NCAR

NARCCAP

North American Regional Climate Change Assessment Program: Overview of Climate Change Results and Applications to Adaptation Research

Linda O. Mearns
National Center for Atmospheric Research

CESM Workshop - Breckenridge

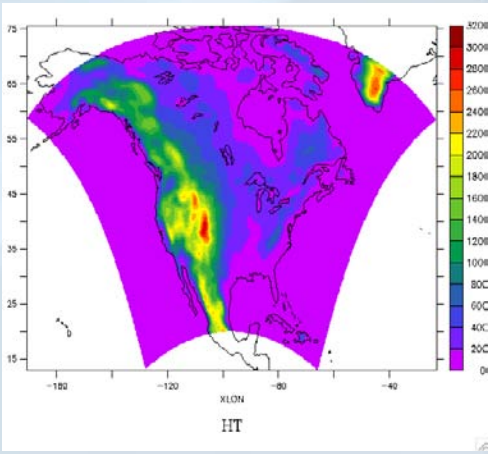
June 20, 2013

The North American Regional Climate Change Assessment Program (NARCCAP)

NCAR

www.narccap.ucar.edu

- Explores multiple uncertainties in regional and global climate model projections
  - 4 global climate models x 6 regional climate models
- Develops multiple high resolution (50 km) regional climate scenarios for use in impacts and adaptation assessments

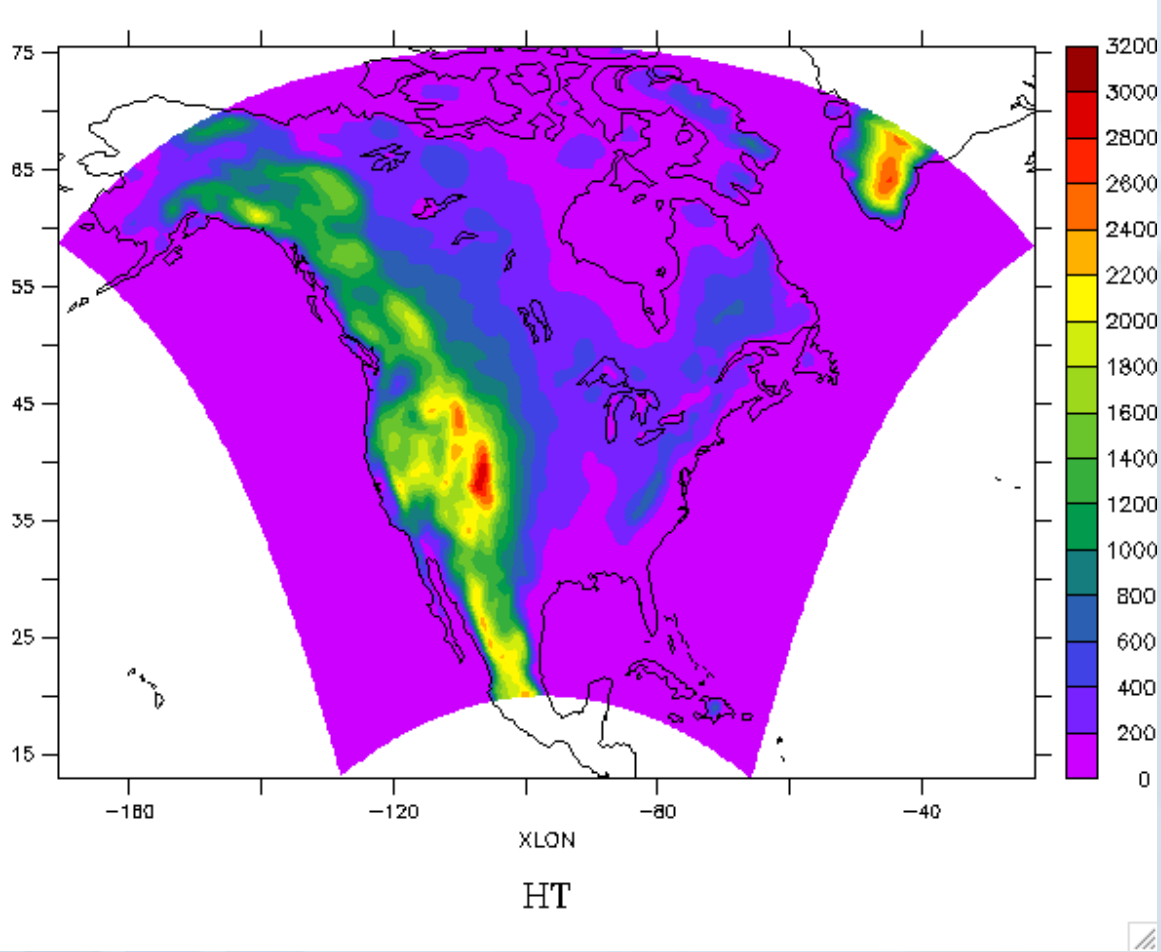


- Evaluates regional model performance to establish credibility of individual simulations for the future

- Participants: Iowa State, PNNL, LLNL, Scripps, UC Santa Cruz, Ouranos (Canada), UK Hadley Centre, NCAR

