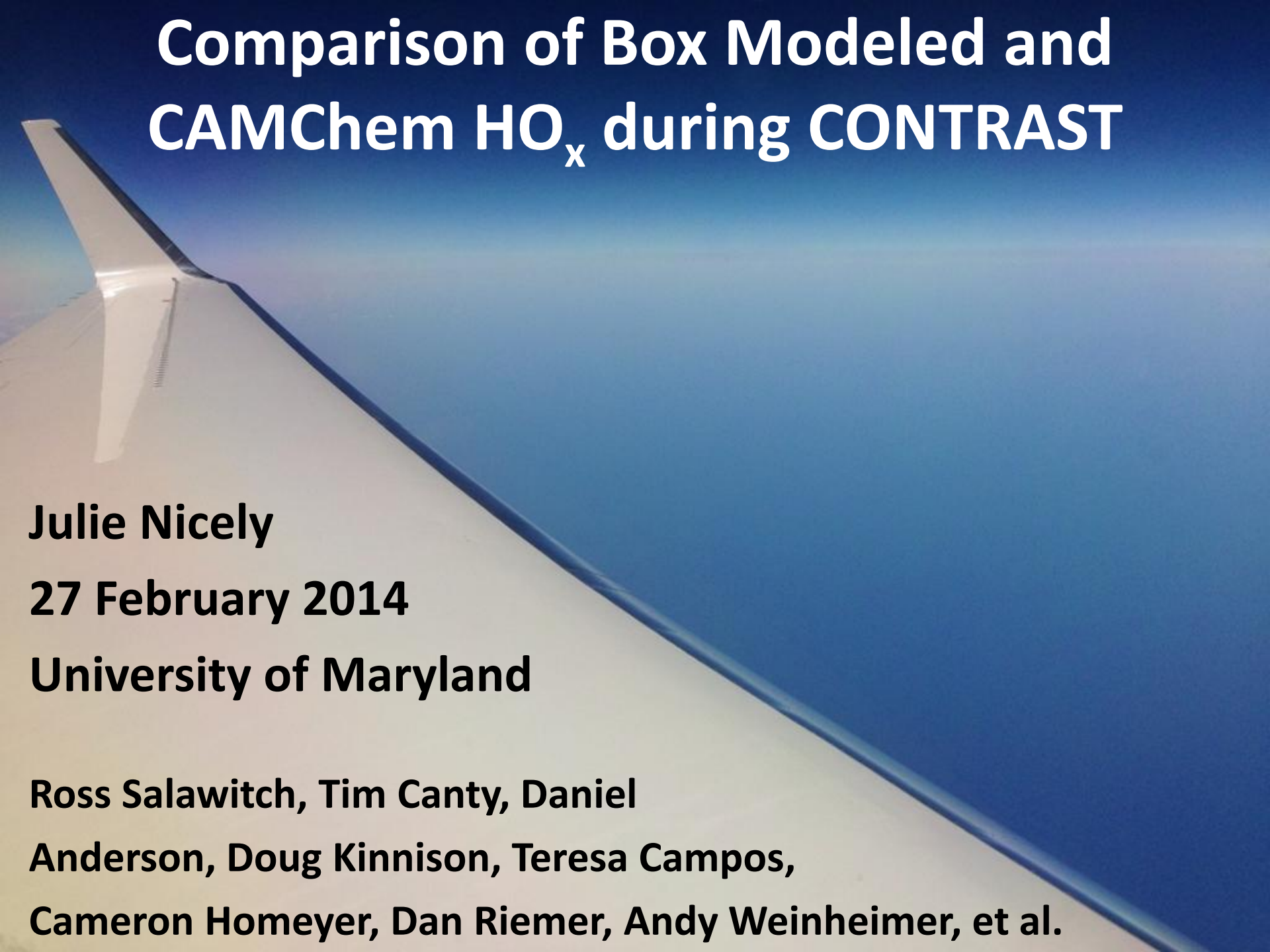# Comparison of Box Modeled and CAMChem HO$_x$ during CONTRAST

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27 February 2014

University of Maryland

Ross Salawitch, Tim Canty, Daniel Anderson, Doug Kinnison, Teresa Campos, Cameron Homeyer, Dan Riemer, Andy Weinheimer, et al.

Box Model

DSMACC: Dynamically Simple Model for Atmospheric Chemical Complexity tropospheric chemistry box model that can interface to various chemical mechanisms

-Emmerson and Evans, ACP, 2009

Makes use of the:

KPP (Kinetics PreProcessor)

