

Welcome !!



Tom Bettge
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Scientific Computing Division

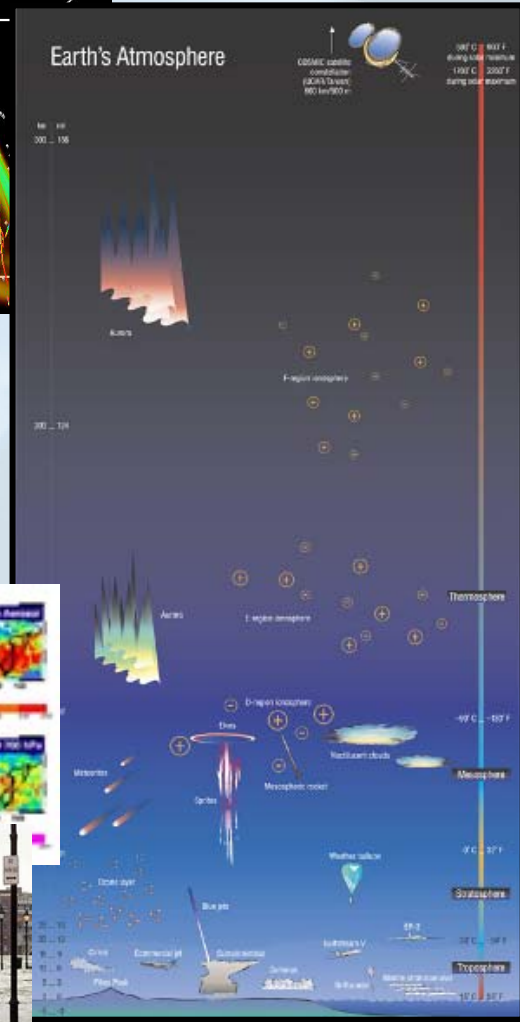
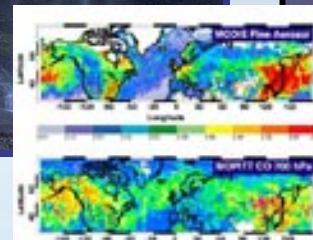
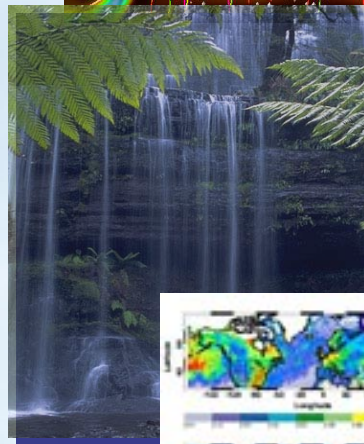
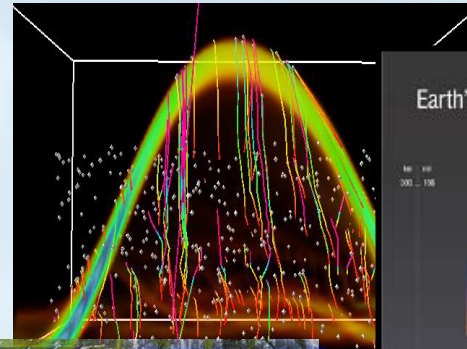
Computational and Information Systems Laboratory