- Initiated in 2006, funded by NOAA-OGP, NSF, DOE, USEPA-ORD – 5-year program

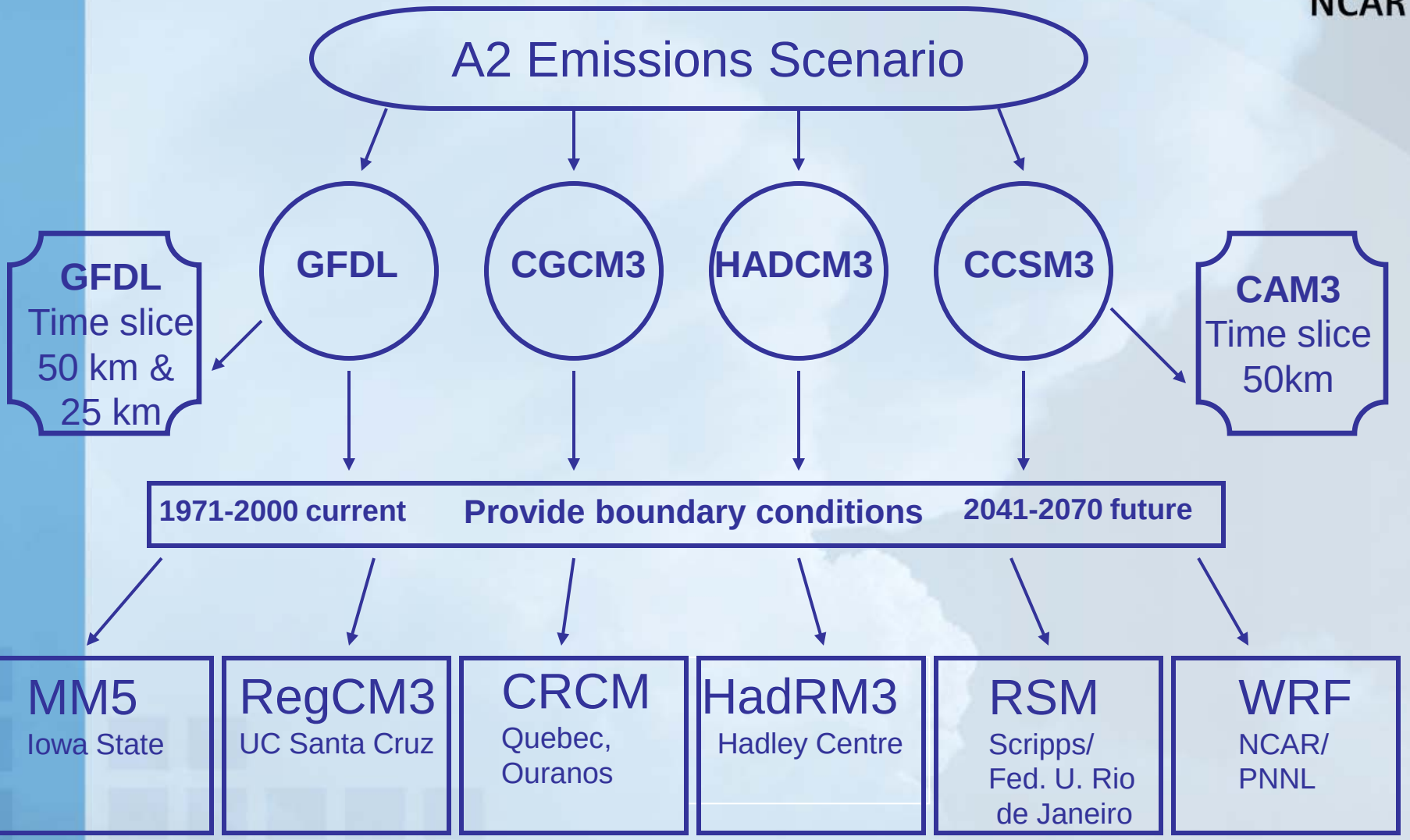
NARCCAP Domain



NCAR

Phase II
Climate Change

NARCCAP PLAN – Phase II



AOGCM-RCM Matrix

NCAR

AOGCMs

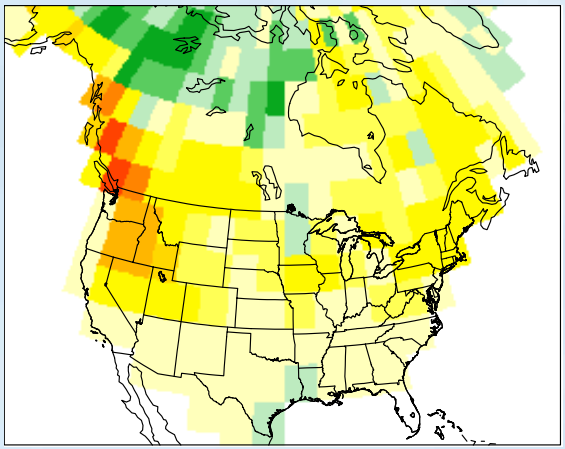
RCMs	GFDL	CGCM3	HADCM3	CCSM3
MM5			X**	X1**
RegCM	X1**	X**		
CRCM		X1**		X**
HadRM	X**		X1**	
RSM	X1**		X	
WRF		X**		X1**
*CAM3				X**
*GFDL	X**			

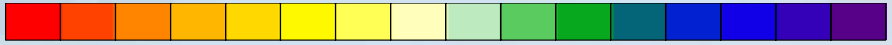
1 = chosen first GCM
*= time slice experiments
Red = run completed
** = data loaded

