Report on Breakout Session: Seasonal Transition of the Upper Tropospheric Composition

In attendance: Owen Cooper, Marta Fenn, Carolyn Butler, Frank Flocke, Jonathan Dean-Day, Louisa Emmons, Heidi Huntrieser, Dale Allen

DC3 Science Team Meeting, February 26, 2013

Three modelling groups are interested in studying the UT seasonal transition

- 1) Cam-Chem, global scale (half degree), NCAR, Louisa Emmons
- 2) EMAC, global scale, DLR, Patrick Joeckel
- 3) NASA CCM or GMI models, global scale (1-degree), U. of Maryland, Dale Allen

General Method:

- 1) Run model for May –August 2012 time period
- 2) Evaluate model performance against in situ observations during DC3
- 3) Evaluate model against satellite retrievals during July-August
- 4) Quantify the ozone and NO_x budget above North America during the study period
- 5) Calculate the radiative influence of the enhanced summertime ozone

Useful data sets:

NASA DIAL ozone CO and O_3 retrievals from TES, IASI and MLS ACE-FTS hydrocarbons (limb soudner) Canister samples of hydrocarbons and CFC's (STE influence) high time resolution N₂O (STE influence)

Best approach for model/measurement comparisons:

- compare the global/regional scale models to chemical measurements made outside of deep convective clouds (global scale models can't resolve thunderstorm chemistry)
- 2) Profiles in and out of Salina (not influenced by recent convection) would give the best climatological view of the free tropospheric composition.
- 3) Use chemical measurements to distinguish between air masses with weak and strong influence from stratospheric intrusions (O₃, CO, H₂O, N₂O, CFC-11).
- 4) DIAL ozone data will be valuable for describing the tropospheric ozone climatology during DC3 (data can be gridded into monthly averages for easy comparison to models).
- 5) During July and August the best data sets for model evaluation will be the satellite retrievals which are biased towards clear sky conditions.

Potential manuscripts:

All three modeling groups plan on running their models past the DC3 time period to also cover the July-August time periods.

The main goal is to evaluate model performance to determine if the models can accurately reproduce UT chemistry during early and late summer across North America.

Quantifying the radiative impact of the late summer ozone enhancement is a possible topic to address.

The seasonal transition is a natural topic to address with a global scale model that will feature, to some extent, in the publications that these groups produce.