Damian et al., Computers and Chemical Engineering, 2002.
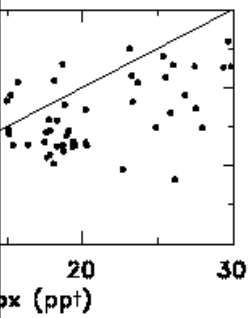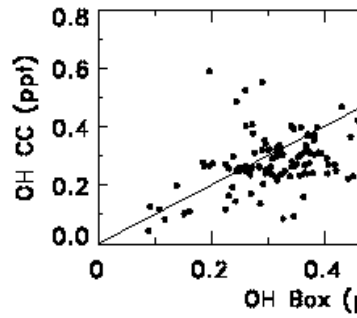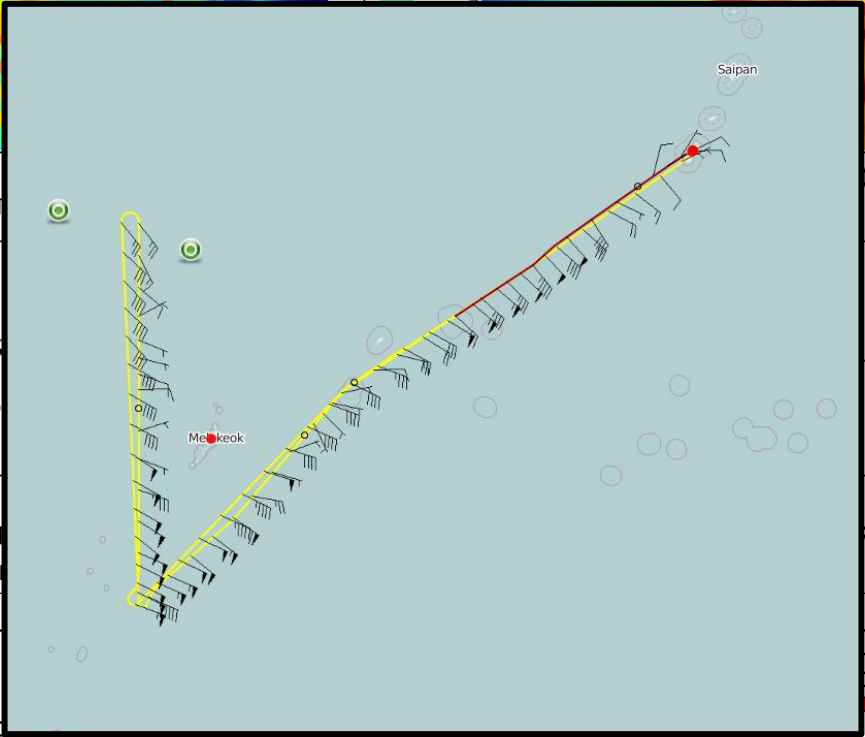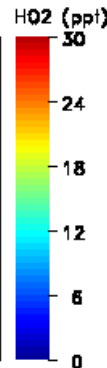
Leeds Master Chemical Mechanism

Bloss et al., ACP, 2005

Box model inputs: all measured on GV
p
T
H_2O
O_3
CO
NO
NO_2
CH_4
Acetone
C_3H_8
Isoprene
MVK
MACR
CH_3OH
CH_3CHO
HCHO
$J(O^1D)$
$J(NO_2)$

RF04

RF04 OH from DSMACC   OH (ppt)

