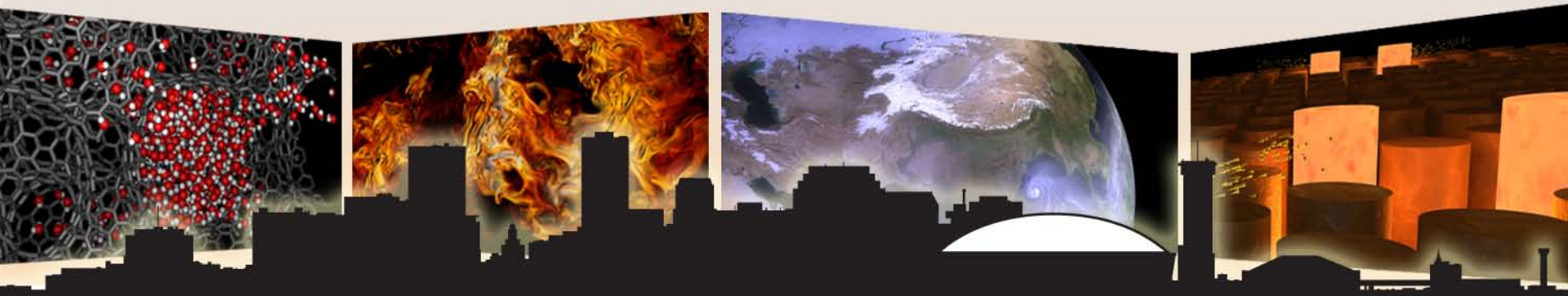
Climate End Station

Presented by

Thomas Bettge
National Center for Atmospheric Research

James B. White III (Trey)
National Center for Atmospheric Research

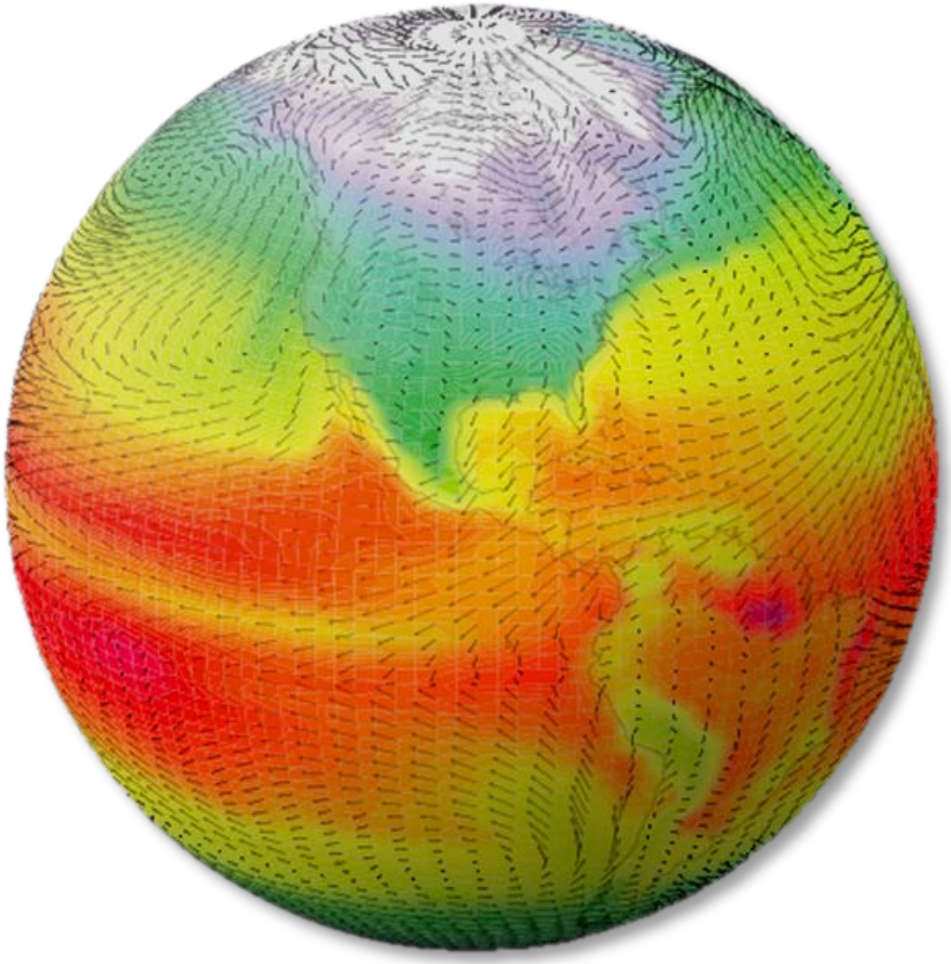


U.S. DEPARTMENT OF ENERGY

OAK RIDGE National Laboratory

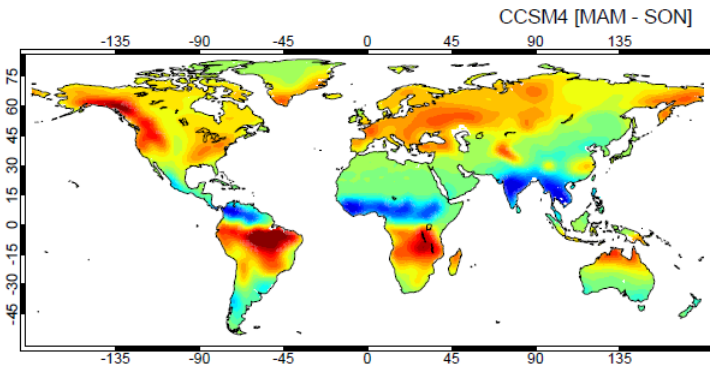
CESM working groups

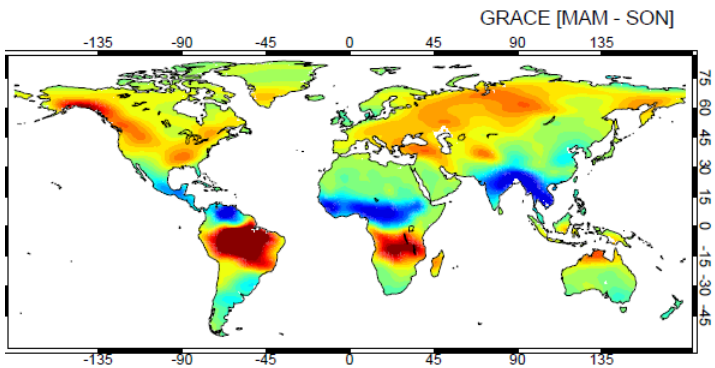
- Application
  - Climate change, paleoclimate, climate variability
- Development
  - Atmosphere, ocean, land, polar, biogeochemistry, chemistry, WACCM, land ice, software engineering

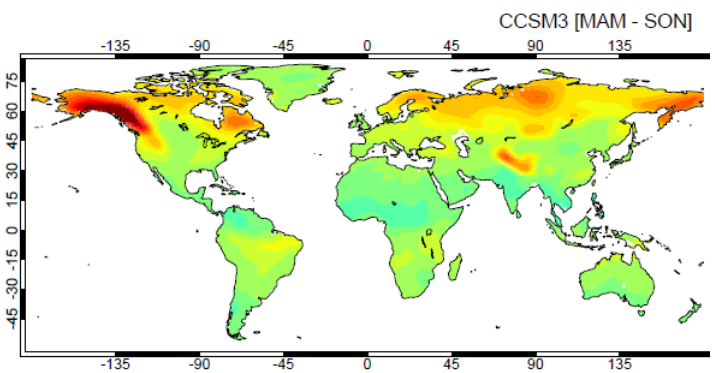


CESM development
Jim Hurrell, NCAR

- Community involvement (DOE, NCAR, universities) in development and application of first version of CESM
- Significant reduction of biases relative to earlier versions