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NCAR Mission

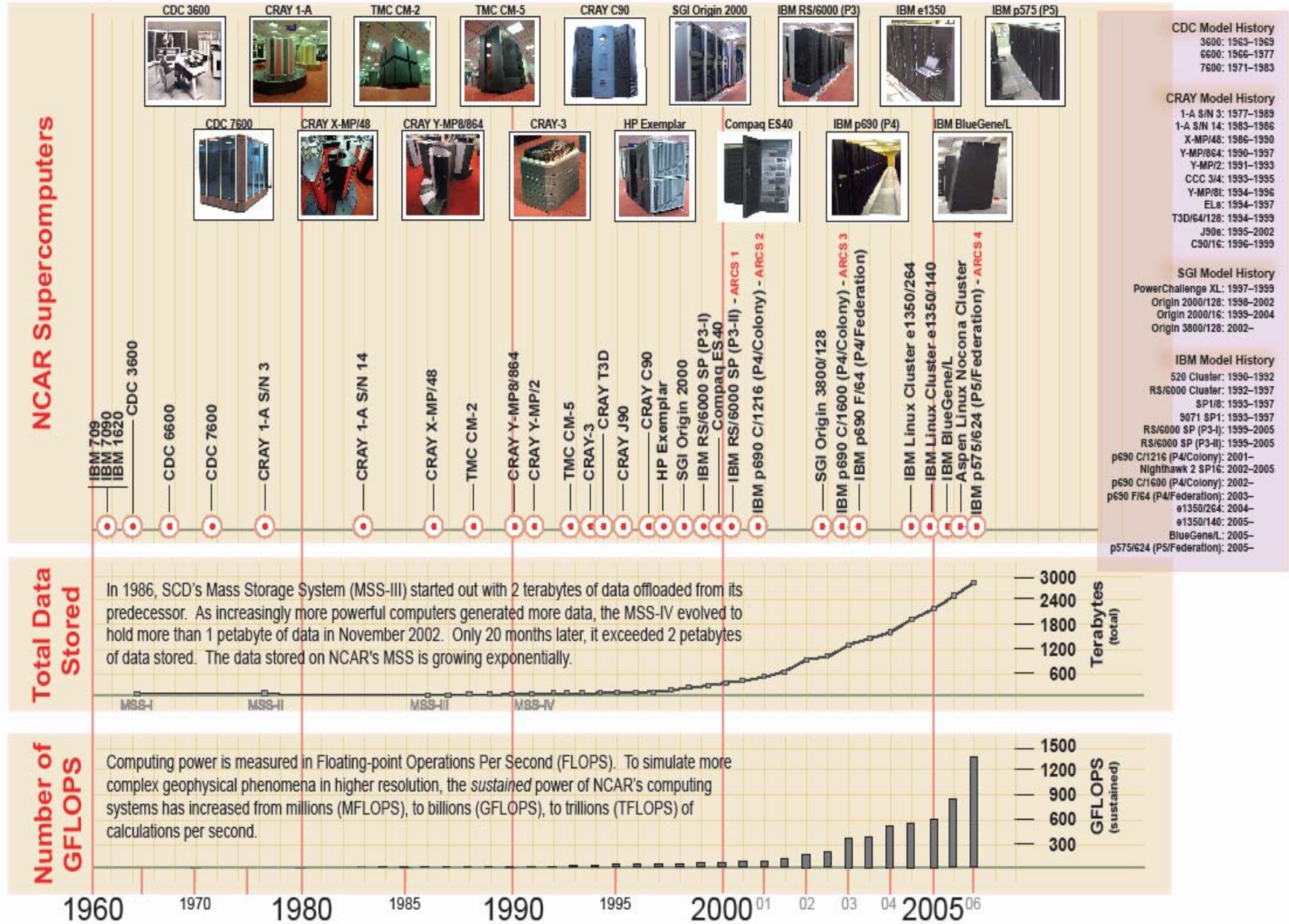
- To understand the behavior of the atmosphere and related physical, biological, and social systems
- To support, enhance and extend the capabilities of the university community and the broader scientific community, nationally and internationally
- To foster the transfer of knowledge for the betterment of life on Earth

“...from the bottom of the ocean to the core of the sun...”



Scientific Computing Division

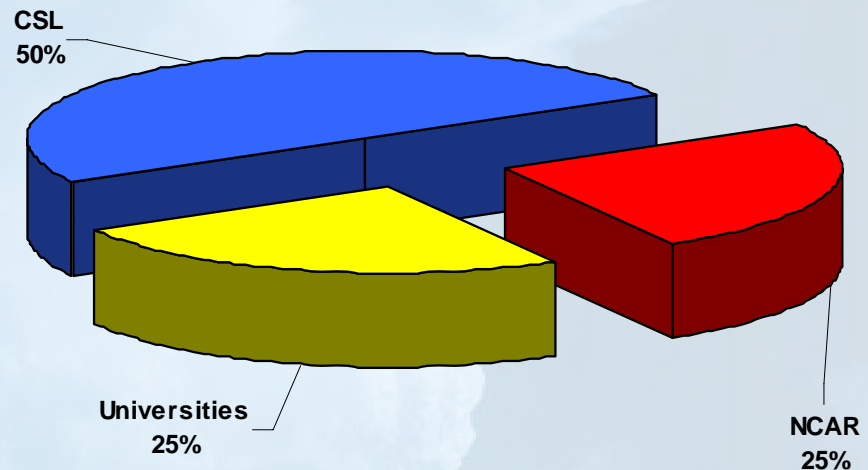
History of Supercomputing at the National Center for Atmospheric Research





The Computing Resource Pie

- NCAR Computing Resources serve two facilities
 - *Climate Simulation Laboratory*
 - multi-agency access for large climate-related projects
 - *UCAR Community*
 - NCAR
 - University