RF04 HO2 from DSMACC   HO2 (ppt)
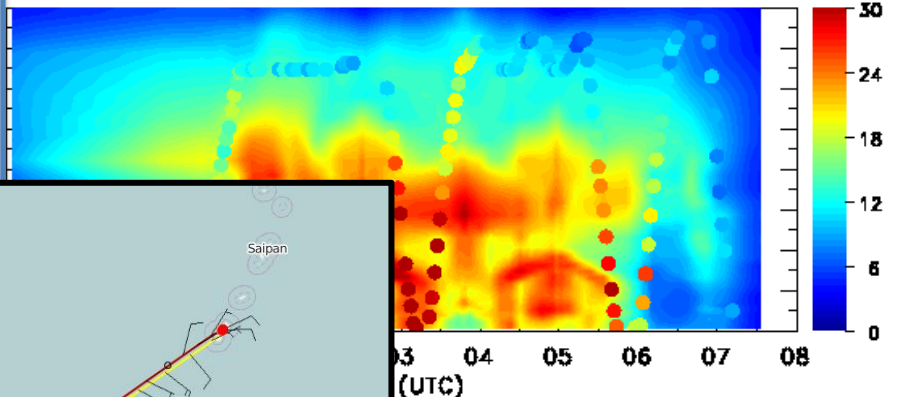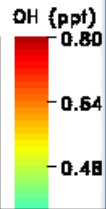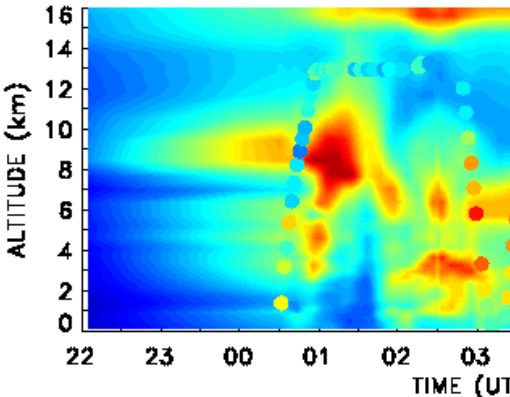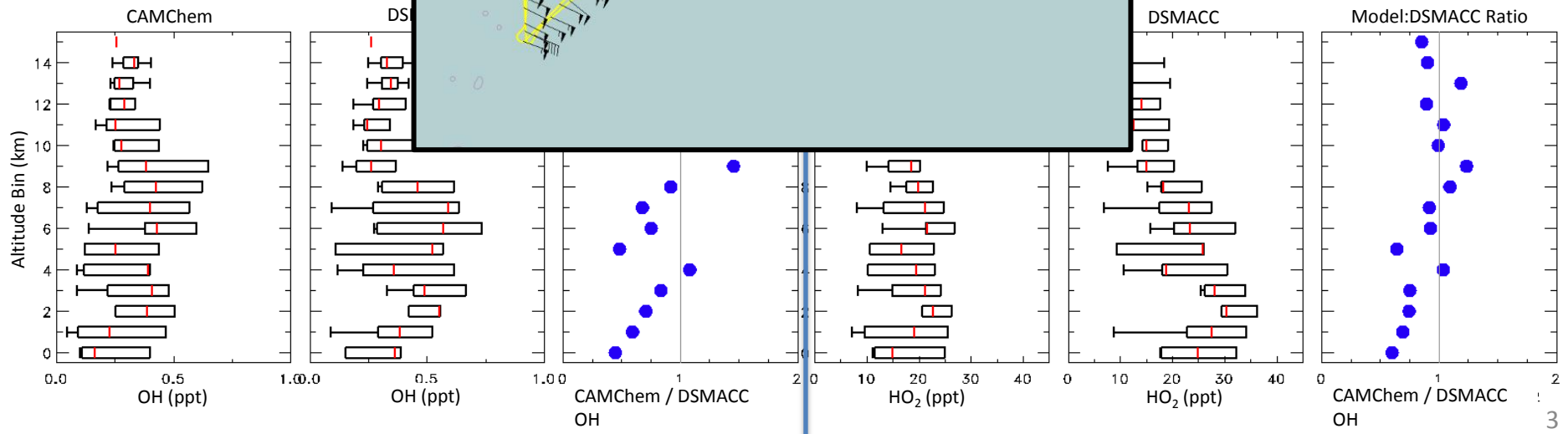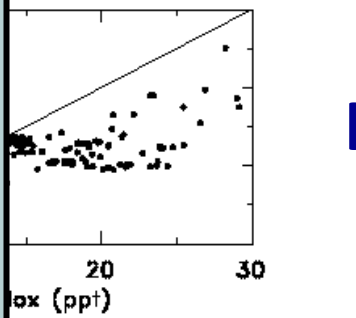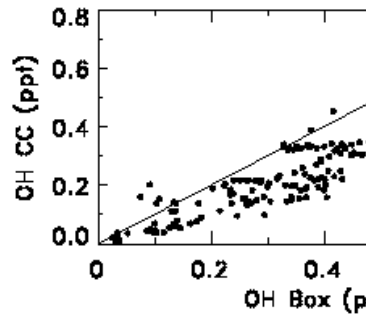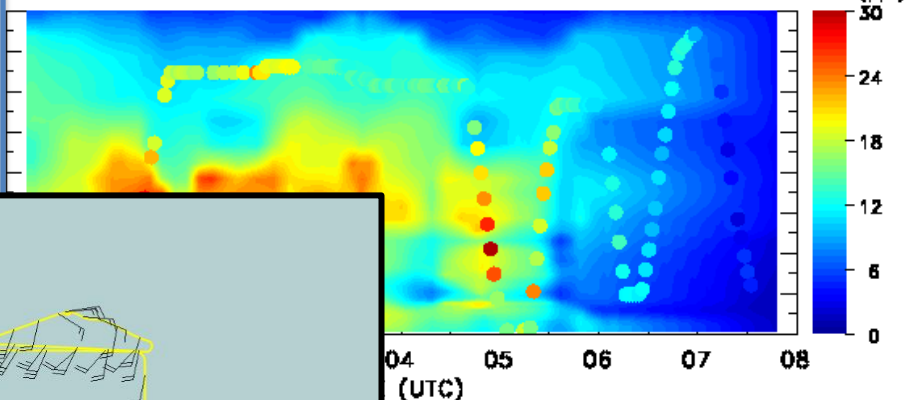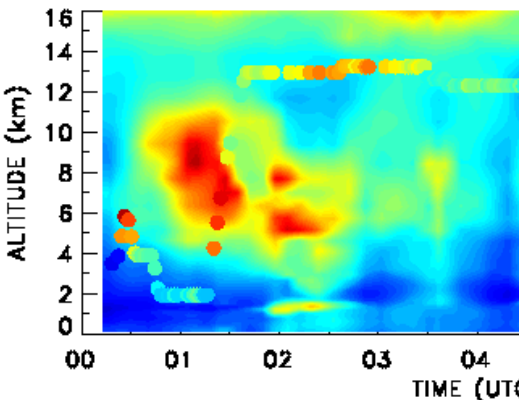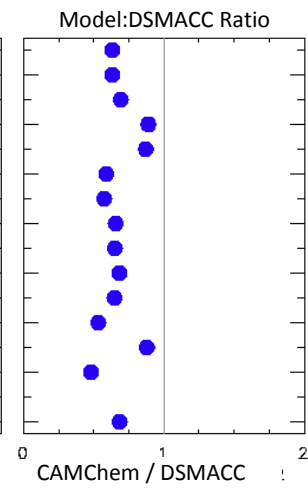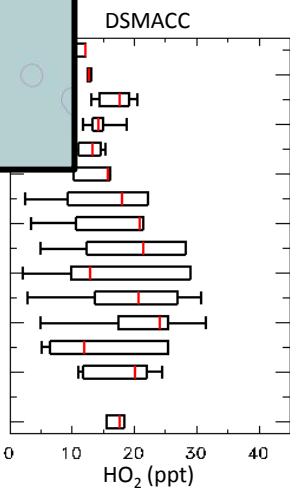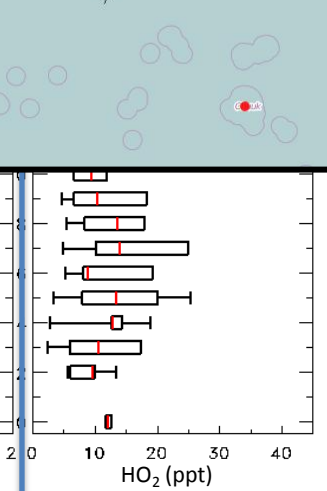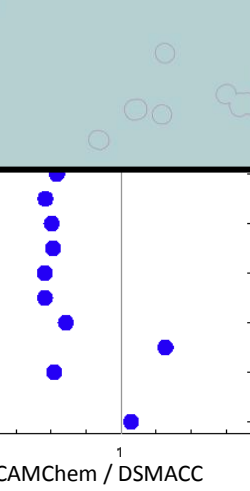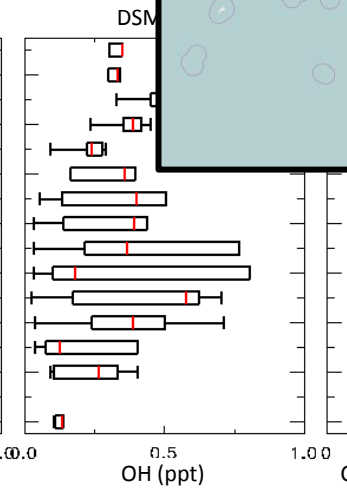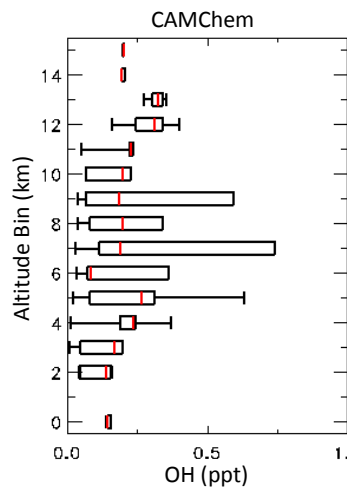
HO$_2$

