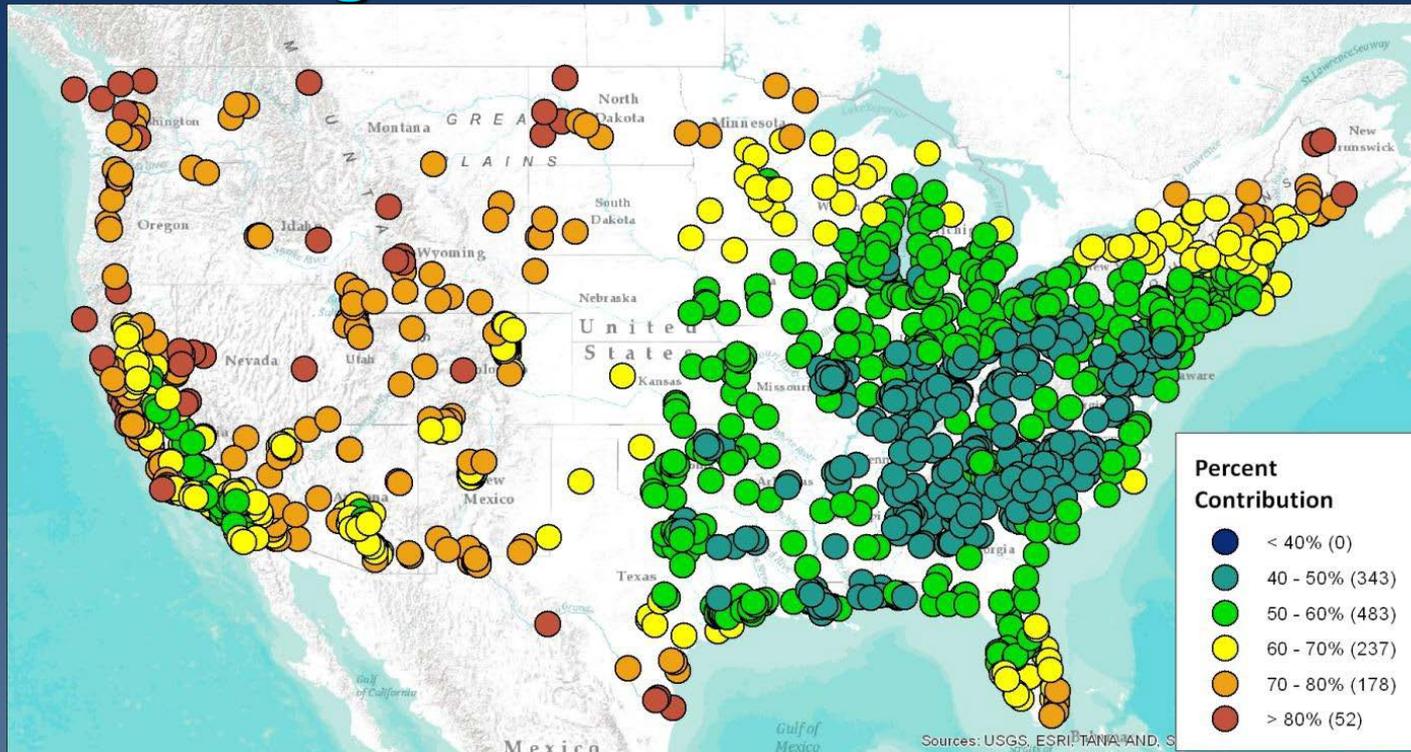
Boulder, Colorado

Comments to the U.S. EPA CASAC Ozone Review Panel

March 26, 2014

Slide 2

Background Ozone Over the U.S.



Map of apportionment-based U.S. background percent contribution to seasonal mean O₃ based on 2007 CAMx source apportionment modeling. (Source: page 2-18 of PA).

Note the very high contribution in the western U.S. and portions of the northeast U.S.

What are the implications for western U.S. ozone levels?