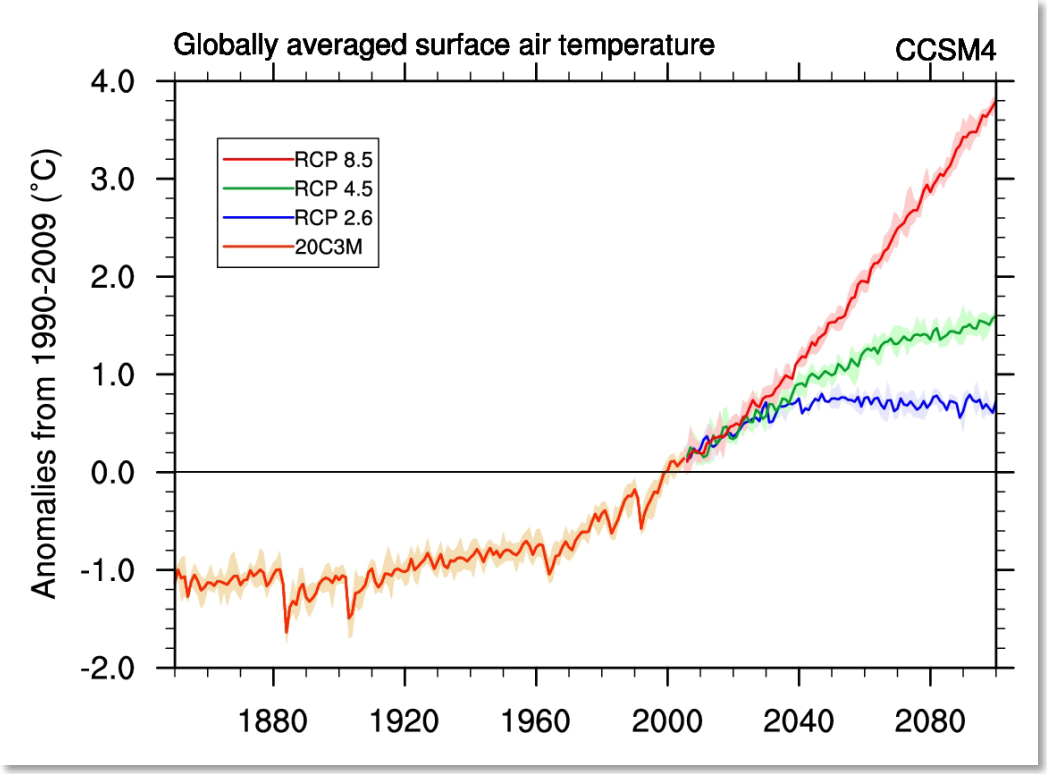


GRACE satellite measures small changes in gravity which on seasonal timescales are due to variations in mean soil and snow water content. CESM has improved capacity to store water from one season to the next

Preparing climate change projections for IPCC AR5

Gerald Meehl and Warren Washington, NCAR

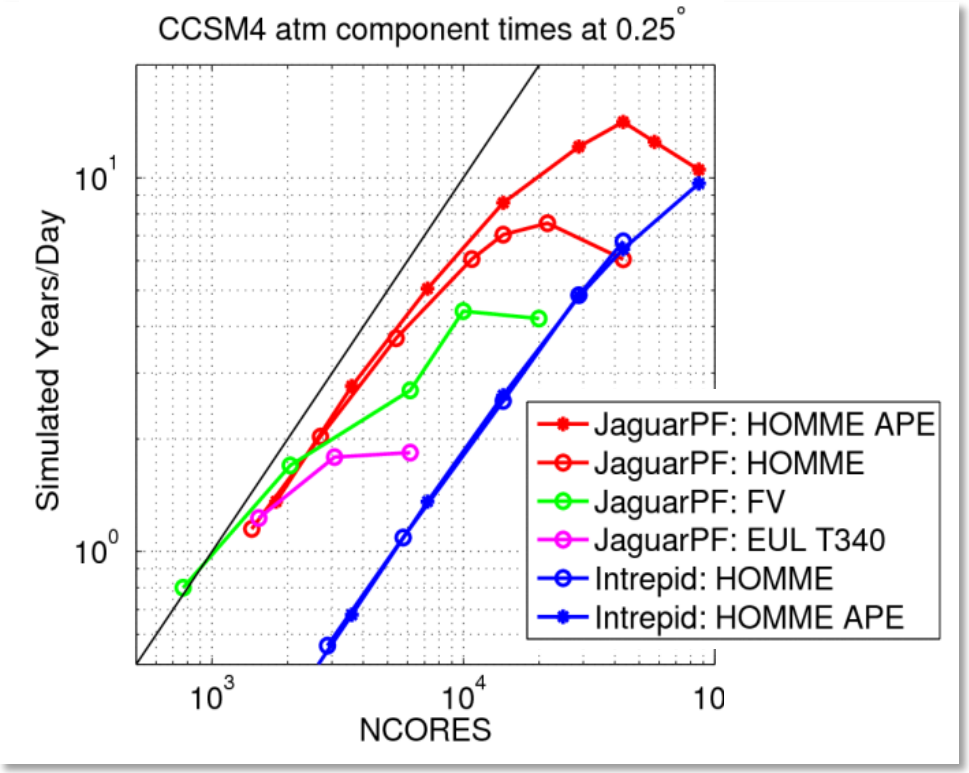
- Climate change simulations for the IPCC AR5
- Decadal prediction
- Near-term high-resolution climate predictions
- Climate change for 2100 and beyond
- Carbon aerosol tests