3

RF05

HO_2

HO$_2$

OH
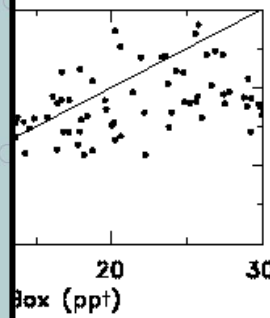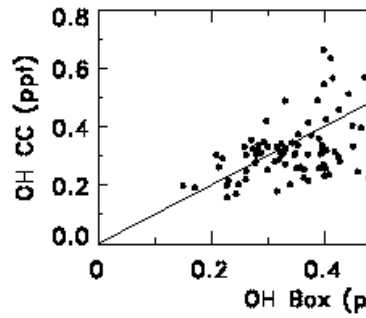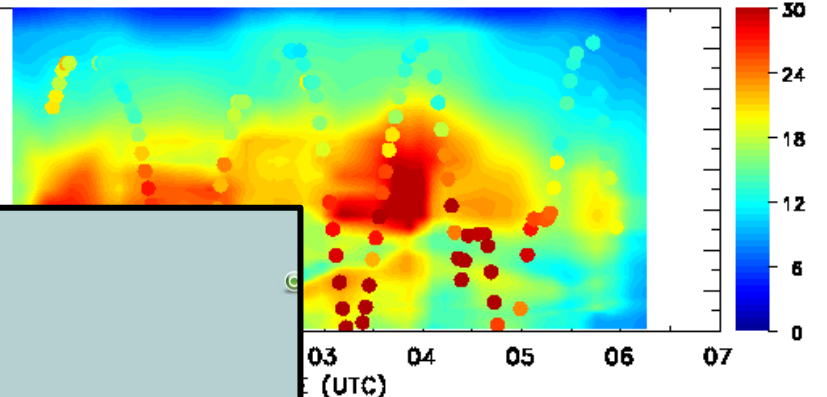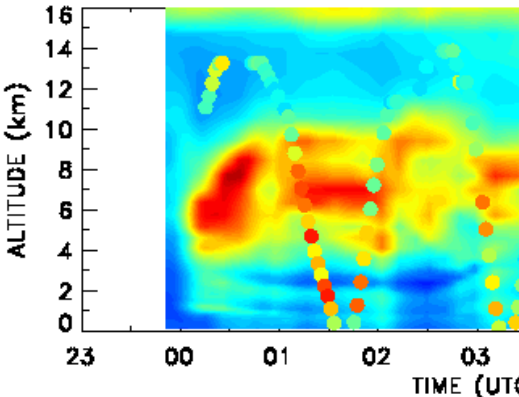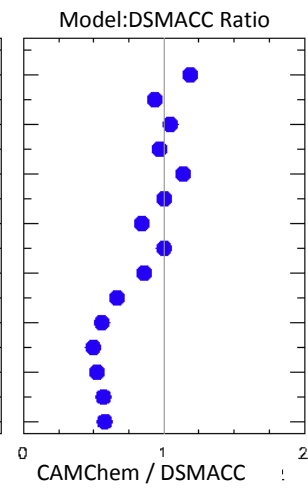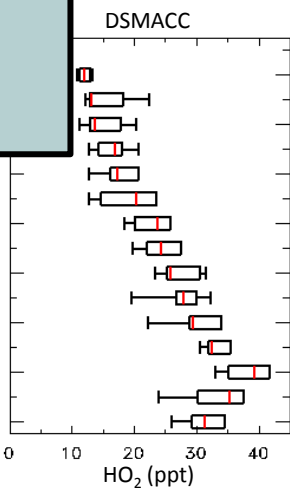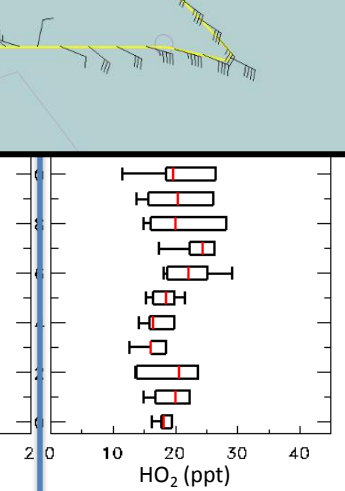