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North American Regional Climate Change Assessment Program (NARCCAP)

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National Center for Atmospheric Research

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The North American Regional Climate Change Assessment Program (NARCCAP)

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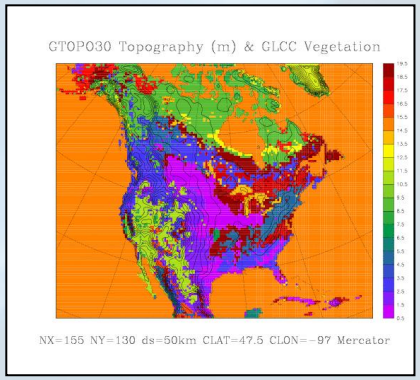
Initiated in 2006, it is an international program that will serve the climate scenario needs of the United States, Canada, and northern Mexico.



- **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, USEPA-ORD – 4-year program**

www.narccap.ucar.edu

NARCCAP - Team

Linda O. Mearns, NCAR

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* Deceased June 2008

Advantages of higher resolution

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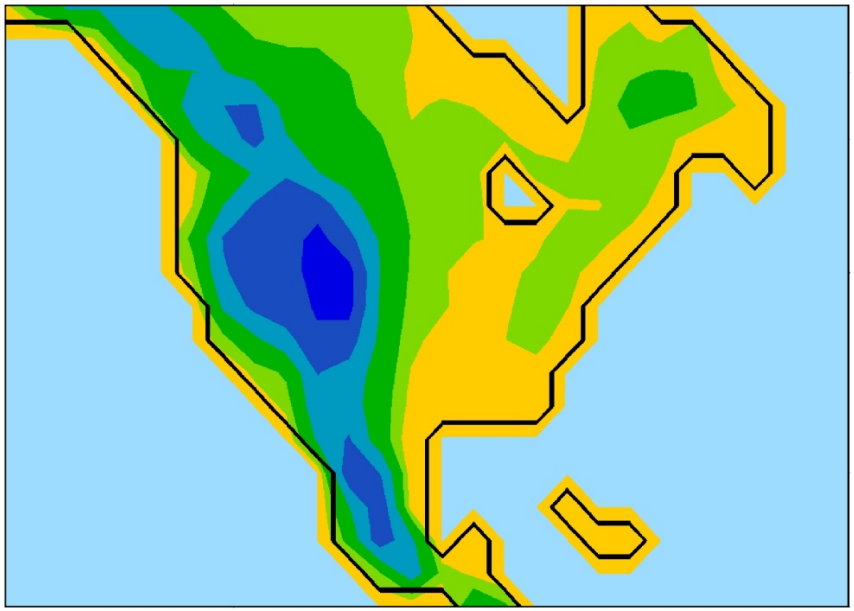
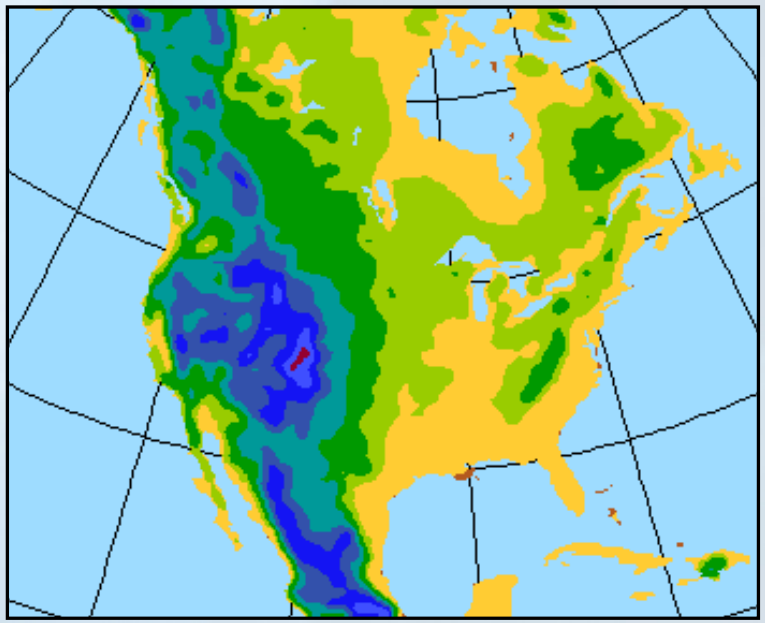


North America at typical global climate model resolution

Hadley Centre AOGCM (HadCM3), 2.5˚ (lat) x 3.75˚ (lon), ~ 280 km



North America at 50 km grid spacing

Regional climate models allow use of finer resolution

- HadCM3 grid spacing is about 280 km.
- To reduce the spacing to 50 km, we would need $(280/50)^3 = 175$ times the computing power.
- Proposal: Use a finer-scale model over only a limited region of interest.

