

Currently Active Global Coupled Climate Models

(June, 2003)

PCM atmosphere: CCM3.2, T42, 18L

ocean: POP, 2/3 to 1/2 degree in eq. Tropics, 32L,
biharmonic diffusion, Pacanowski/Philander mixing

sea ice: dynamic (EVP), thermodynamic

land surface: LSM

CCSM atmosphere: CAM, T42 (and T85, ~1.5 degrees), 26L

ocean: POP, 1 to 1/2 degree in eq. Tropics, 40L, GM, KPP

sea ice: dynamic (EVP), thermodynamic

land: CLM

(T42 class models run 10 years per day on IBM Power4; T85 is more than factor of two slower)

PCM 20th, 21st and 22nd Century Simulations

- Volcano-only, 1870-2000, 4 members
- Ozone-only, 1870-2000, 4 members
- GHG-only, 1870-2000, 4 members
- Sulfate aerosol-only, 1870-2000, 4 members
- GHG+ozone, 1870-2000, 4 members
- Solar+ozone, 1870-2000, 4 members
- GHG+sulfates+ozone, 1870-2000, 10 members
- GHG+sulfates+ozone+solar, 1870-2000, 4 members
- GHG+sulfates+ozone+solar+volcano, 1870-2000, 4 members
- Solar+volcano, 1870-2000, 4 members
- Solar+volcano+ozone, 1870-2000, 4 members
- GHG+sulfates, 1870-2000, 4 members
- control simulation (1000 years)
- 1% CO₂ increase to doubling (5 members), and quadrupling (1 member); 150 years at 2XCO₂, 150 years at 4XCO₂; (CMIP)
- ACACIA “Business as Usual”, 5 members, 2000-2100; 1 member to 2200
- ACACIA “stabilization”, 5 members, 2000-2100, 1 member to 2200
- SRES A2 ,B2, A1B (single members), A1FI and B1 (five members), 2000-2100
- 20th century stabilization (five members)
- Land surface change (in progress)
- Solar-only, 1870-2000, 4 members

Climate Change Working Group Objectives

- ◆ Quantifying uncertainty in climate change projections
 - CMIP “forcing repository” so groups can use same forcings
 - Single forcing experiments still useful
 - ◆ Requirements:
 - 1. Improve regional climate simulation and extremes: higher resolution atmospheric component, T85, T170 coupled simulations; more outputs from model in time and space for extremes analyses
 - 2. Probabilistic projections of climate change: Ensemble simulations with various forcings and scenarios
 - 3. Integration from 1500-2000 with volcano and solar to look at variability (work with Paleo WG)
 - 4. Coupled carbon cycle experiments for 20th and 21st century (work with Biogeochemistry WG)
 - 5. Understand model response to changes of forcing; climate sensitivity a main issue for next IPCC
 - a. single model--sensitivity experiments with CCSM; atmosphere only or mixed layer slab coupled experiments
 - b. CMIP coordinated experiments involving other models from different modeling centers in addition to CCSM; analysis of 1000 year runs from PCM and CCSM
- Forcing: GHGs, SA, Volcanic, ozone, solar, CA, land, surface, etc.
- Issues: Computer time (2003-2005); model data transfer, storage and access; human capital
- IPCC simulations: 1) 20th century stabilization (yr 2000 concentrations held constant to 2100),
2,3) 21st century stabilization (yr 2100 concentrations held constant to 2200,
A2/A1B and B2/B1), ensemble, one member to 2300
- (IPCC scenarios: A2, B2, A1B, B1, A1FI)