Community Atmosphere Model (CAM)

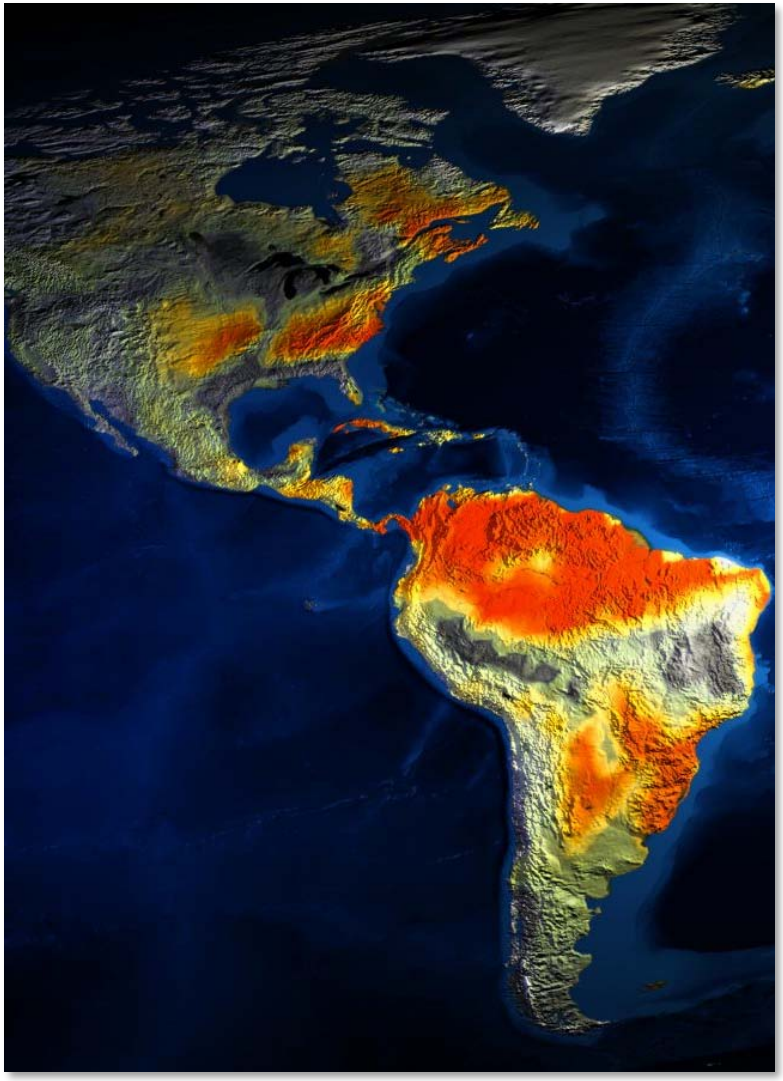
Mark Taylor, Sandia National Laboratory
Jim Hack, ORNL

- HOMME dynamical core now an option in CAM
- CESM1 with HOMME can run effectively on thousands of processors at 1/8° and 1/4° atmospheric model resolution
- The influence of small-scale processes on large-scale climate can be more closely evaluated (clouds, convection, radiation, boundary layer)
- Regional climates and extreme events can be studied