Production Platforms



bluevista

- IBM [Power5](#) p575
- 78 8-way nodes
- 624 single core 1.9GHz
- Federation Switch
- 4.7 Tflop Peak
- 55 TB Disk Storage
- 210 kW



bluesky

- IBM [Power4](#) p690
- 76 8-way nodes
- 31 32-way nodes
- 1600 1.3 GHz pes
- Colony Switch
- 8.3 Tflop Peak
- 29 TB Disk Storage
- 400 kW



lightning

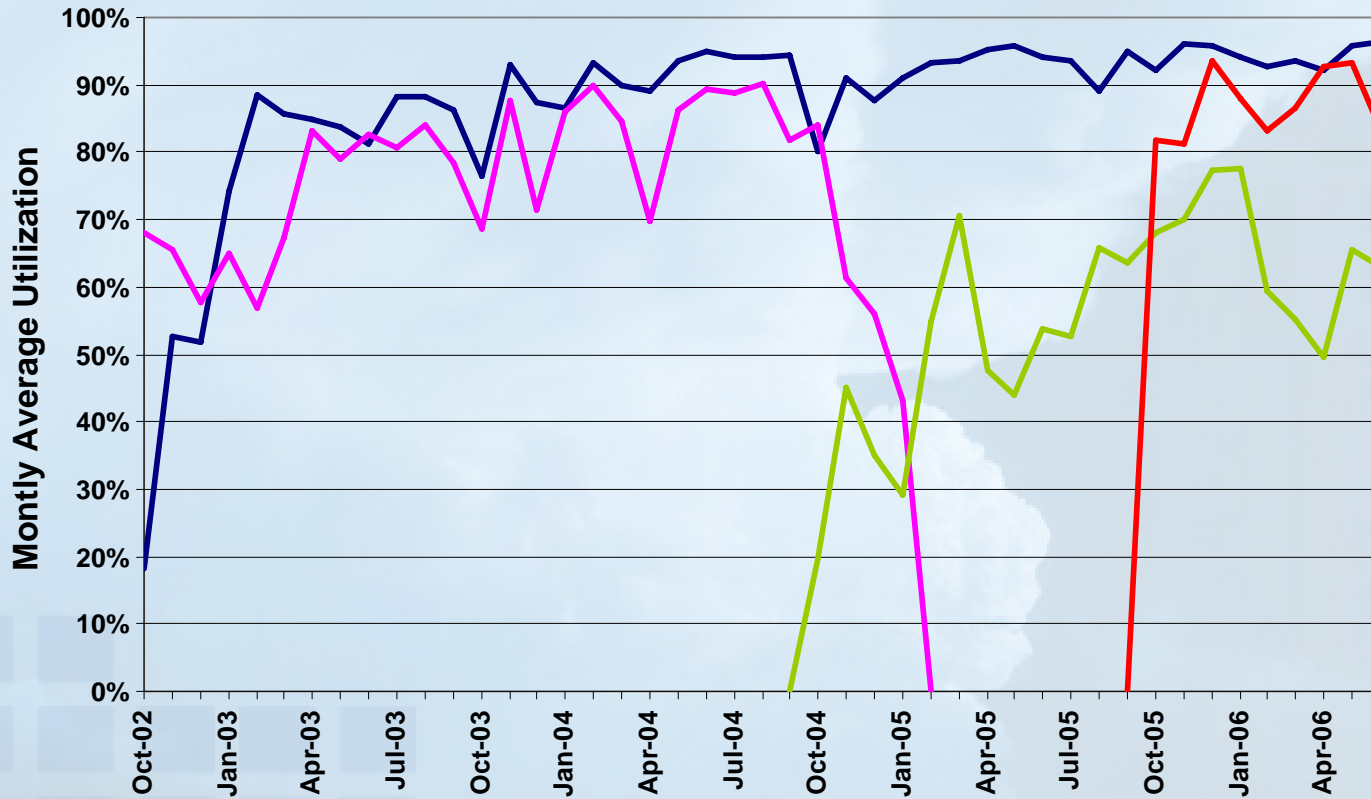
- IBM Cluster e1350
- SuSE Linux
- 132 2-way nodes
- 264 2.2 GHz Opteron pes
- Myrinet Switch
- 1.2 Tflop Peak
- 6 TB Disk Storage
- 48 kW



Utilization by Machine

Average % Utilization of Production Systems

- bluesky
- blackforest
- lightning
- bluevista





Research Platforms

frost

- IBM BlueGene/L
- 1024 compute nodes
- 2048 0.7 GHz processors
- 5.7 Tflop Peak
- 25 kW

Blue Gene/L is jointly owned and managed collaboratively by NCAR and the University of Colorado (Boulder & Denver).