Change in SWE – CGCM3

NCAR

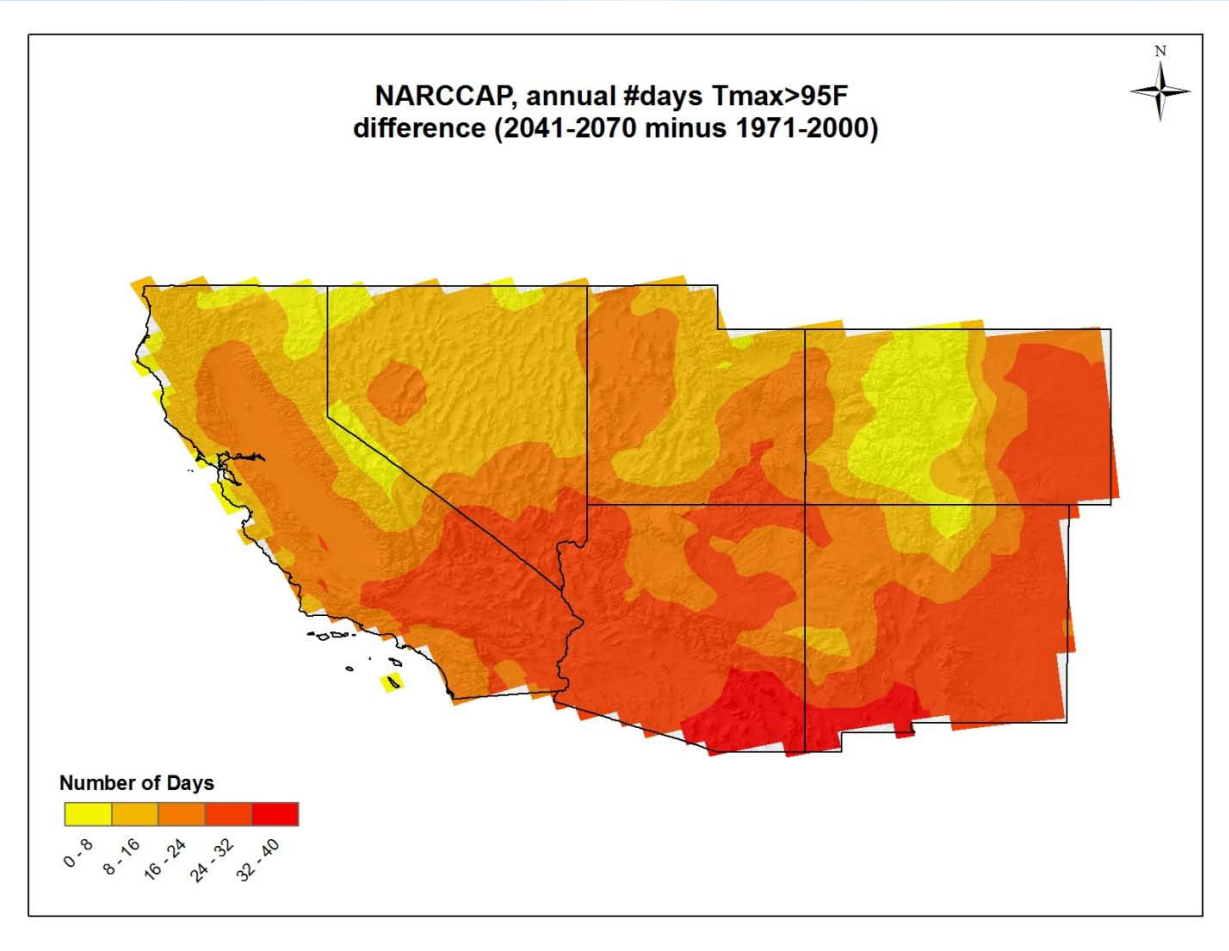
GCM3





R. McCrary

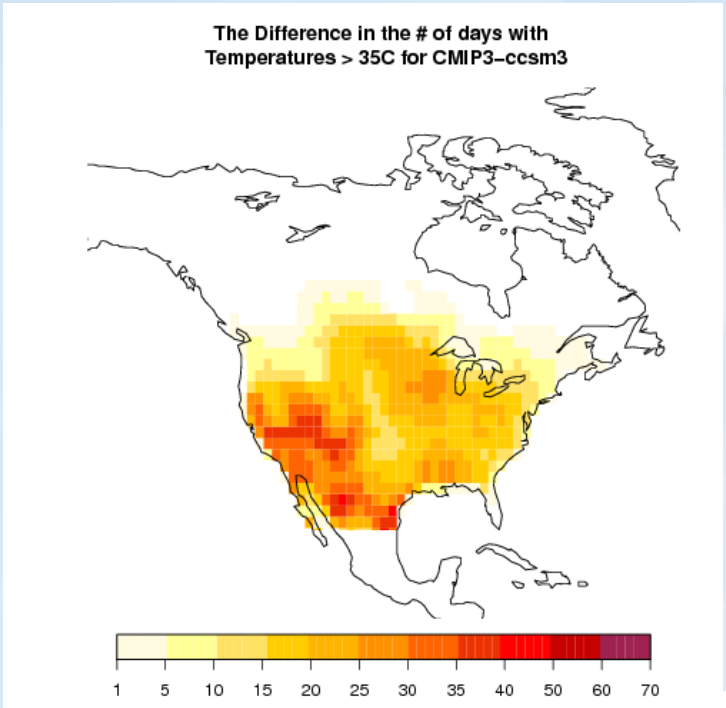
Southwest Climate Outlook
Change in Extreme Tmax



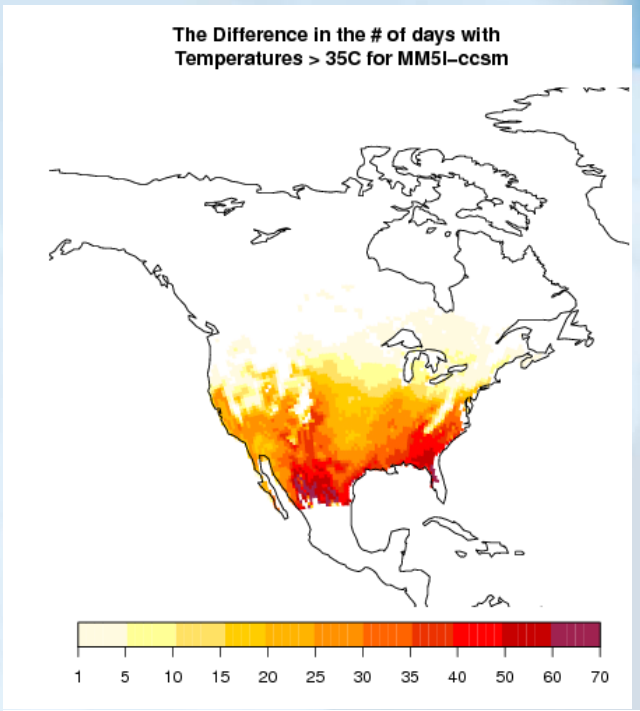
Kunkel et al., 2012 Southwest Regional Climate Outlooks – prepared for the National Climate Assessment (NCA)

