

Status Report for GMI

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Where we left off at the November Meeting in Boulder.....

After examining results from DAO, CCM3, and GISS versions of the tropospheric model (Version 1) ...

- Dissatisfaction with CCM3 met fields because they lacked shallow convection
- Concern about GISS met fields because shallow and deep convection had been lumped together. Also, no downdrafts.

The discussions continued after the meeting.

Decisions reached by the end of 2004...

- Michael Prather would supply separated shallow and deep convection fields for GISS. Dan Bergmann implemented transport by downdrafts. *Fixes ready Jan. 2005.*
- After much discussion, it was decided to not use (or fix) the CCM3 fields and instead use the FVGCM fields that we had already obtained as the 3rd set of met fields.

Preparing the FVGCM Met Fields

- Processed 1 year of 2x2.5 x 55 level met fields to 4x5 and 42 levels. Vertical resolution decreased only between 10 and 0.01 mb.
- New subroutine required to calculate deep (Zhang-MacFarlane) and midlatitude (shallow, Hack) convection.
- Routine from Rasch by way of Harvard GEOS-Chem (Jacob), implemented by Steve Steenrod (GSFC).
- There are downdrafts in deep convection and wet scavenging in updrafts.
- There was a lot of testing and debugging...

Tropospheric Model – Version 2

- *Full chemistry simulations complete (DAO, GISS, and FVGCM)*. Description of Version 2 available on website.
- All supporting simple tracer and radionuclide runs complete
- These met fields have very different cloud optical depths and precipitation fields
- Cloud optical depths (from met fields) affect the chemistry (OH, O₃, HNO₃,...)
- Lightning parameterization implemented. Ongoing testing with DAO and GISS met fields.

IPCC Photochemical Intercomparison

- Simulations of present day and future scenarios
- DAO, CCM3, and GISS met fields used
- Jose attended IPCC workshop in January
- GMI simulations part of model intercomparison [Stevenson et al., submitted, 2005; Dentener et al., submitted, 2005]

Combined Chemistry Model

- Uses Fast JX
- Stratosphere appears OK
- Has been run with CCM3 and FVGCM fields
- Tropospheric chemistry OK? Low cloud optical depth from the FVGCM affects chemistry
- Radionuclide simulations have been useful for diagnosing convection and scavenging issues

Aerosol Models

- Simulations using DAO, GISS, and FVGCM met fields complete.
- Simulations using 1870 sulfate levels (DAO)
- Michigan Microphysical model implemented and tested with DAO (GISS and FVGCM testing is imminent)

And....

- Two 50-yr 'hindcast' simulations were completed with the stratospheric CTM (FVGCM winds). 2x2.5 x 33 levels = higher resolution and lid than before.
- netCDF utility libraries were written by Jules and Bhat. Simplified netCDF calls and eliminated a lot of model code. These libraries and documentation are available from the GMI website.
- Core team helped Thanos Nenes and Nicholas Meskhidze port the GMI code to their machine at Georgia Tech.
- We have a new core team member, Tom Kucsera of Code 613.3. So far, Tom has helped with processing of model inputs and outputs.