Slide 3

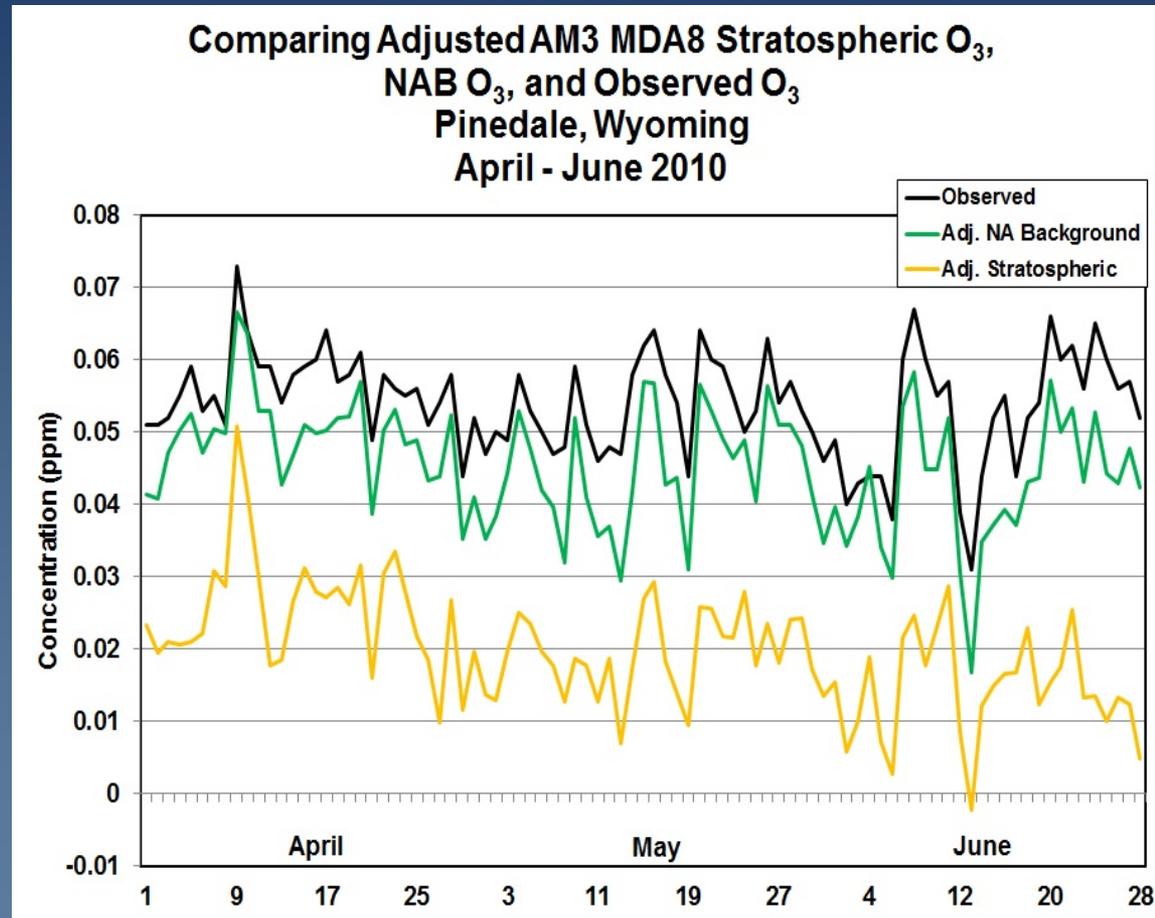
Comparison of Model Results: Impact of Background Over the Intermountain West

GFDL AM3 (2010) adjusted model O₃ and adjusted stratospheric component at Pinedale, Wyoming in April-June with observed O₃.

There are a number of days with MDA8 O₃ > 0.06 ppm, all with large NAB contribution.

The model captures a high observed O₃ event on April 9 with large stratospheric input.