NCAR

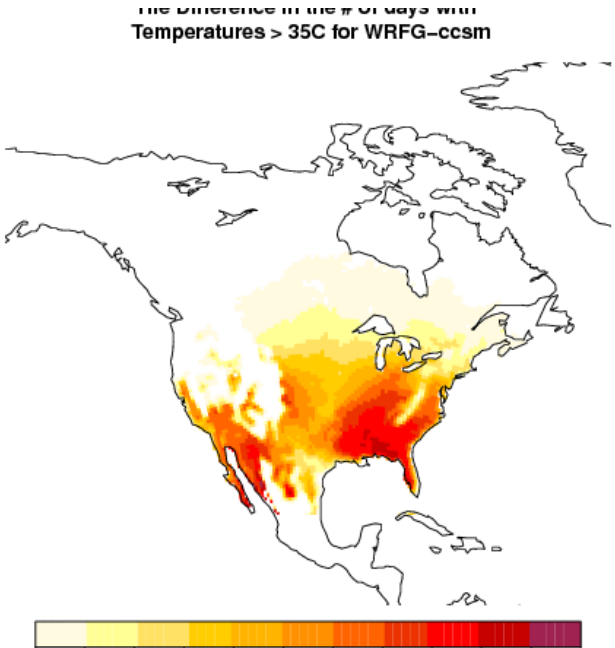
CCSM3



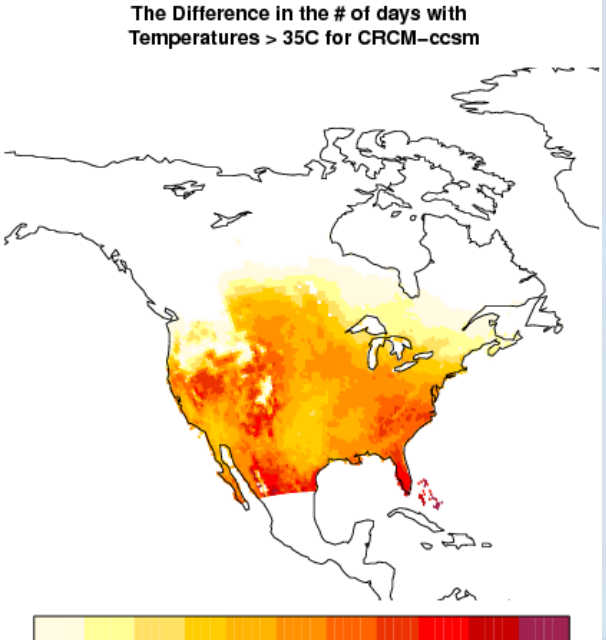
MM 5



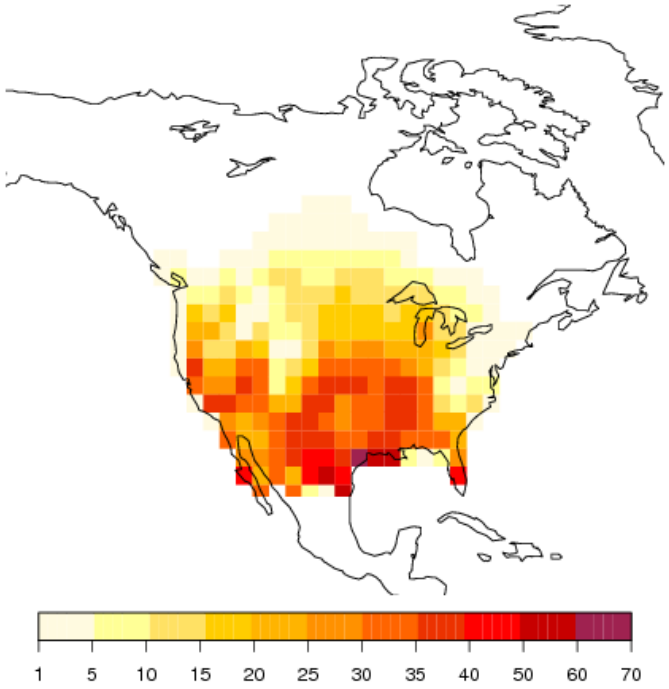
WRF



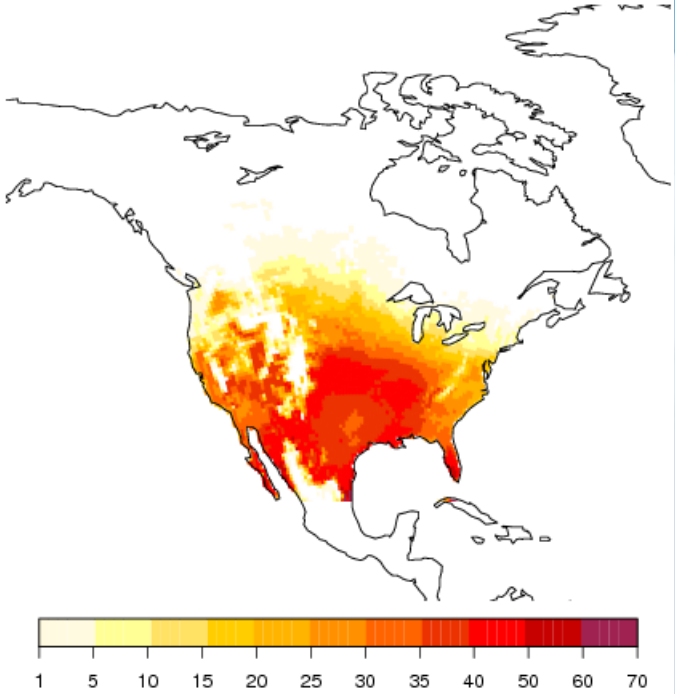
CRCM



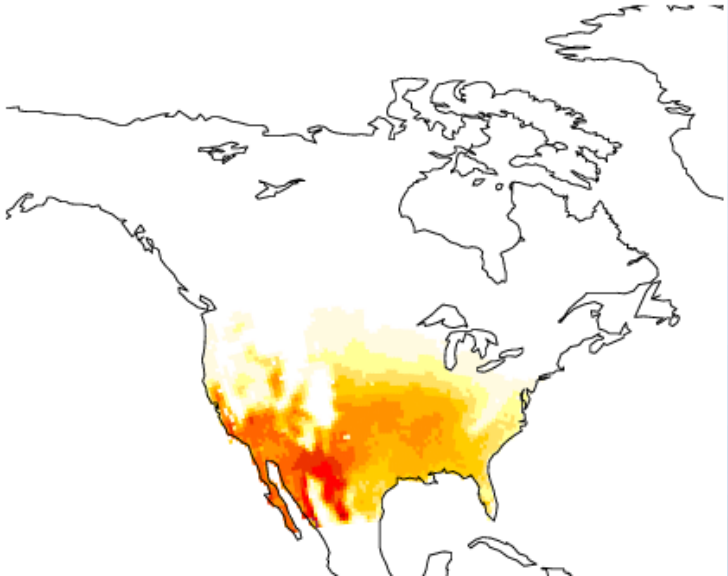
The Difference in the # of days with Temperatures > 35C for CMIP3–gfdl



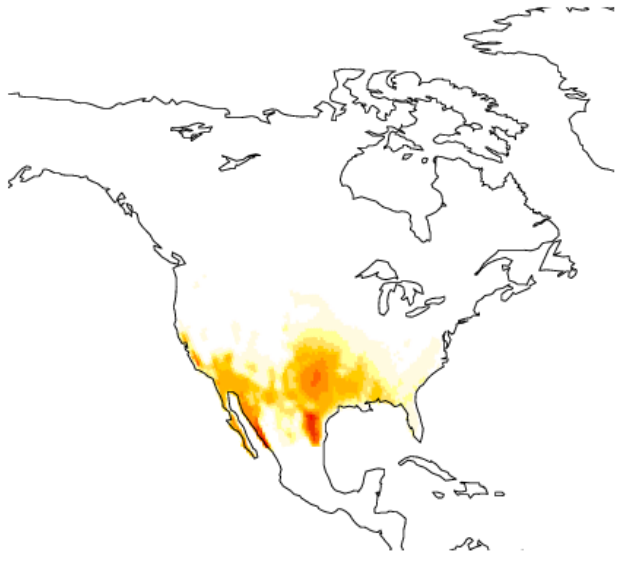
The Difference in the # of days with Temperatures > 35C for HRM3–gfdl



The Difference in the # of days with Temperatures > 35C for RCM3–gfdl



The Difference in the # of days with Temperatures > 35C for ECP2–gfdl



NCAR

Adaptation Projects

Informing Climate-Related Decisions with Earth System Models

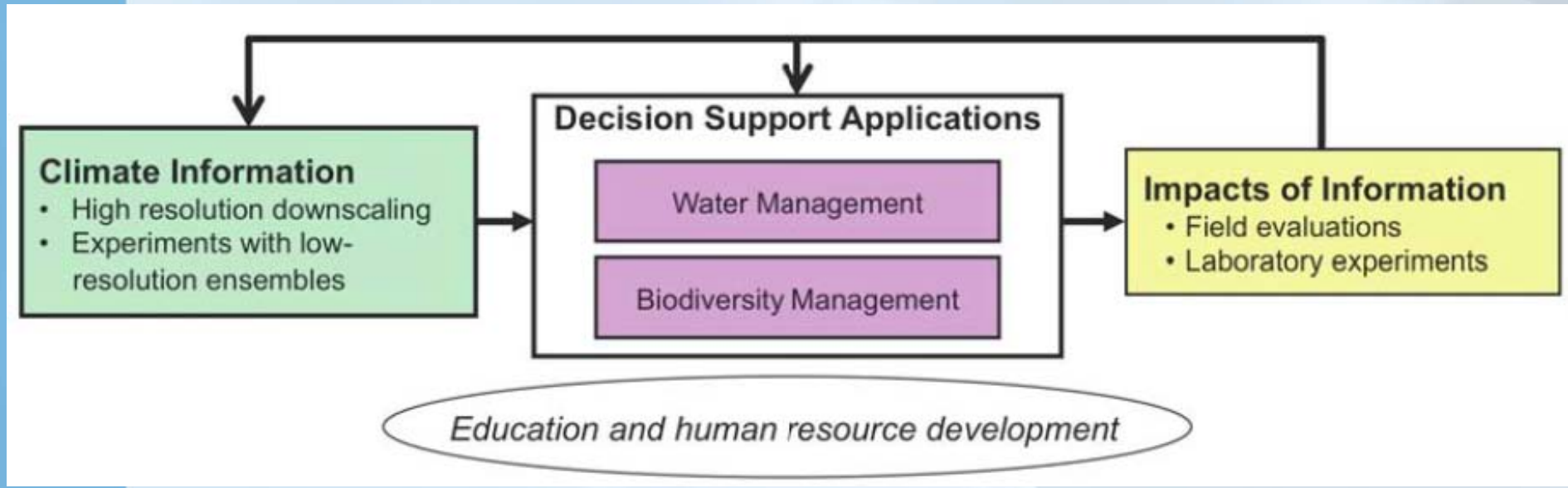
- **NSF EaSM**, joint with Rand (R. Lempert)
- Provide a deeper understanding of how best to use information from next-generation EaSMs to improve climate-related decisions
- Generating different types of information from ensembles of such models, using this information with decision makers through field evaluations and psychology laboratory experiments.

Questions Addressed

- What is the value of climate information with increased spatial and temporal resolution?
- What is the value of imprecise/deeply uncertain information about potentially extreme behaviors of the climate system?
- What is the value of understanding how climate information might increase in the future?
- What are the best means to characterize such information for decision makers?

