

## **Aura 3 Combo (2004 – 2006) Production Run Summary**

### Status

Available as of 10/16/2007 on the anonymous ftp site:

*output/gmic/aura3*

### Purpose

To test the effects of the ap1.0 lightning algorithm (Allen, 2006) and the HO<sub>2</sub> uptake reaction in combination with the aura code integrations. Please note: David Considine's H<sub>2</sub> fix for combo did **not** make it into these runs.

### Corrections from Original Aura run

- Convection fix for the “creation” of all of the advected species in the upper troposphere. This creation occurred about 6 times per year.
- Soil NO<sub>x</sub> fix
- Correct fertilizer scale, vegetation type, precipitation, and leaf area index input
- Correct forcing boundary conditions for 2003, 2004 and 2005

### General Model Configuration

- Years: 2004 – 2006
- 30 minute model time step
- Updated boundary conditions to reflect the year 2004
- Spin up for 6 years, using source gas boundary conditions for 1998-2003. This adjusts the stratospheric mixing ratios of a number of long-lived species.
- Spin up done with Aura\_Harvard\_2004\_Emissions.nc
- GEOS4DAS met fields
- 8 records per day
- 2 deg lat x 2.5 deg lon x 42 levels with lid at 0.01 hPa
- JPL02 updates
- HO<sub>2</sub> uptake reaction on tropospheric aerosols
- New tropopause definition
- Fast\_JX v5.2

- The x-section data have been revised using JPL-02, IUPAC (up to 2004) and Gierczak's acetone tables.
- Ship emissions
- 2000-1 fossil fuel emissions (EDGAR+others) and Yevich biofuelNo isop scaling
- GFEDv2 year-specific biomass burning source
- Ap1.0 lightning parameterization (Allen, 2006)
- 195 profile stations
- Vertical profile truncation fix for column diagnostics
- Capability to output surface ozone in the freq files
- Capability to output column profiles in the freq files

### Code Version

Runs were performed on the Aura branch.

#### Tags

Aura2ReRun\_1\_2004\_5\_2005  
Version: 2.0.0.b3

Aura2ReRun\_6\_2005\_12\_2006  
Version: 2.0.0.b6

### Known bugs

- Condense routine did not use local values of ilat
- The ship emissions were processed incorrectly in units of kg/s, instead of molec/s. Therefore, the production of ozone from shipping NO<sub>x</sub> is too low and should be higher by a ratio of 48/30, the molecular weights of ozone/NO. This correction is implemented in Aura 4.
- Two time records in February due to the leap year.

### Lightning

Dale 2006 ap1.0

### Output & Diagnostics

- 4 overpass times
  - o 2 kinds of noon species, which really represent different satellite overpass times. Both types save CH<sub>2</sub>O, CO, O<sub>3</sub>, NO<sub>2</sub>, and OH
- Overpass times: 10 – 11 am, 1 – 2 pm, midnight – 3 am, 9 pm – midnight
- Photolysis overhead ozone column in overpass files

- Other overpass outputs: temperature, surface pressure, mass, grid box, relative humidity, and cloud optical depth (1000 nm)
- Instantaneous daily constituents (freq1) “const\_freq1”. The constituents to be output at this frequency are: CH<sub>4</sub>, CO, HNO<sub>3</sub>, N<sub>2</sub>O, O<sub>3</sub>, OH, ClO, Cl<sub>2</sub>O<sub>2</sub>, ClONO<sub>2</sub>, HCl, CH<sub>3</sub>Cl, CFC<sub>13</sub> and CF<sub>2</sub>Cl<sub>2</sub>
- Other instantaneous daily outputs: potential vorticity, tropopause pressure, temperature, surface pressure, mass, relative humidity and metwater
- Grid box height in overpass, idaily, and hourlyoz files
- Surface hourly ozone for 1/2004- 5/2005
- Lower 8 levels of hourly ozone for 6/2005 – 12/2006
- All species in “const” in monthly averaged files

### Emissions

*(From Bryan 3/11/2007)*

emist\_2004\_m\_2x2.5\_auraharvardwship.nc  
 emist\_2005\_m\_2x2.5\_auraharvardwship.nc  
 emist\_2006\_m\_2x2.5\_auraharvardwship.nc

The total emissions for 2004 are:

CH<sub>2</sub>O = 2.1 Tg C  
 CO = 1076.7 Tg  
 NO = 35.5 Tg N  
 ALK4 = 19.6 Tg C  
 C<sub>2</sub>H<sub>6</sub> = 9.8 Tg C  
 C<sub>3</sub>H<sub>8</sub> = 11.7 Tg C  
 ISOP = 462.8 Tg C  
 MEK = 2.8 Tg C  
 PRPE = 27.3 Tg C

CO\_methanol = 126.7 Tg  
 CO\_monoterpene = 57.8 Tg  
 biogenic\_propene = 13.2 Tg C  
 soil\_NO<sub>x</sub> = 6.5 Tg N  
 HNO<sub>3</sub> = 4.6 Tg  
 O<sub>3</sub> = 4.3 Tg

### Aerosol Dust

aerodust\_agcm\_2x2.5\_2004\_kgm-3.nc  
 aerodust\_agcm\_2x2.5\_2005\_kgm-3.nc  
 aerodust\_agcm\_2x2.5\_2006\_kgm-3.nc