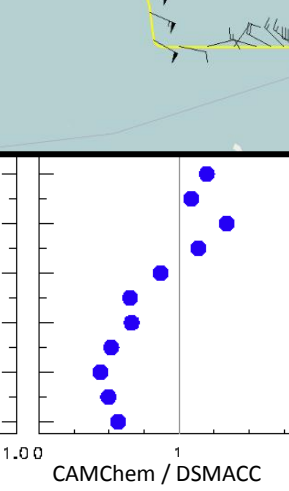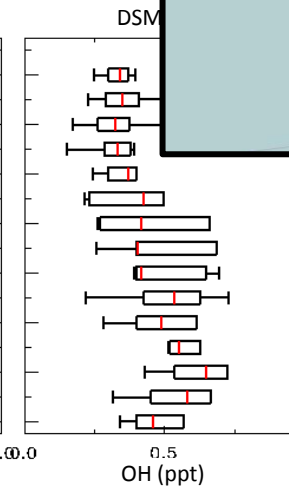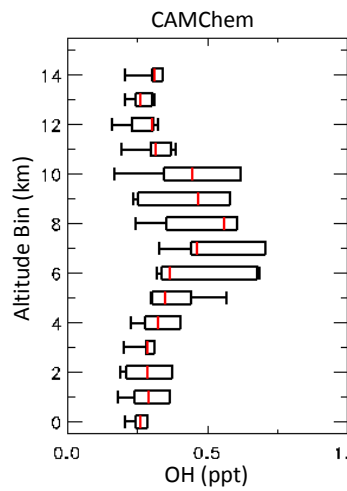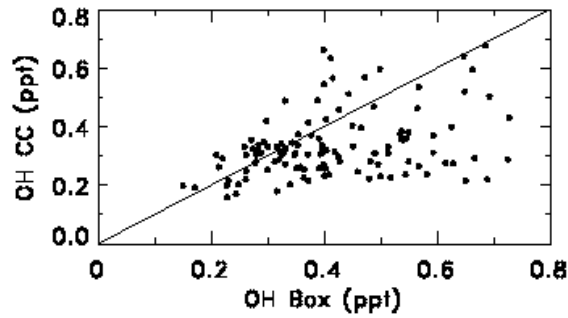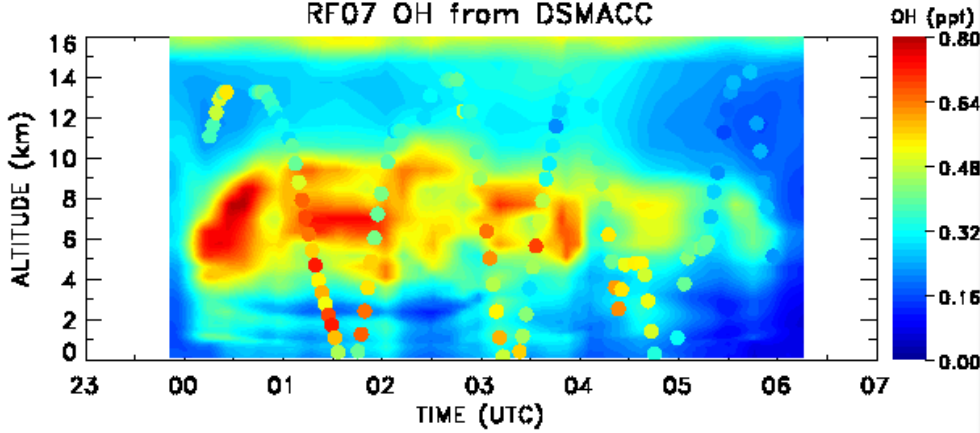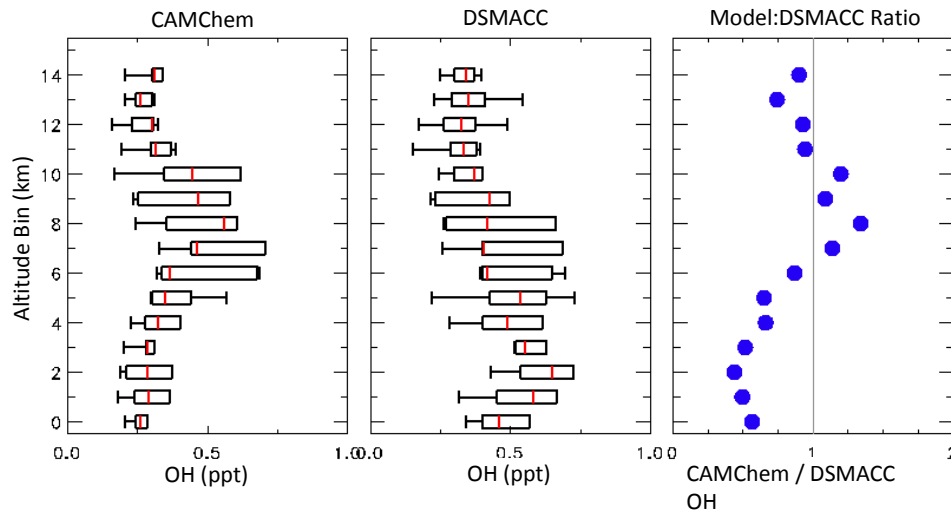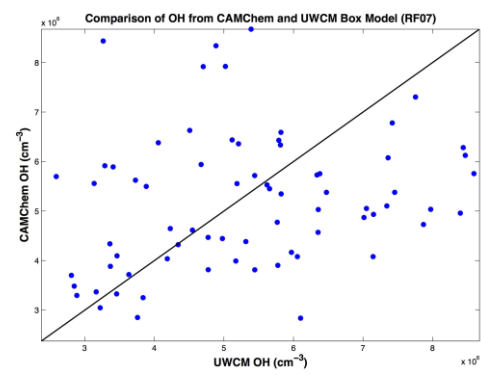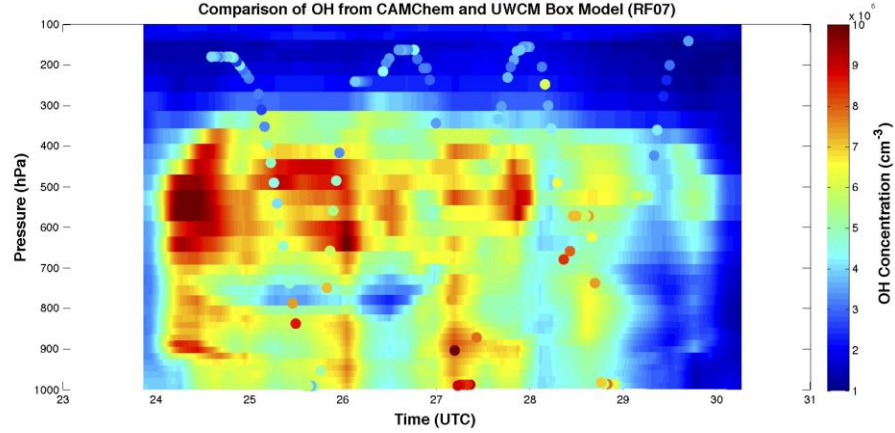
OH

