

MAP08 Proposal

The Global Modeling Initiative:
Satellite data analyses and model sensitivity experiments
to reduce uncertainties in chemistry climate modeling

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Tasks 1 & 3 are

- *satellite data analyses (AURA and SciSat)*
- *application of analysis results to the details of UT/LS and tropical transport in Chemistry Transport Models (CTMs) and Chemistry-Climate Models (CCMs)*

Tasks 2 & 4 are

- *GMI CTM sensitivity studies (e.g., to horizontal/vertical resolution, convection scheme, meteorology)*
- *Evaluation of GMI CTM hindcast simulation credibility*

Satellite Data Analyses

Analyze SciSat ACE long-lived trace gas measurements (e.g., N₂O, CH₄, F11, and F12) to empirically derived age spectra (a la Schoeberl et al. 2005), esp. in the polar region. Get a more robust measure of tropical mean age, investigate tropical 'recirculation' as a function of height.

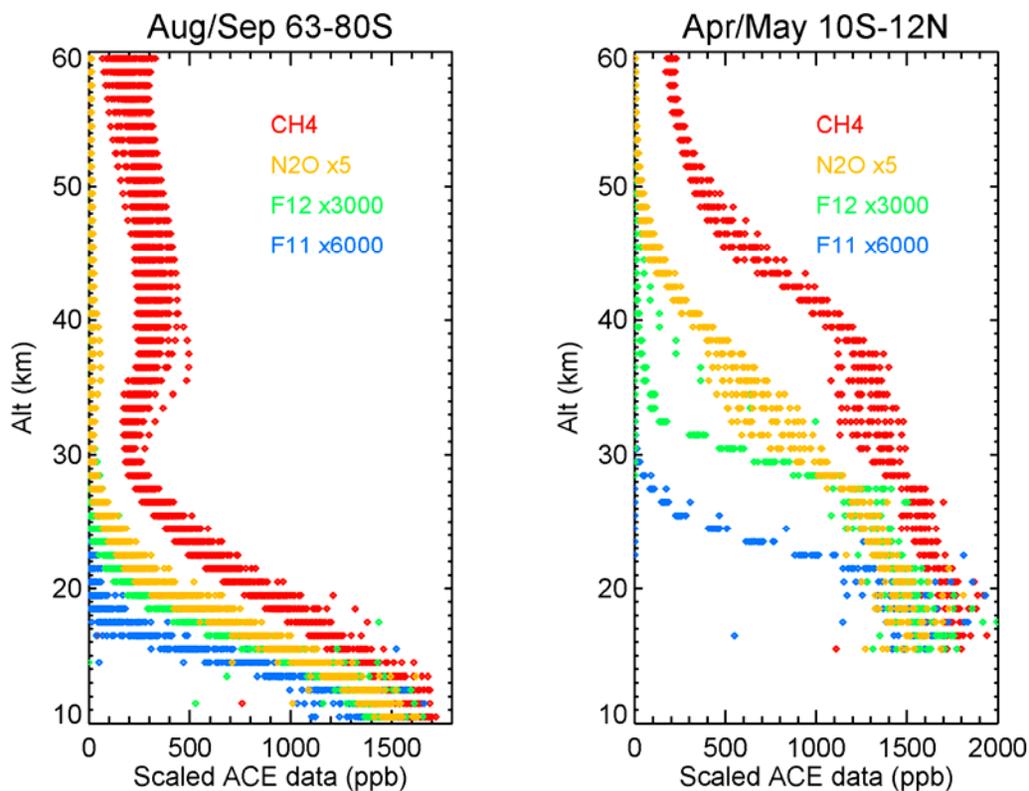
Analyze AURA HIRDLS O₃ in UT/LS to create a climatology of laminae (Olsen)

While the above work can stand alone scientifically, it will also be used for model evaluation...

Apply transport diagnostics to Chemistry-Climate Models – develop/improve 'grading system' that distinguishes between models based on physical performance. I especially see the ACE-derived age spectra being useful for model evaluation in support of the Goddard CCM effort as well as the international model evaluation work (CCMVal). Some of the GEOSCCM work may be involve **evaluating GW schemes to see how they affect tropical recirculation, polar isolation, and QBO (Luke Oman)**.

Mark's STE analyses will be useful in evaluating various incarnations of the GMI-CTM (including studies of sensitivity to resolution), other met fields, GEOS-Replay, Goddard CCM, etc.

ACE measurements of CH₄, N₂O, F11, and F12: different stratospheric lifetimes (loss rates as a function of altitude). The species used together are like empirical age spectra: they constrain transport.



GMI Sensitivity Studies

How does STE depend on model meteorology? Using the STE analyses of HIRDLS/MLS data sets (Olsen), run GMI CTM experiments to evaluate sensitivity of UT/LS composition to resolution and assimilation differences (e.g., G4GCM vs. G5GCM, G4DAS vs. G5DAS, 1° vs. 2°). Which resolution, met fields provide the most realistic behavior?

Would UT/LS O₃ be credible in a long-term CTM or Replay simulation, e.g., a GMI-Combo Merra 'Hindcast' of the 1990's or 2000's? This is evaluation work in support of a proposed GMI modeling project.