Use the LAGRANTO trajectory model to corroborate the event



Slide 4

Comparison of Model Results: Impact of Background Over the Intermountain West

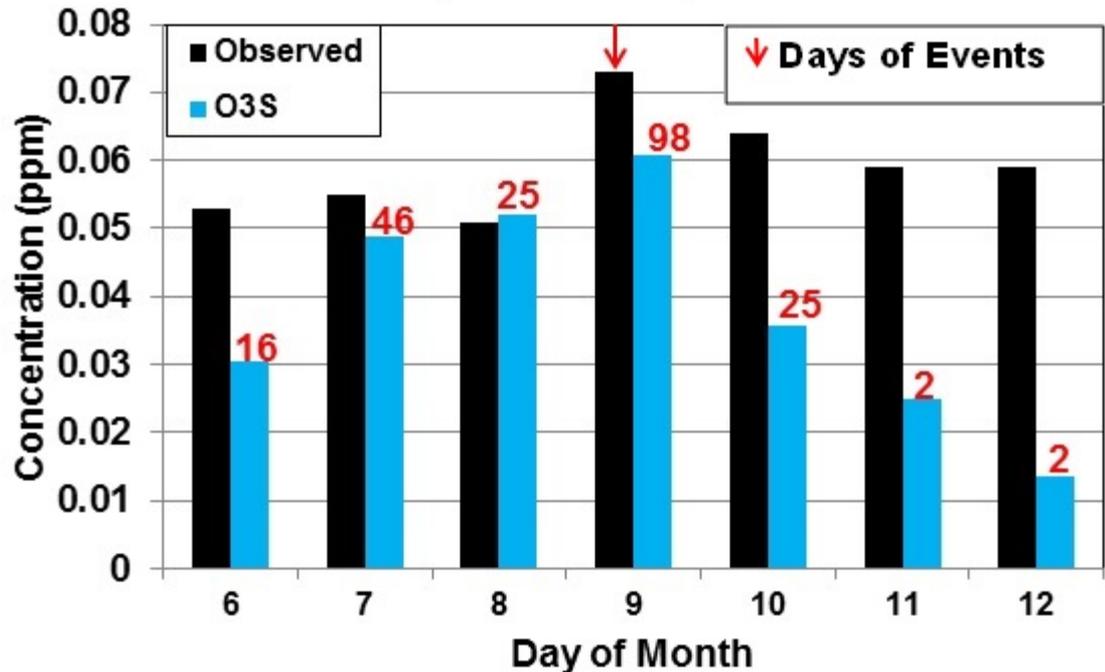
Model NAB from GFDL AM3 (2010) at Pinedale, Wyoming in April-June.

Lagrangian model LAGRANTO shows possible significant stratospheric O₃ on April 9 consistent with AM3.

The AM3 model identifies significant stratospheric input to NAB for the April 9 event consistent with the trajectory model.

However, high NAB throughout the April-June period does not appear to be stratospheric "event" driven.

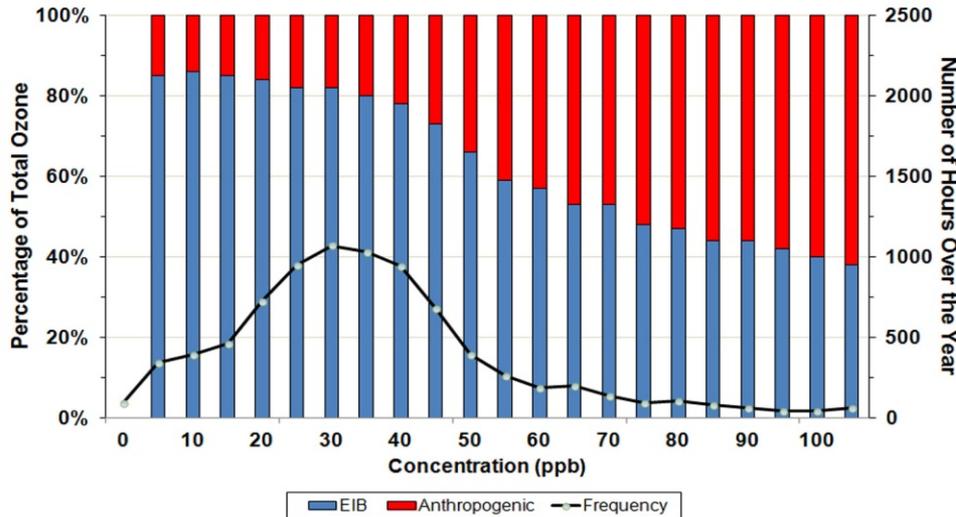
Observed O₃, Unadjusted O_{3S}, and Daily Total STT-S Counts
Pinedale, Wyoming
April 6 - 12, 2010