(from another box model)

Dan Anderson independently runs the UWCM box model developed by Glenn Wolfe

Conclusions

- OH and HO_2 inferred from CONTRAST observations are consistently larger than OH and HO_2 within CAMChem
  - Discrepancy ~factor of 2 near surface
  - Discrepancy decreases with altitude

- Further research:
  - What species most strongly influence the apparent low bias in CAMChem HO_x?
  - Extend to other flights as data submission becomes complete
  - Assess HO_x mechanism within both box models by comparing to CAMChem output using CAMChem constraints as well as measurements of tropospheric HO_x from other missions
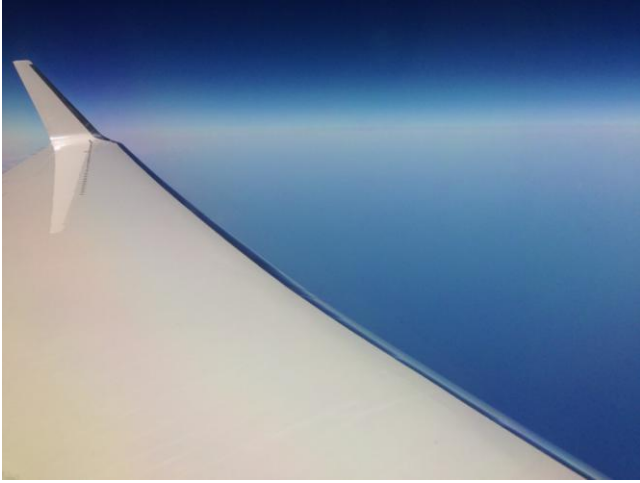
Questions?

