Preliminary Photochemical Air-Quality Simulations in California during CalNex

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Planning and Technical Support Division
Air Resources Board
California Environmental Protection Agency
Acknowledgements

- Rainer Volkamer, Hilke Oetjen, Sunil Baidar (Univ. of Colorado)
- Thomas Ryerson, Ilana Pollack, John Holloway (NOAA)
- Barry Lefer (Univ. of Houston)
- Dazhong Yin, Kemal Gurer, Bruce Jackson, Jeremy Avise (CARB)
- Louisa Emmons (NCAR)
- James Kelly (EPA)
Model Application

- CMAQ4.7 with SAPRC99
- 4 km × 4 km horizontal resolution; 30 vertical layers from surface to ~100mb with the lowest layer nominally 30-m deep; 315 × 285 × 30 total grid points.
- MM5 Meteorological fields
- “2008 June” weekday/weekend emissions
- Boundary conditions from MOZART-4
NO$_2$ Vertical Column Below Aircraft
[Unit: $1 \times 10^{15}$ molec cm$^{-2}$]

Twin Otter
07/16/2010
Wednesday
Morning flight
CalTech Surface Site (LA Supersite)
Lancaster Surface Site

Date of 2010
P3 Flight on 05/16/2010 (Sunday)
P3 Flight on 05/16/2010
Vertical Comparison on 05/16/2010

(Data are grouped to each model layer, solid dot: mean, error bar: ±1σ)
NO$_2$ Vertical Column Below Aircraft
[Unit: $1\times10^{15}$ molec cm$^{-2}$]

Twin Otter 06/29/2010 (Tuesday) Flight

**Observation**

**Simulation**
Bakersfield Surface Site

Date of 2010
Shafter Surface Site

Date of 2010

Observation
Model

Date of 2010

05/06 05/11 05/16 05/21 05/26 05/31 06/05 06/10 06/15 06/20 06/25 06/30

0 20 40 60 80

NOx(ppb)

0 20 40 60 80

NO2(ppb)

0 20 40 60 80

NCO(ppb)

0 20 40 60 80

O3(ppb)
Fresno Surface Site

Observation Model

Date of 2010

05/06 05/11 05/16 05/21 05/26 05/31 06/05 06/10 06/15 06/20 06/25 06/30
NO$_2$ Vertical Column Below Aircraft

[Unit: $1 \times 10^{15}$ molec cm$^{-2}$]

06/21/2010
Monday
Flight ~2km

06/28/2010
Monday
Flight ~2km
Sacramento Surface Site

Date of 2010

O_{3}(ppb)

N_{O}(ppb)

N_{2}O_{2}(ppb)

N_{Ox}(ppb)

Observation
Model

06/21 06/28
NO$_2$ Vertical Column Below Aircraft
[Unit: 1x10$^{15}$ molec cm$^{-2}$]
Twin Otter 06/26/2010 Saturday (Flight ~4-5.5km)
Livermore Surface Site
CalNex P3 06/14/2010 (Monday)
CalNex P3 Flight on 06/14/2011
Vertical Comparison on 06/14/2011

(Data are grouped to each model layer, solid dot: mean, error bar: ±1σ)
Future Work

- “True 2010” emissions inventories with appropriate adjustments for recession
- Compare with additional measurements
  - Collaborations with CalNex experimentalists
  - Routine surface/space based measurements
- Model performance evaluation (Met/AQ)
- Model inter-comparison (Met/AQ)
Further Questions and Comments?

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