Regional Modeling Strategy

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Nested regional modeling technique

- Global model provides:
  - initial conditions – soil moisture, sea surface temperatures, sea ice
  - lateral meteorological conditions (temperature, pressure, humidity) every 6-8 hours.
  - Large scale response to forcing (100s kms)
- Regional model provides finer scale (10s km) response

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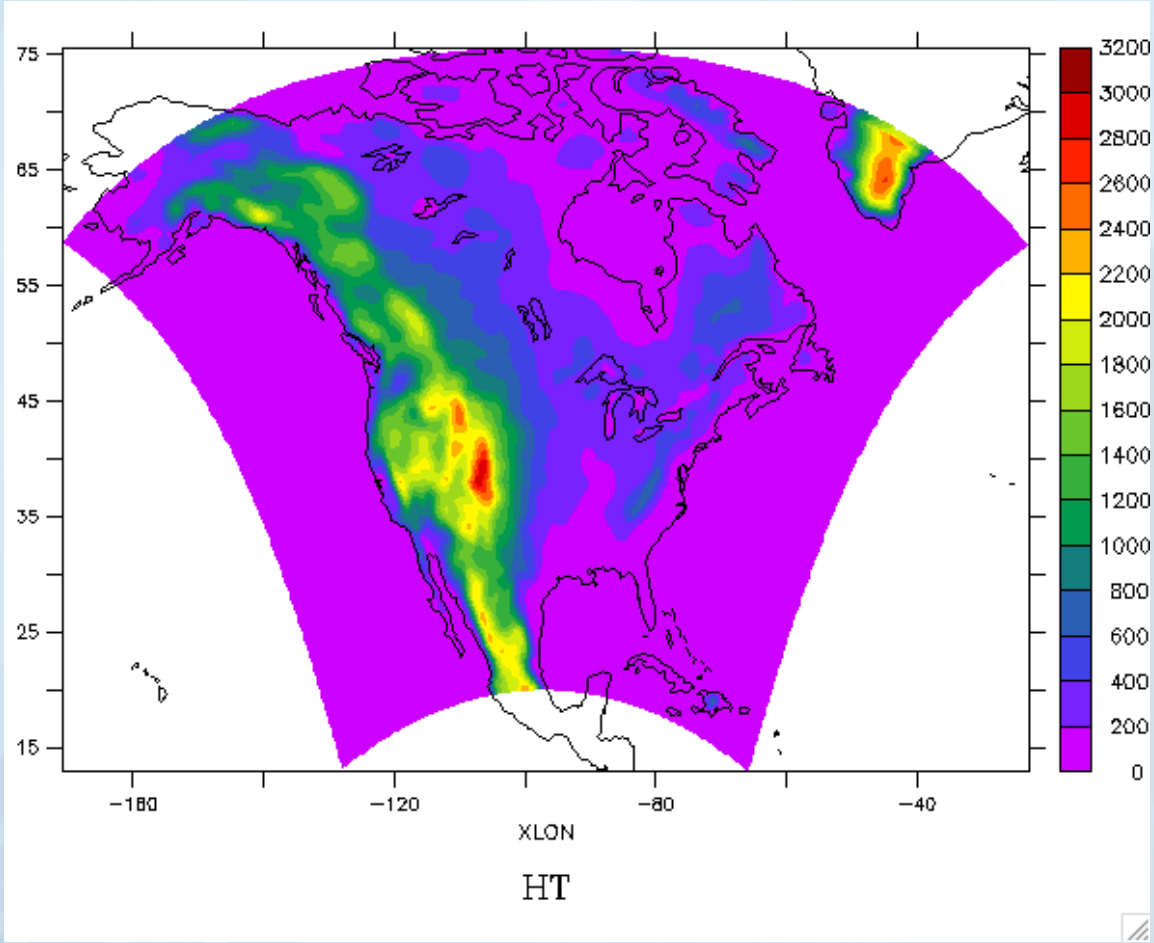
Physical Contexts for Regional Modeling