Project Overview

NCAR



Applications: salamander species habitat in Appalachians
water resources in southern California

Strategic Environmental Research and Development Program (SERDP)
2 Projects

Funded by

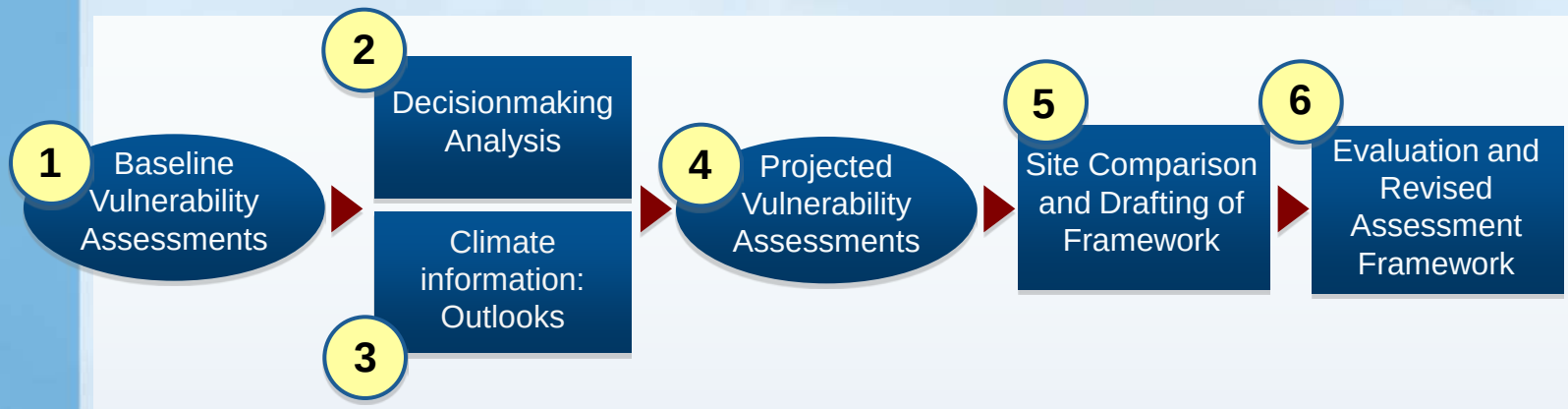
DoD, DoE, EPA

Assessing Vulnerability of DoD Installations to Climate Change: Informing Decisionmaking

R. M. Moss, L. O. Mearns

PNNL and NCAR

Technical Approach



1: Baseline assessment

2: Decisionmaking

3. Climate information (modeling, expert elicitation)

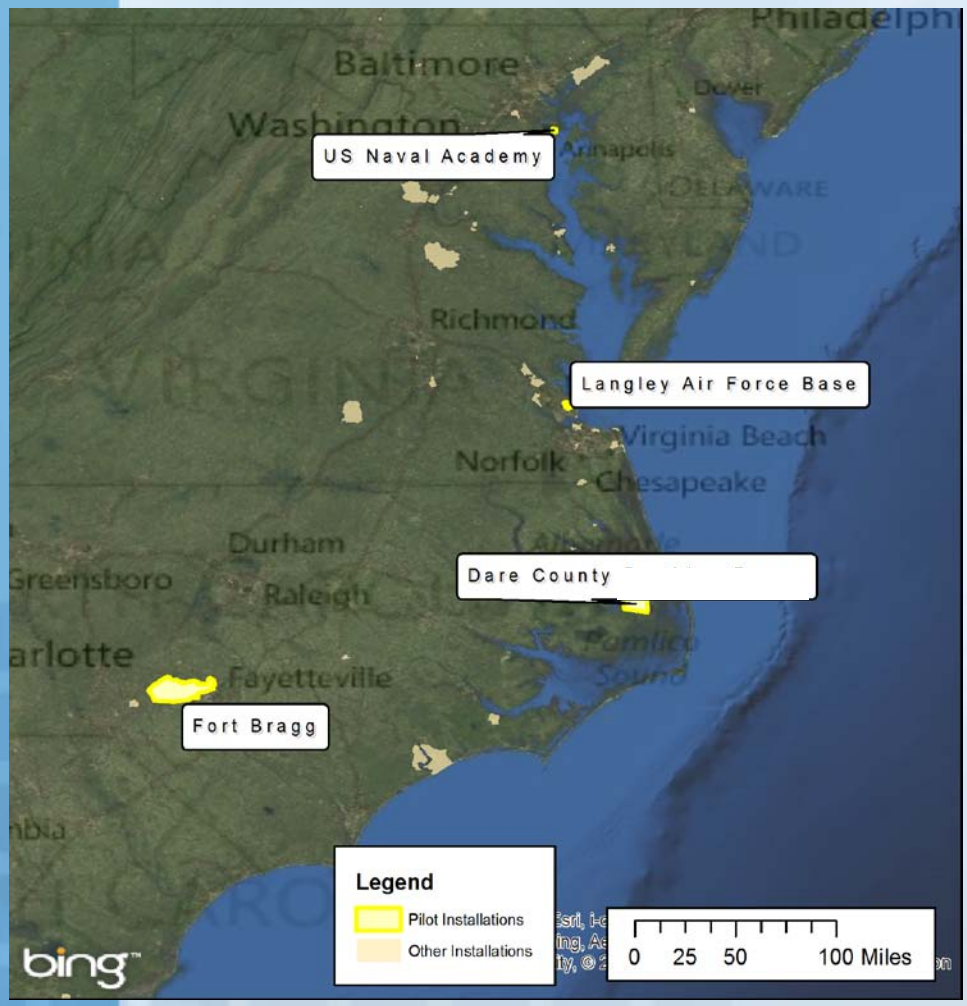
4: Assessment and evaluation of projected vulnerability

5: Development of replicable vulnerability assessment framework

6: Evaluation and revision of framework

*

Installations Selected



Represents:

- Range of services and mission
- Range of operational size
- Coastal and inland
- Types of infrastructure
- Potential climate stresses
- Decision processes

Missions included:

- Army's maneuver and training mission
- Air Force air training logistics and force protection
- Navy training and operations

Installations include a wide range of both built and natural infrastructure in complex systems

Decision-Scaling: A decision framework for DoD climate risk assessment and adaptation planning

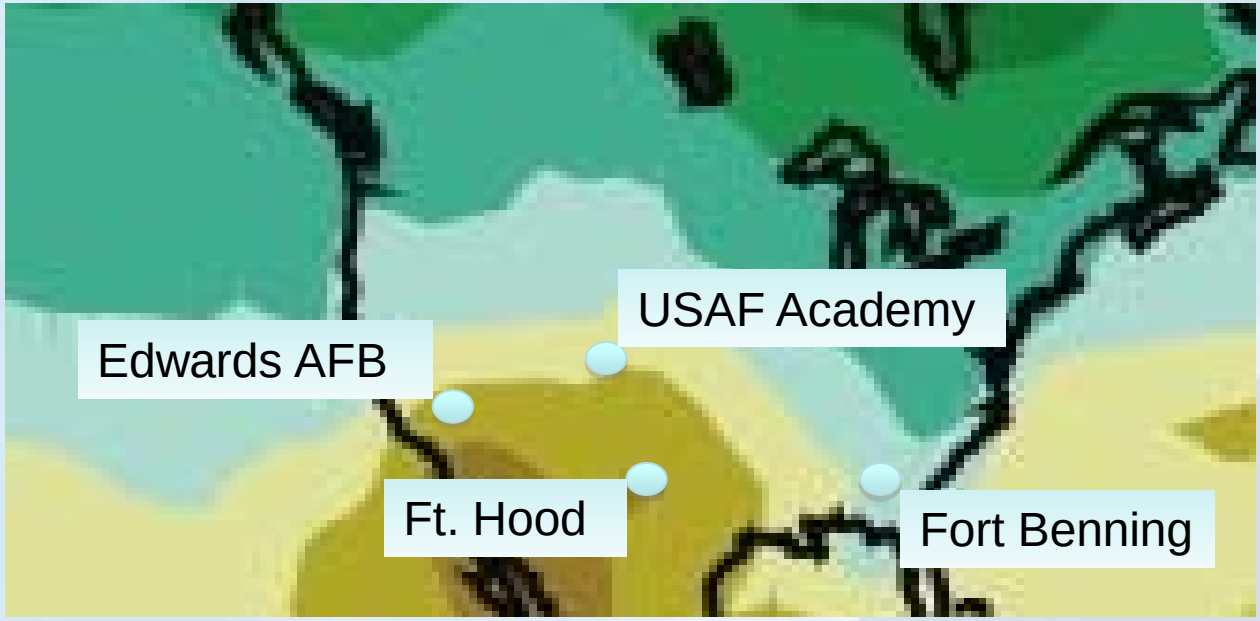
C. Brown, L. O. Mearns,
T. Hayden, J. Weatherly
University of Massachusetts
NCAR
Army Corps of Engineers

Technical Objective

NCAR

- Develop a framework for DoD decision processes for the evaluation and use of climate information in decision-making
  - Identify current sensitivity of DoD decision processes
  - Assess state of available climate information in terms of providing relevant information for these decisions
  - Develop tools and guidance for use of climate information and decision making under climate uncertainty
  - Pilot the framework