Backup

SZA

RF04:

RF05:

RF07:

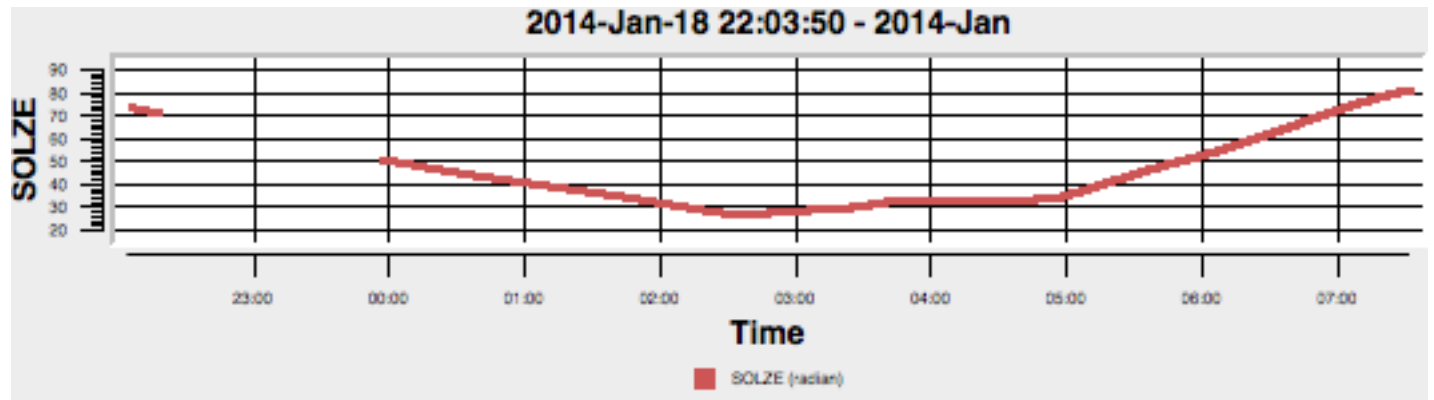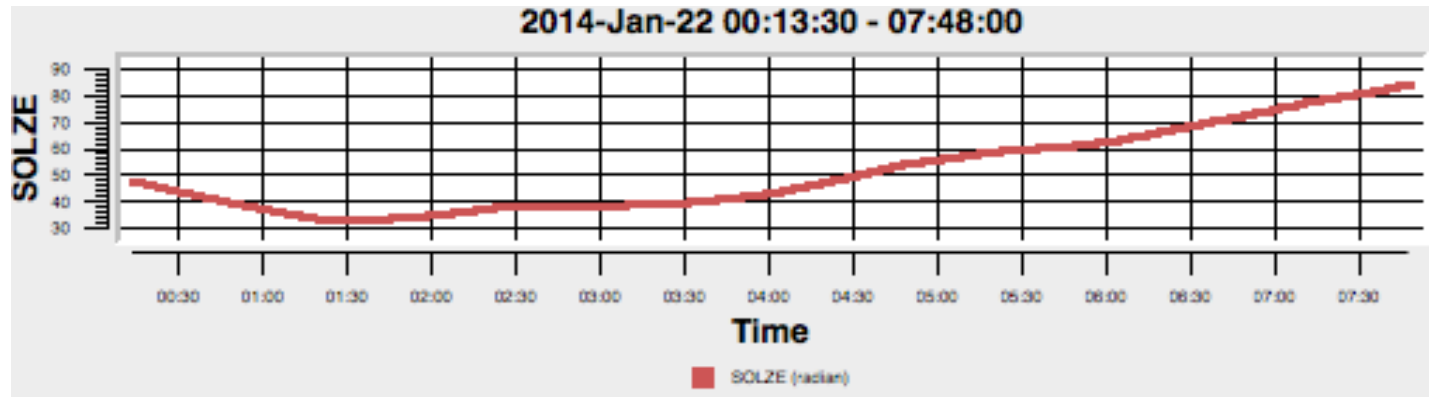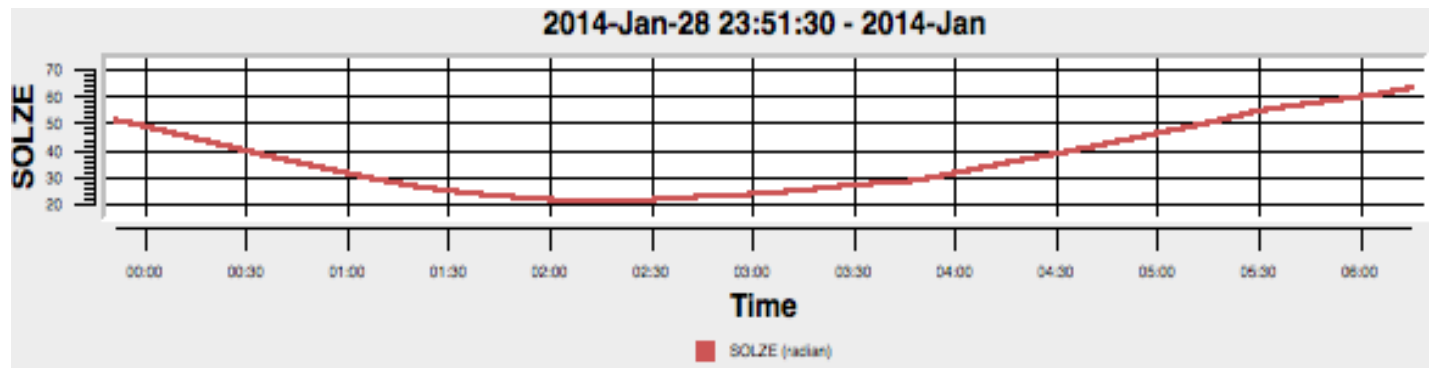| RF	CO	CH$_4$	NO	NO$_2$	ISOP	Acetone	Propane	MVK	MACR	CH$_3$OH	CH$_3$CHO	HCHO	J(O^{1}D)	J(NO$_2$)
01	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
02	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
03	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
04	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
05	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
06	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
07	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
08	✔	✔	✔	✔	✘	✘	✘	✘	✘	✘	✘	✔	✔	✔
09	✔	✔	✔	✔	✘	✘	✘	✘	✘	✘	✘	✔	✔	✔
10	✔	✔	✔	✔	✘	✘	✘	✘	✘	✘	✘	✔	✔	✔
11	✔	✔	✔	✔	✘	✘	✘	✘	✘	✘	✘	✔	✔	✔
12	✔	✔	✔	✔	✘	✘	✘	✘	✘	✘	✘	✔	✔	✔
13	✔	✔	✔	✔	✘	✘	✘	✘	✘	✘	✘	✔	✔	✔