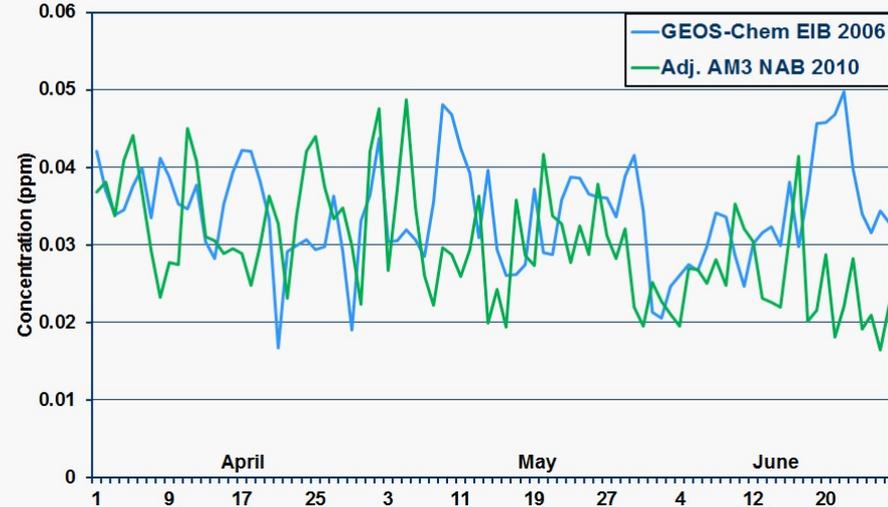
Slide 5

Relative Importance of Anthropogenic and Background O₃ Concentrations

Anthropogenic and Emissions-Influenced Background (EIB) Contributions to Total Ozone Concentration
Sacramento, CA
Data for the Year 2006



Comparing MDA8 GEOS-Chem EIB O₃ (2006) with Adjusted AM3 NAB O₃ (2010)
Sacramento County, California
April - June



Comparison of model emissions influenced background (EIB) with GEOS-Chem (2006) anthropogenic concentrations.

For the Sacramento County site, background O₃ plays a predominant role (i.e., > 50%) throughout most of the range of concentrations.

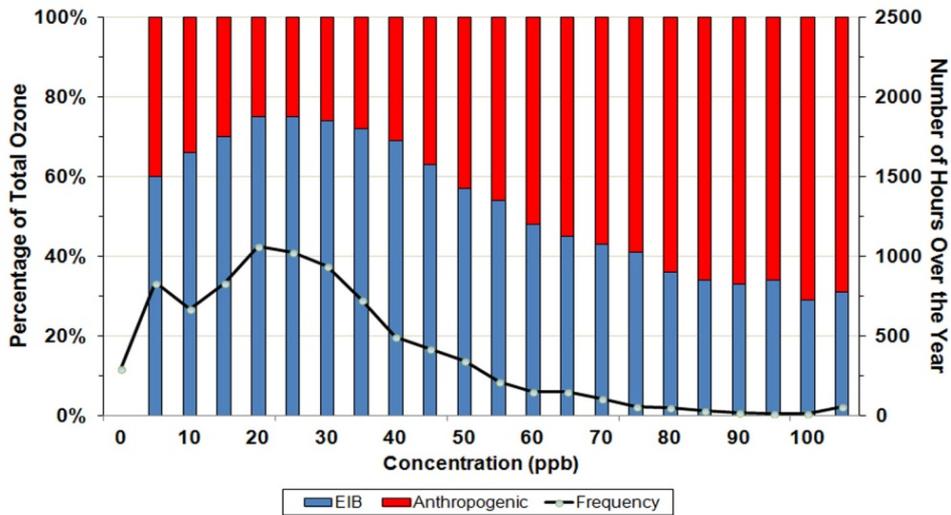
Comparison of GEOS-Chem/CAMx model emissions influenced background (EIB) with adjusted GFDL AM3 NAB.

