Meeting with Program Managers

April 17, 2008
Washington, D C
The North American Regional Climate Change Assessment Program (NARCCAP)

Initiated in FY06, it is an international program that will serve the climate scenario needs of the United States, Canada, and northern Mexico.

- Exploration of multiple uncertainties in regional model and global climate model regional projections.
- Development of multiple high resolution regional climate scenarios for use in impacts assessments.
- Further evaluation of regional model performance over North America.
- Exploration of some remaining uncertainties in regional climate modeling (e.g., importance of compatibility of physics in nesting and nested models).
- Program has been funded by NOAA-OGP, NSF, DOE – 3-4-year program

www.narccap.ucar.edu
NARCCAP - Participants

Linda O. Mearns, National Center for Atmospheric Research

Ray Arritt, Iowa State, Dave Bader, LLNL; Sébastien Biner, Ouranos; Erasmo Buono, Hadley Centre; Daniel Caya, Ouranos; Phil Duffy, LLNL; D. Flory, Iowa State; Filippo Giorgi, Abdus Salam ICTP; William Gutowski, Iowa State; Isaac Held, GFDL; Richard Jones, Hadley Centre; René Laprise, UQAM; Ruby Leung, PNNL; Don Middleton, NCAR; W. Moufouma-Okia, Hadley; Ana Nuñes, Scripps; Doug Nychka, NCAR; John Roads, Scripps, Steve Sain, NCAR, Lisa Sloan, Mark Snyder, UC Santa Cruz; Ron Stouffer, GFDL; Gene Takle, Iowa State; Phil Rasch, Tom Wigley, NCAR
NARCCAP Domain
Organization of Program

- **Phase I**: 25-year simulations using NCEP boundary conditions (1979—2004)
- **Phase IIa**: RCM runs (50 km res.) nested in AOGCMs current and future
- **Phase IIb**: Time-slice experiments at 50 km res. (GFDL AM2.1 and NCAR CAM3) – current and future
- Opportunity for double nesting (over specific regions) to include participation of other RCM groups (e.g., for NOAA OGP RISAs, CEC, New York Climate and Health Project)
- Scenario formation and provision to impacts community (led by NCAR)
Phase I

• All RCMs have completed the reanalysis-driven runs.

• Configuration:
  – common North America domain (some differences due to horizontal coordinates)
  – horizontal grid spacing 50 km
  – boundary data from NCEP/DOE Reanalysis 2
  – boundaries, SST and sea ice updated every 6 hours
**NARCCAP PLAN – Phase II**

**A2 Emissions Scenario**

- GFDL
- CGCM3
- HADCM3
- CCSM

**Provide boundary conditions**

- **1971-2000 current**
- **2040-2070 future**

**GFDL**
- Time slice 50 km

**CGCM3**
- UC Santa Cruz
- ICTP

**CRCM**
- Quebec, Ouranos

**HADRM3**
- Hadley Centre

**RSM**
- Scripps

**WRF**
- NCAR/ PNNL

**RegCM3**
- Iowa State/ PNNL

**MM5**
- UC Santa Cruz

**HADCM3**
- New European
  - Project
Global Time Slice / RCM Comparison
at same resolution (50km)

A2 Emissions Scenario

GFDL AOGCM

CCSM

Six RCMS
50 km

GFDL
Time slice
50 km

compare

compare

CAM3
Time slice
50 km
### GCM-RCM Matrix

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<th>GFDL</th>
<th>CGCM3</th>
<th>HADCM3</th>
<th>CCSM</th>
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1 = chosen first GCM
NARCCAP Project Timeline

- **Project Start**: 1/06
- **Phase 1**: 9/07
- **AOGCM Boundaries available**: 12/07
- **Current 1**: 4/08
- **Future climate 1**: 6/08
- **Current and Future 2**: 12/08

Archiving Procedures - Implementation

Time slices
The NARCCAP User Community

Three user groups:

• Further dynamical or statistical downscaling
• Regional analysis of NARCCAP results
• Use results as scenarios for impacts studies

www.narccap.ucar.edu
Users’ Workshop
February 14-15 2008

• User introductions
• NARCCAP in broader context and AOGCMs
• Time slice experiments (atmospheric models)
• RCMs
• Results of Phase I – overview
• User discussions
• Data Archiving, Practicum, GIS
• Uncertainty Analysis
• In depth user group discussions
Use of NARCCAP Data

• 14 users have downloaded 343 data files from ESG - 220 GB - since workshop
• NARCCAP data set called out in RFP for US Clivar Drought in Coupled Models Project
• Used in other proposals, e.g., F. Semazzi – proposal to EPA on future air quality in N. Carolina
• Program described in senate hearing before Subcommittee on Water and Power of Committee on Energy and Natural Resources, June 6, 2007
NARCCAP Data Overview

15 RCM/GCM combinations + 6 NCEP-driven runs
7 x 3-D variables @ 42 pressure levels + 31 x 2-D variables
50 km resolution = ~ 130 x 110 grid cells
(25 years NCEP + 2 x 33 years GCM-driven) x 3-hourly data
Each 2-D NCEP variable is ~ 4 GB in total size
x
~60 terabytes total data volume
(~90% of volume is 3-D data)
NARCCAP Archiving Pipeline

1. Modeling groups run RCMs
2. Modeling groups iterate with ISU to check format of sample data files
3. Once format is approved, modeling groups generate NetCDF data files
4. Data is shipped on 1-TB external hard drives to LLNL/PCMDI
5. PCMDI makes disaster recovery copy of data on NERSC HPSS
6. NCAR QC team checks data for correct format, CF compliance, data integrity
7. QC team fixes minor problems, refers major problems back to modelers
8. Data passing QC is archived on NCAR MSS & copied to NCAR/PCMDI disk
9. Data is published via Earth System Grid web-based data portal
The Future
Future Work - Possible Levels

• **Level 0** - Completion of work as described in revised proposal – all runs completed, all data archived, active use by users’ community

• **Level 1** - Level 0 plus with some minimal supplementary funding in 4th year perform some basic analyses

• **Level 2** – matrix completed plus some additional analyses

• **Level 3** – major follow-on 3-4 year project (e.g., using newest AOGCM simulations for AR5, mitigation scenarios, land use change)