- Regions with small irregular land masses (e.g., the Caribbean)
- Complex topography (mountains)
- Complex coastlines (e.g., Italy)
- Heterogeneous landscapes

NARCCAP Domain



Organization of Program

- **Phase I: 25-year simulations using NCEP-Reanalysis boundary conditions (1979—2004)**
- **Phase II: Climate Change Simulations**
  - **Phase IIa: RCM runs (50 km res.) nested in AOGCMs current and future**
  - **Phase IIb: Time-slice experiments at 50 km res. (GFDL and NCAR CAM3). For comparison with RCM runs.**
- **Quantification of uncertainty at regional scales – probabilistic approaches**
- **Scenario formation and provision to impacts community led by NCAR.**
- **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, U. Nebraska).**

Phase I

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- All 6 RCMs have completed the reanalysis-driven runs (RegCM3, WRF, CRCM, ECPC RSM, MM5, HadRM3)
- 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

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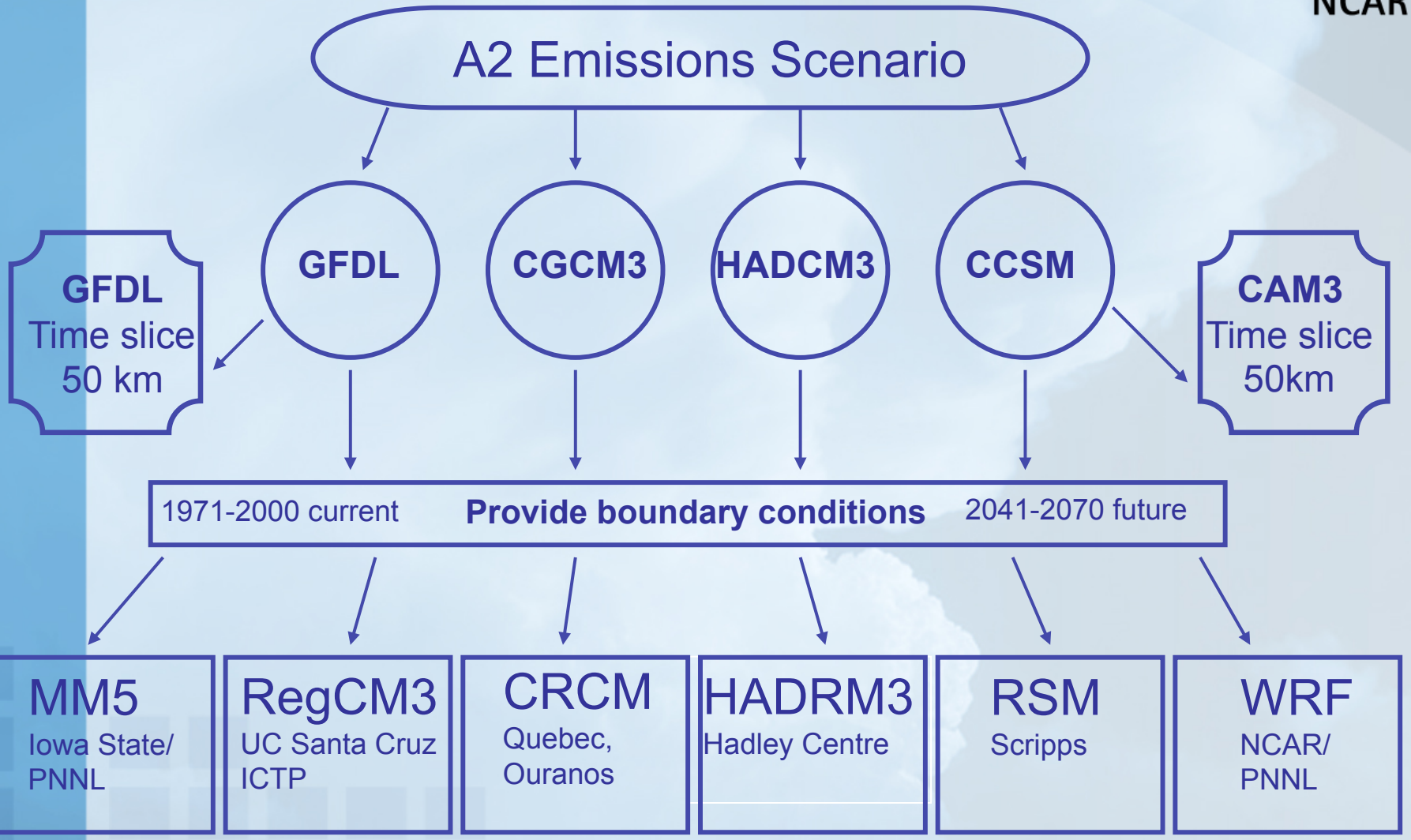