Bias corrected EIB and NAB show very similar levels even when comparing different years.

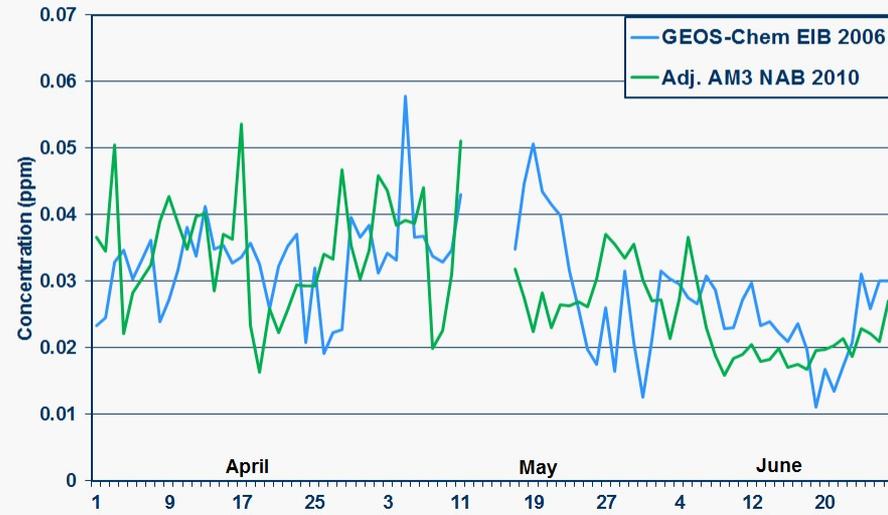
Slide 6

Relative Importance of Anthropogenic and Background O₃ Concentrations

Anthropogenic and Emissions-Influenced Background (EIB) Contributions to Total Ozone Concentration
Houston, TX
Data for the Year 2006



Comparing MDA8 GEOS-Chem EIB O₃ (2006) with Adjusted AM3 NAB O₃ (2010)
Harris County, Texas
April - June



Comparison of model emissions influenced background (EIB) with GEOS-Chem (2006) anthropogenic concentrations.

For the Houston site, background O₃ plays a predominant role (i.e., > 50%) until approximately 55 ppb.

Comparison of GEOS-Chem/CAMx model emissions influenced background (EIB) with adjusted GFDL AM3 NAB.

Bias corrected EIB and NAB show very similar levels even when comparing different years.

The Importance of Background O₃

- ◆ Two models (GEOS-Chem/CAMx and GFDL AM3) indicate a substantial contribution of North American Background O₃ to observed levels in western U.S.
- ◆ After adjusting for model biases the two models predict very similar levels for both low, middle, and high EIB or NAB O₃.
- ◆ Background ozone (either EIB O₃ or NAB O₃) contributes a large percentage of the total O₃ concentration in the 25-55 ppb range.
- ◆ High background O₃ can lead to exceedance or near exceedance levels of observed MDA8 O₃ for the current, and even more frequently for proposed lower, standards at high-elevation sites in the western U.S.
- ◆ Some potential O₃ exceedances from background O₃ may be identifiable as "exceptional events" but most high background O₃ days are not primarily short term "event" driven.