Comparison between box models

Comparison of Modeled OH Output for RF04, 05, & 07
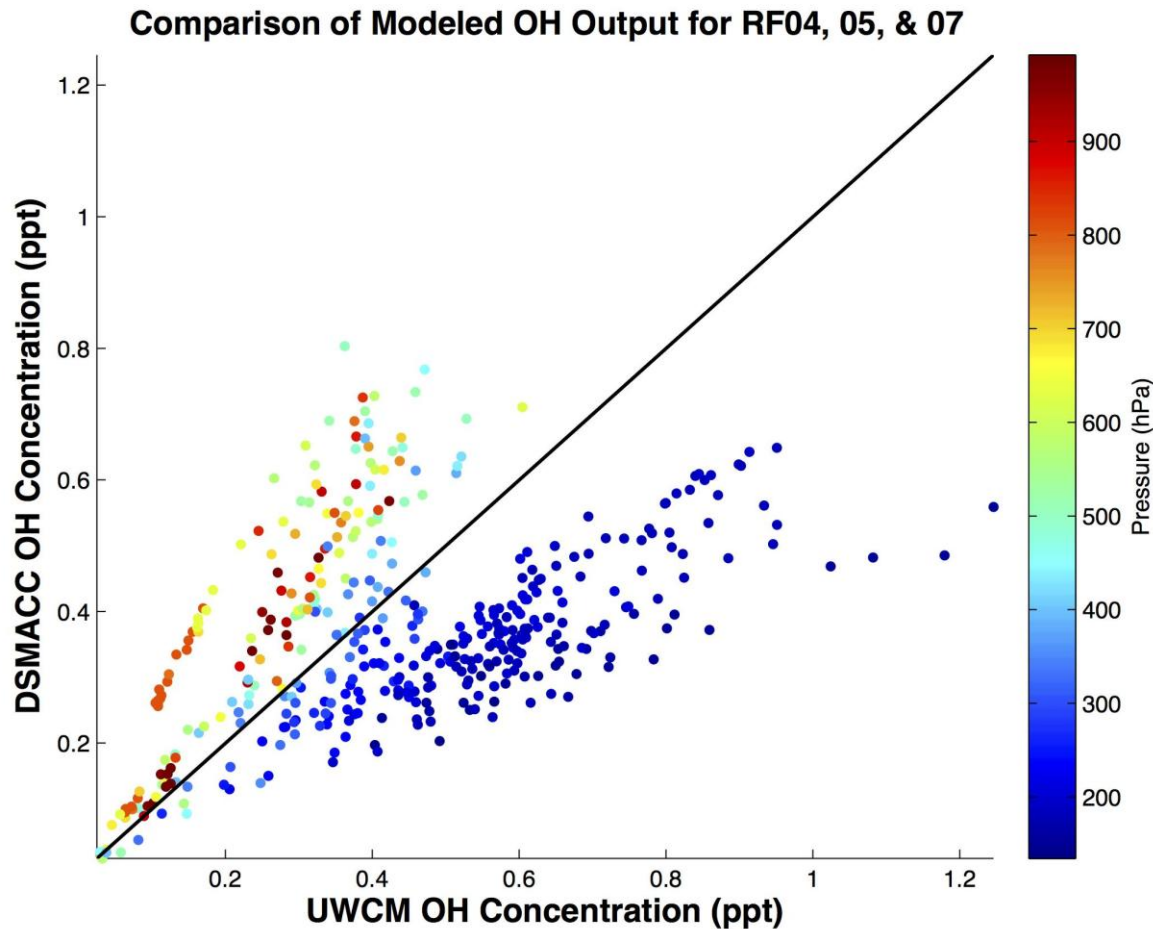
Dan Anderson independently runs the UWCM box model developed by Glenn Wolfe, put together above comparison