Biogeochemistry
Forrest Hoffman, ORNL

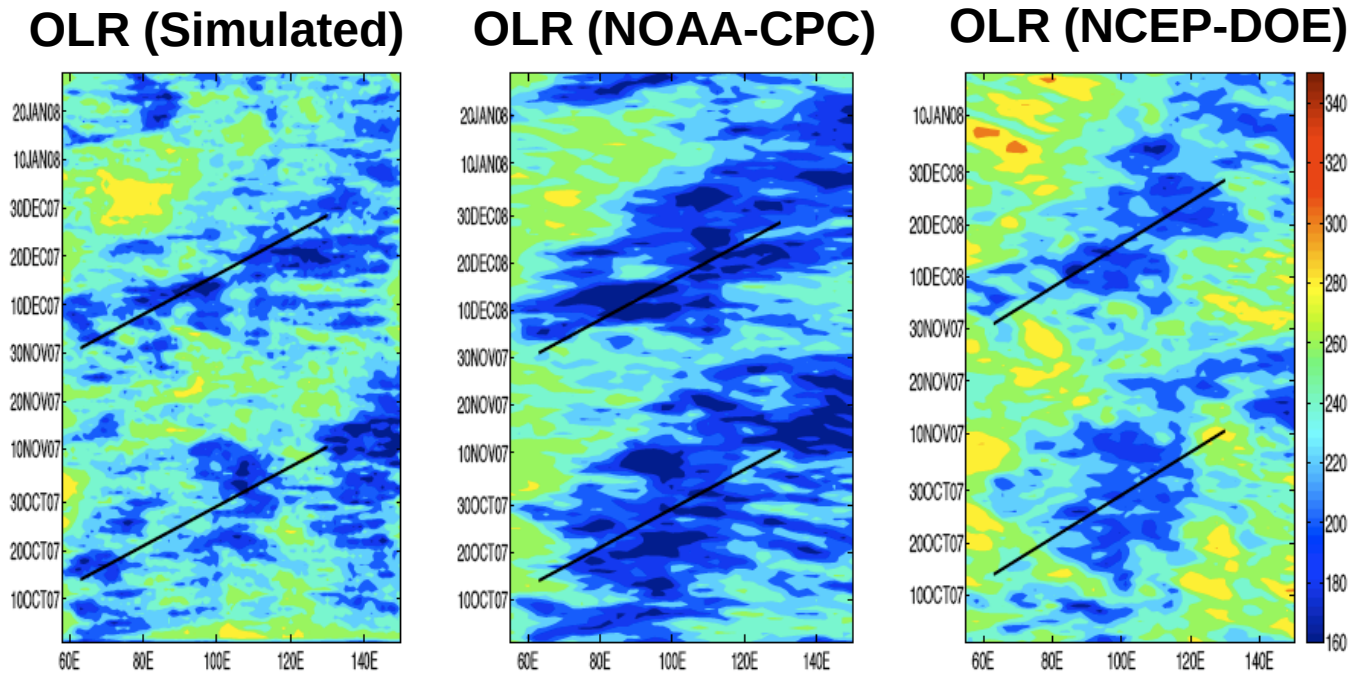
- Improving terrestrial biogeochemistry models
- Comparing results with best available observations
- Metric established for scoring models on scientific performance
- Simulations with CLM3-CASA' and CLM-CN
- Extensive diagnostics
- C-LAMP simulations: >16k years, 50 TB output
- http://www.climatemodeling.org/c-lamp



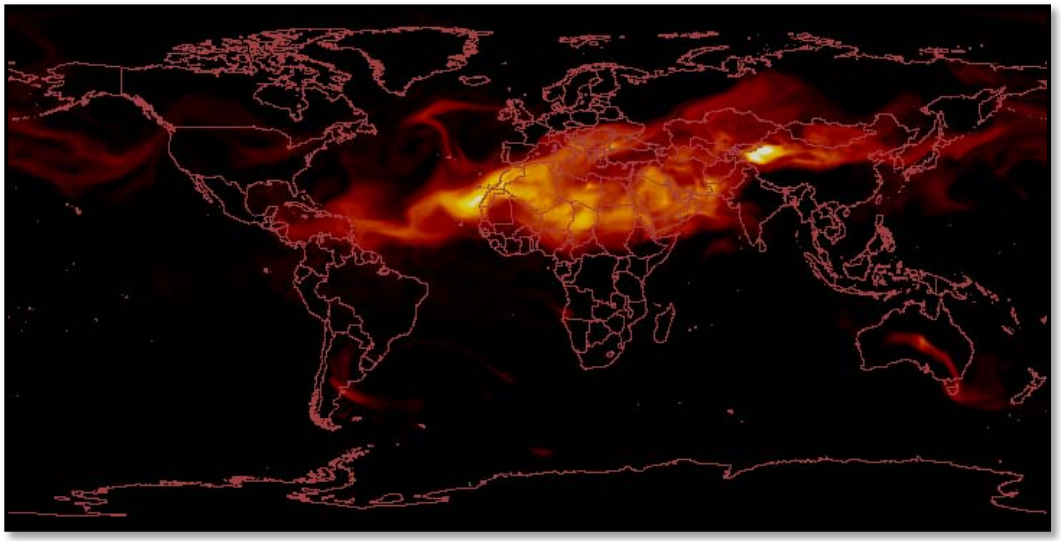
Simulations of MJO
Ruby Leung, PNNL

- To diagnose the energy and moisture budgets of MJO based on cloud resolving simulations using WRF and to improve cloud parameterizations for global models
- Perform cloud resolving simulations of multiple MJO episodes using WRF
- Develop a more complete thermodynamic model of MJO and improve cloud parameterizations
- Perform CAM simulations to evaluate the improved parameterizations