GCM-RCM Matrix

AOGCMS

RCMs	GFDL	CGCM3	HADCM3	CCSM
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

Global Time Slice / RCM Comparison

at same resolution (50km)

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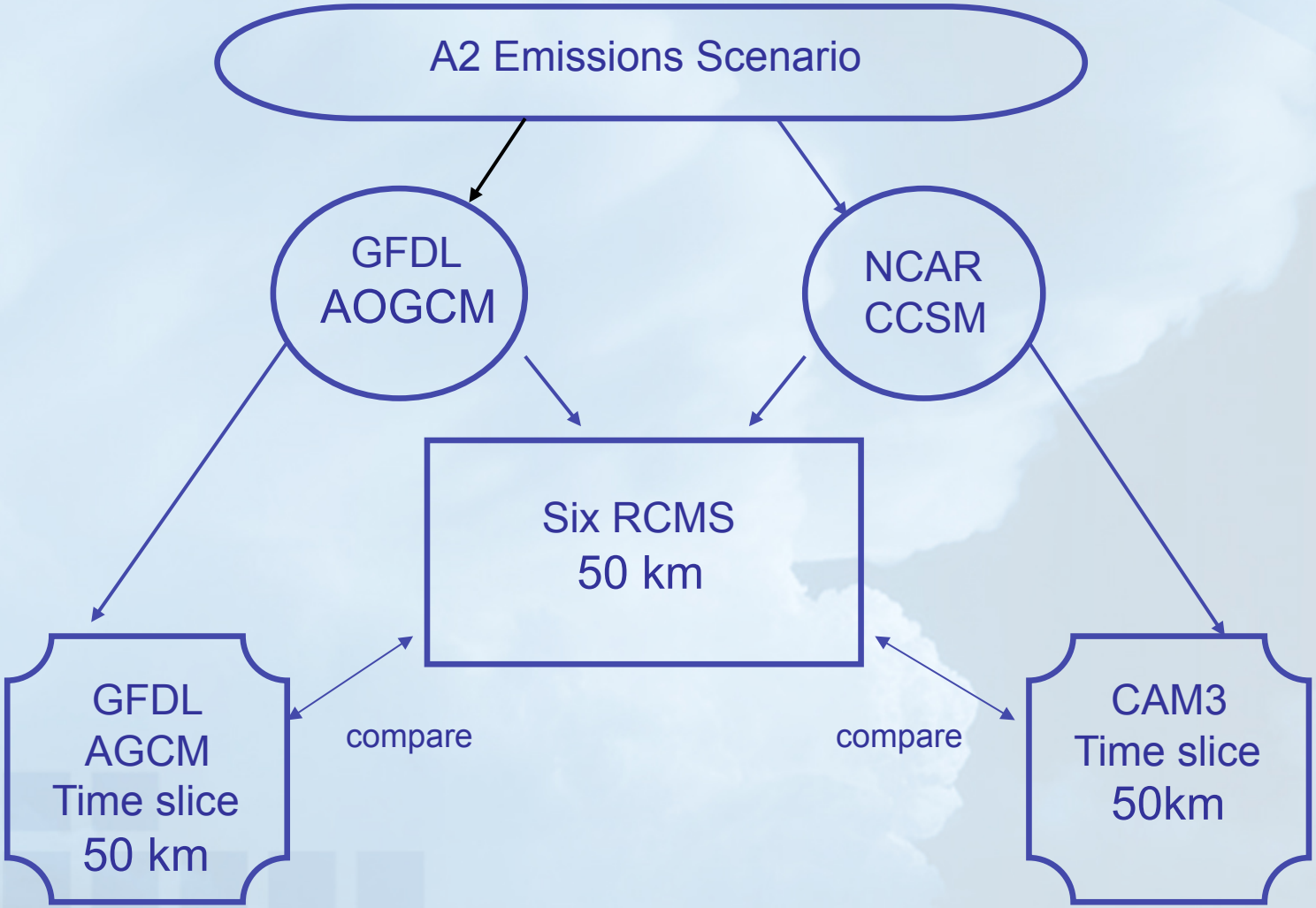
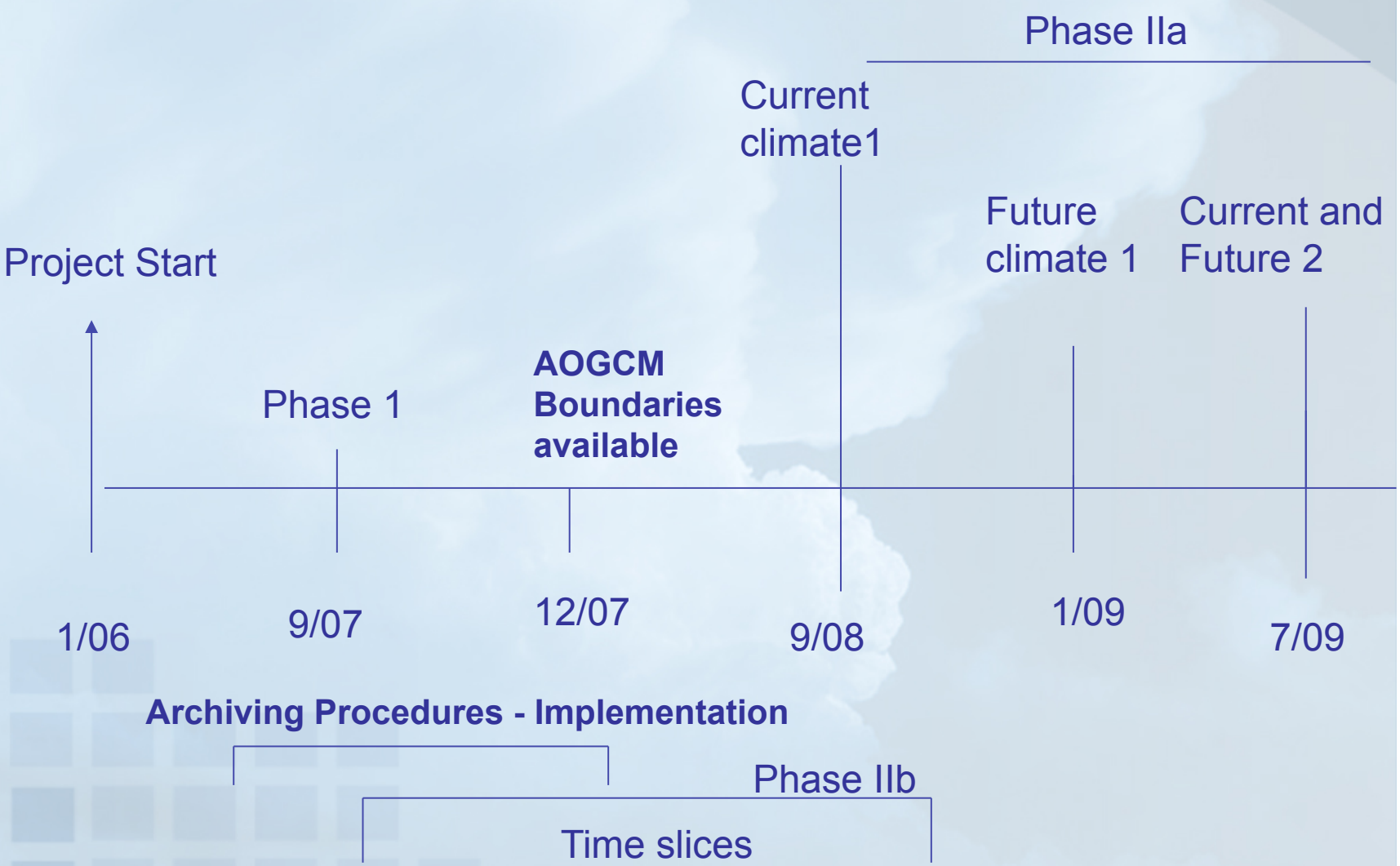


NARCCAP Project Timeline



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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

To sign up as user, go to web site – contact Seth McGinnis,

mcginnis@ucar.edu

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