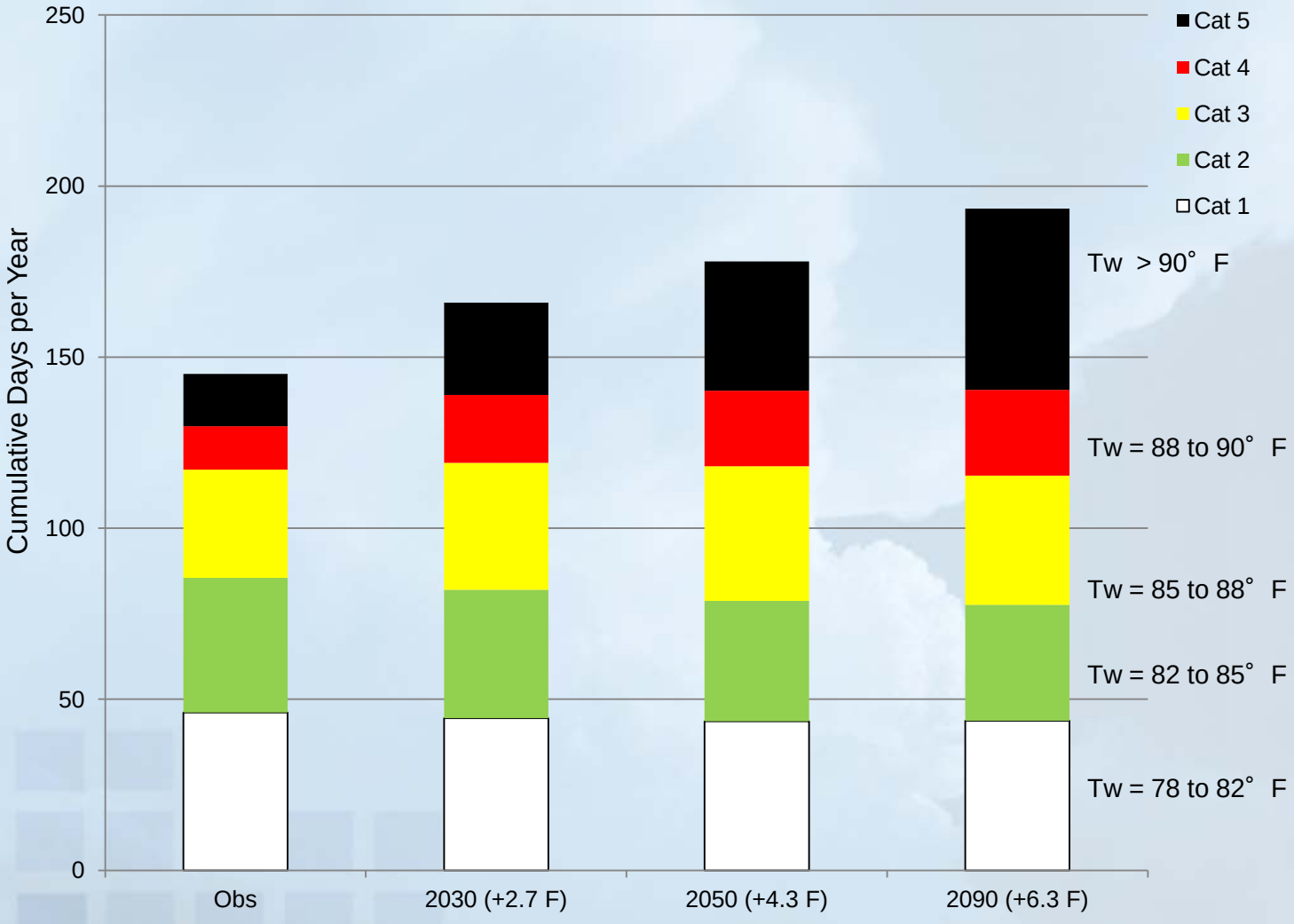
Study Sites



- **Fort Hood (South Central) – Fire management; Training; Water**
- **Fort Benning (Southeast) – Fire management; Training; Energy**
- **USAF Academy (Mountain West) – Water; Training; Energy**
- **Edwards AFB (West) – Water; Energy**

Ft Benning GA Heat Stress Days per Year

Observed data (1950-2009) and model-average climate change projection



NCAR

The NARCCAP User Community

Three user groups:

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

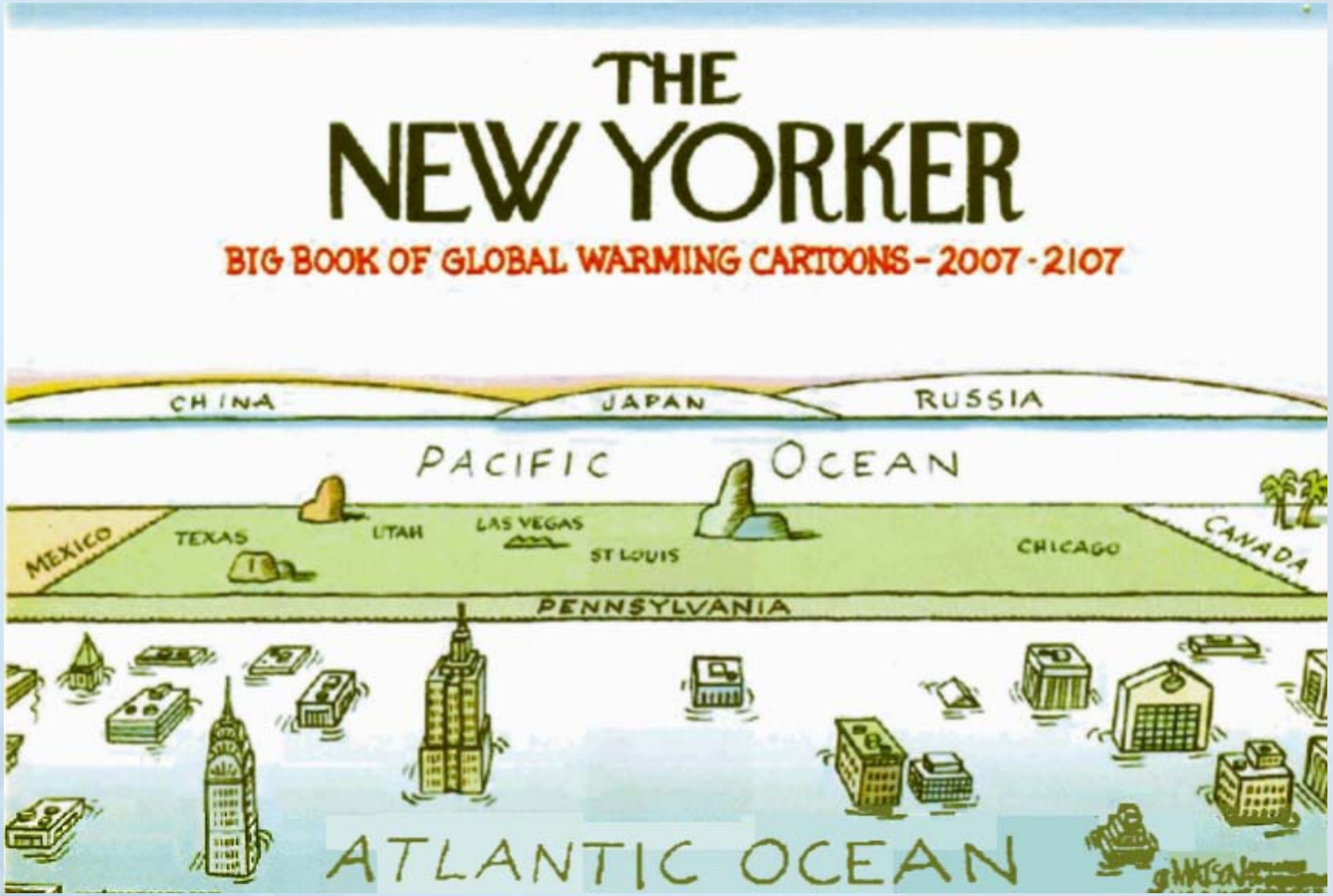
www.narccap.ucar.edu

To sign up as user, go to web site

Over 750 users registered, around 100 articles published

THE END

NCAR


THE
NEW YORKER
BIG BOOK OF GLOBAL WARMING CARTOONS - 2007 - 2107
CHINA
JAPAN
RUSSIA
PACIFIC OCEAN
MEXICO
TEXAS
UTAH
LAS VEGAS
ST LOUIS
CHICAGO
CANADA
PENNSYLVANIA
ATLANTIC OCEAN