A cloud resolving simulation well captured two MJO episodes between Oct 1, 2007 and Jan 31, 2008



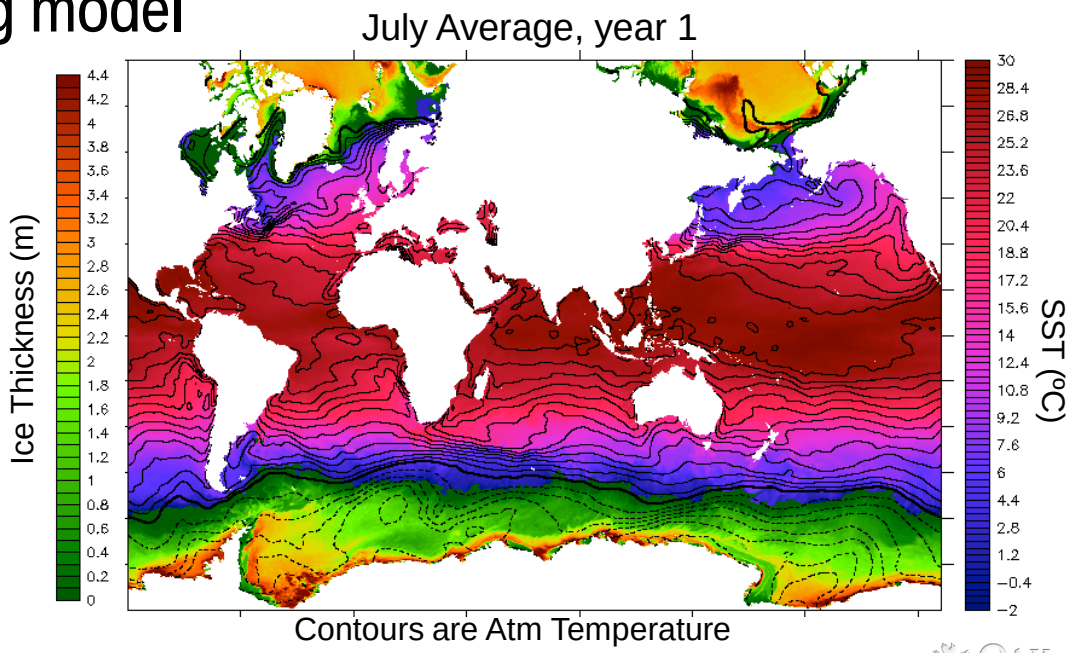
Carbon assimilation
Don Anderson, NASA



- Simulation and assimilation of atmospheric carbon species
- Multiyear, 0.5°, GEOS-5, specified emissions of CO and CO2
- Sensitivity estimates of tropospheric trace gases to physical parameterizations
- Quantify quality of simulations, agreement with ground-based measurements and space-based radiances
- Collaborators: Donald Anderson, Steve Pawson, Mike Seablom

Eddy-resolving POP
Phil Jones, LANL

- Use 1/10° POP and CICE configurations in fully coupled CCSM with T85 CAM
- Test sensitivity to several different initial conditions
- Compare with similar 1° run
- Quantify impact of eddying model
- Collaborators
  - Mathew Maltrud (LANL)
  - Kate Evans (ORNL)
  - Phil Jones (LANL)
  - Julie McClean (SIO)



University component
David Erickson, ORNL

- Purdue team (Castillo and Gurney) Active Dynamic Vegetation Model
- Vegetation dynamically evolving with climate, human, and natural disturbances
- MIT team (Knox, Bras, Erickson) using ensemble of Amazon land-atmosphere states
- University of Virginia (Long, Keene, Erickson)
- Halogen chemistry in CAM

Contact

James B White III (Trey)
National Center for Atmospheric Research
trey@ucar.edu