Extra Slide



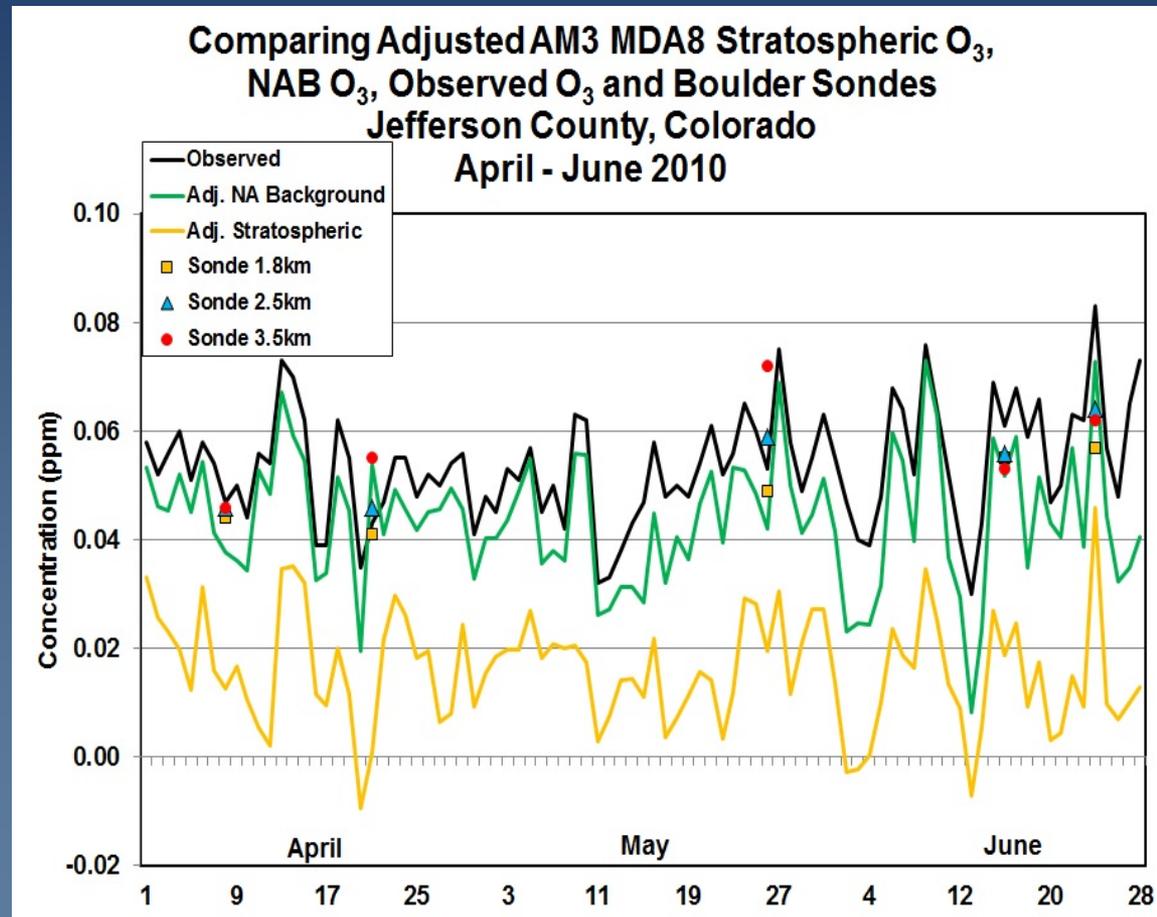
Extra Slide

Comparison of Observations with Model Results: Impact of Background Over the Intermountain West

Comparison of model results from the GFDL AM3 with observations at Jefferson County (Denver) in April-June 2010.

A large fraction of observed attributed to NAB

The contribution from the stratosphere is important to NAB even into early summer



Extra Slide

Comparison of Observations with Model Results: Impact of Background Over the Intermountain West

Comparison of model results from the GFDL AM3 with observations at Rocky Mountain National Park, CO in April-June 2010.

A large fraction of observed attributed to NAB

The contribution from the stratosphere is important to NAB even into early summer