ScicomP Program:

Scaling the Parallel Ocean Program (POP) to 30,000 processors on BG/L

-John Dennis, NCAR





NCAR

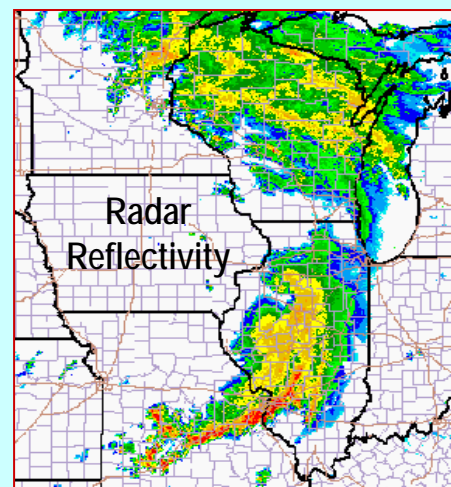
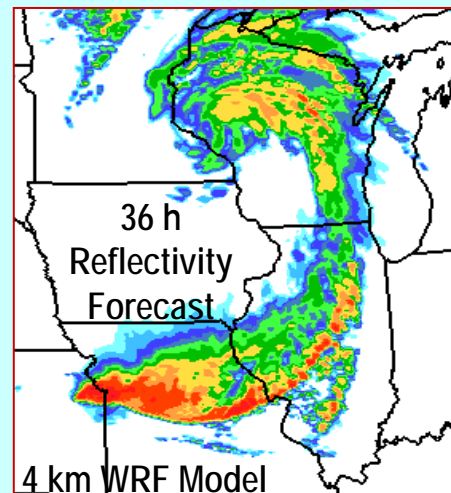
Research Applications.....

Weather Research & Forecast Model (WRF)



Goals: Develop an advanced mesoscale forecast and assimilation system, and accelerate research advances into operations.

- Collaborative partnership, principally among NCAR, NOAA, DoD, OU/CAPS, FAA, and university community
- Multi-agency oversight and advisory boards coordinating development in 15 WRF Working Groups
- Ongoing active testing and rapidly growing community use
 - *Major WRF version 2.0 release in May 2004*
 - *Over 2,000 registered community users, 14 NCAR fte's*
 - *Annual workshops and tutorials for community users*
 - *Over 200 participants expected in 2006 WRF Users Workshop*
 - *125 participants in 2005 WRF Users Tutorial*
- Daily experimental real-time forecasting at NCAR, NCEP, NSSL, FSL, AFWA, U. of Illinois
- Operational implementation at NCEP in **2004**



