Updates to the GMI/CCM chemistry package within last year or so & some ongoing activities

1) Updating to v6.5 of FASTJX: Jules Kouatchou with guidance from Huisheng Bian

Why? 1. cross-sections are outdated and significantly changed.
2. Michael Prather no longer supports our old version.

2) Tropospheric heterogeneous chemistry: Eric Nielsen implemented an updated heterogeneous chemistry package from Joel Thornton at U. of Washington.

Why? Uncertain of how to treat uptake of HO_2 on aerosols.

Thornton, J. A., L. Jaegle, and V. F. McNeill (2008), Assessing known pathways for HO_2 loss in aqueous atmospheric aerosols: Regional and global impacts on tropospheric oxidants, *Journal of Geophysical Research-Atmospheres*, *113*(D5), D05303.

3*)* Improved isoprene mechanism: Bill Swartz, in consultation with Mat Evans, is beginning implementation of a new isoprene oxidation mechanism (Paulot et al. (2009)).

Why? Should provide more credible representation of the impact of isoprene on isoprene nitrate formation, OH, and, hopefully, ozone.

4) Option for methane fluxes: Eric Nielsen implemented.

Why? Facilitate work at GMAO on land-surface modeling.

5) Updated trace gas emissions: Sarah Strode implemented the latest Harvard emissions into the code. GFEDv3 implemented.

Why? Emissions really outdated.

6) Reduced chemical mechanism: Bill Swartz will work to simplify VOC chemistry.

Why? This will help computational efficiency, particularly for 1x1.25 degree or long simulations.

7) Trace Gas-Aerosol Coupling: Eric Nielsen coupled the trace gas chemistry and aerosols in the CCM.

8) Improved structure of code: Jules Kouatchou rearranged the structure of the code.

Why? Make code more flexible and efficient.

9) Tagged CO & methane options: Eric Nielsen/Lesley Ott implemented tagged CO and tagged methane options.

Why? Great diagnostic tools.

10) Solar cycle: Bill Swartz implemented variation in solar output in StratChem. May implement in Combo as well.

Why? Solar variability impacts stratosphere and troposphere chemistry and dynamics.

11) …. Probably lots more that I'm forgetting!