10 June 2003 12Z

CISL

Computational and Information
Systems Laboratory

IBM ScicomP/SPXXL
19 July 2006

Weather Research Forecast Model: Katrina Landfall: Aug 29, 2005

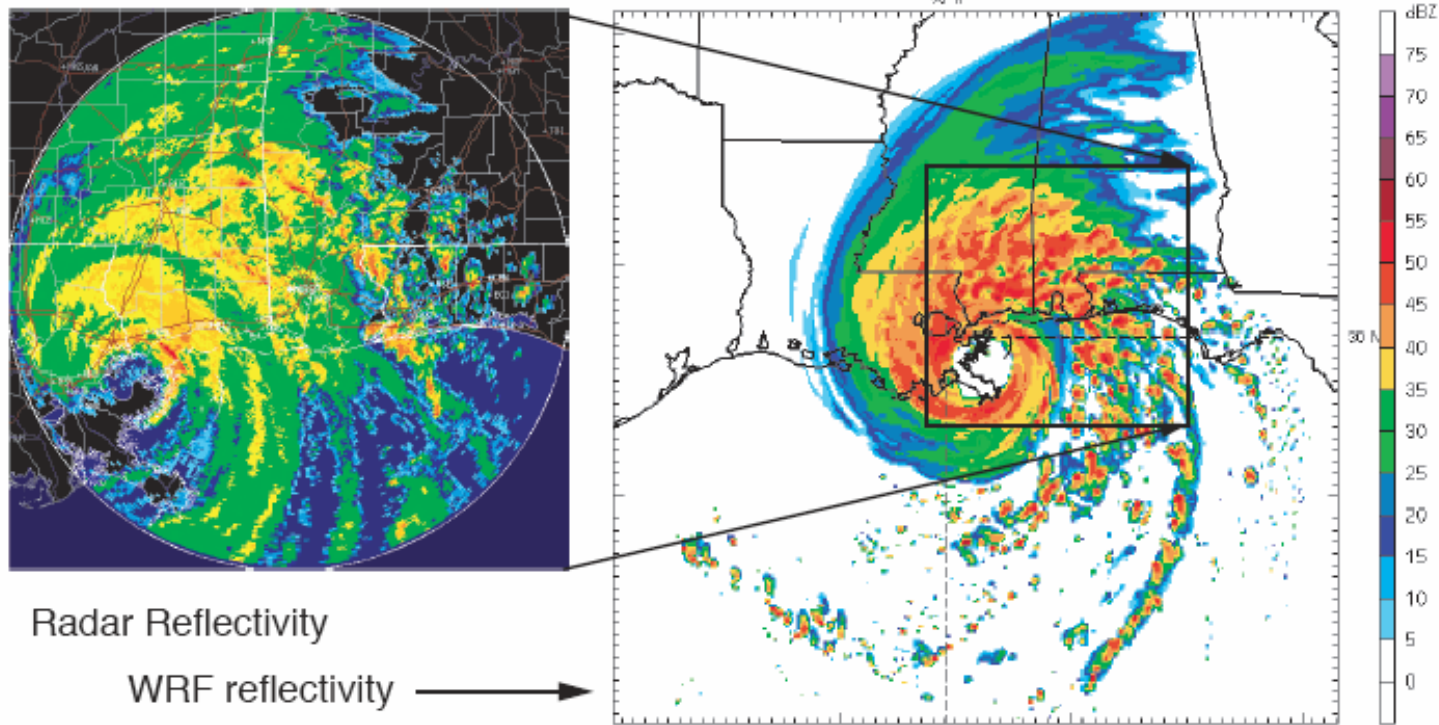


Figure 1: Observed reflectivity from the Mobile AL radar at 1400 UTC 29 August 2005, and a 62 h forecast from the WRF model, valid at that time, using $\Delta x = 4$ km on a moving nested grid tracking hurricane Katrina.

The NCAR Community Climate System Modeling (CCSM) Program



NCAR

Scientific Objectives:

- Develop a comprehensive climate model to study the Earth's Climate.
- Investigate seasonal and interannual variability in the climate.
- Explore the history of Earth's climate.
- Estimate the future of the environment for policy formulation.

Recent Accomplishments:

- Release of a new version (CCSM3) to the climate community.
- Studies linking SST fluctuations, droughts, and extratropical variability.
- Simulations of last 1000 years, Holocene, and Last Glacial Maximum.
- Creation of largest ensemble of simulations for the IPCC AR4.



<http://www.ccsm.ucar.edu>

Application of CCSM3 to Intergovernmental Panel on Climate Change (IPCC)



NCAR's Bluesky Supercomputer

600 Power 4 Processors
Peak speed: 8.3 Teraflops

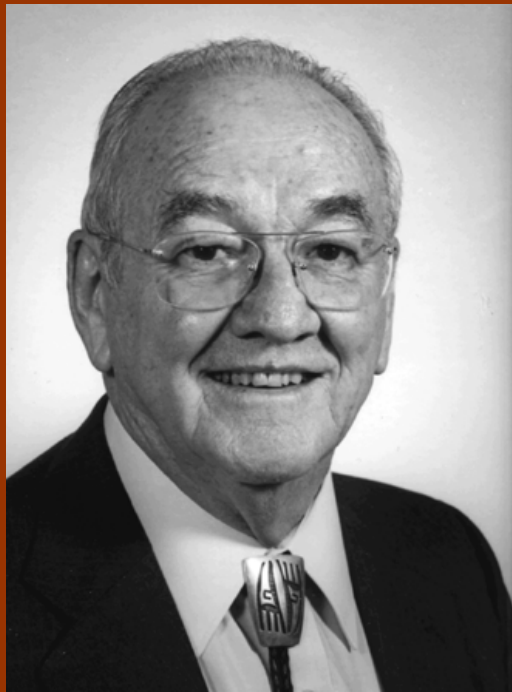


Characteristics of NCAR CCSM3:

- ~1 quadrillion operations/simulated year
- Rate of simulation: 3.5 sim. years/day
- Ensemble size: 11,000 simulated years
- Computation cost: ~7 million CPU hours
- Output: 10 GB/simulated year
- Data volume for IPCC: ~100 TB

Walter Orr Roberts

NCAR Founding Father



"I have a very strong feeling that science exists to serve human welfare. It's wonderful to have the opportunity given us by society to do basic research, but in return, we have a very important moral responsibility to apply that research to benefiting humanity."

Walter Orr Roberts



New Directions

June 2006: NCAR Joins TeraGrid



"..the nation's most comprehensive and advanced infrastructure for open scientific research."