The Abdus Salam
International Centre for Theoretical Physics

United Nations
Educational, Scientific and
Cultural Organization

IAEA
International Atomic Energy Agency

2148-8

Fifth ICTP Workshop on the Theory and Use of Regional Climate Models

31 May - 11 June, 2010

Coordinated Regional Downscaling Experiment (CORDEX)

William J. Gutowski
Iowa State University
Ames, Iowa
USA

Coordinated Regional Downscaling Experiment (CORDEX)

William J. Gutowski

Iowa State University

Ames, Iowa, USA

(with thanks to F. Giorgi & C. Jones)

CORDEX

A WCRP Initiative

Colin Jones & Filippo Giorgi
Task Force Leaders

Other Members: Jens Christensen, Greg Flato, Bill Gutowski, Bruce Hewitson, Krishna Kumar, Won-Tao Kwan, Claudio Menendez, James Murphy, Wong Li Wah

General Aims and Plans for CORDEX

- Provide a set of *regional climate scenarios* covering the period 1950-2100, for the majority of the populated land-regions of the globe.
- Make these *data sets readily available and useable* to the impact and adaptation communities.
- Provide a *generalized framework for testing and applying* regional climate models and downscaling techniques for both the recent past and future scenarios.
- Foster coordination between regional downscaling efforts around the world and *encourage participation* in the downscaling process by local scientists/organizations

What has been decided/suggested

1. A request to GCM groups to archive 6-hourly 3D model level fields was included in the CMIP5 output protocol.

   Requested: at least 1 member of an RCP4.5 run and if possible an RCP8.5 run also.

   At least 5-6 GCMs seem quite likely to contribute.

2. The standard RCM resolution is 50km (groups are encouraged to test higher resolutions, but please do the standard)

Region 1: South America

[88W-30W;57S-18N]

120 x 150

Region 2: Central America

[130W-25W;15S-35N]

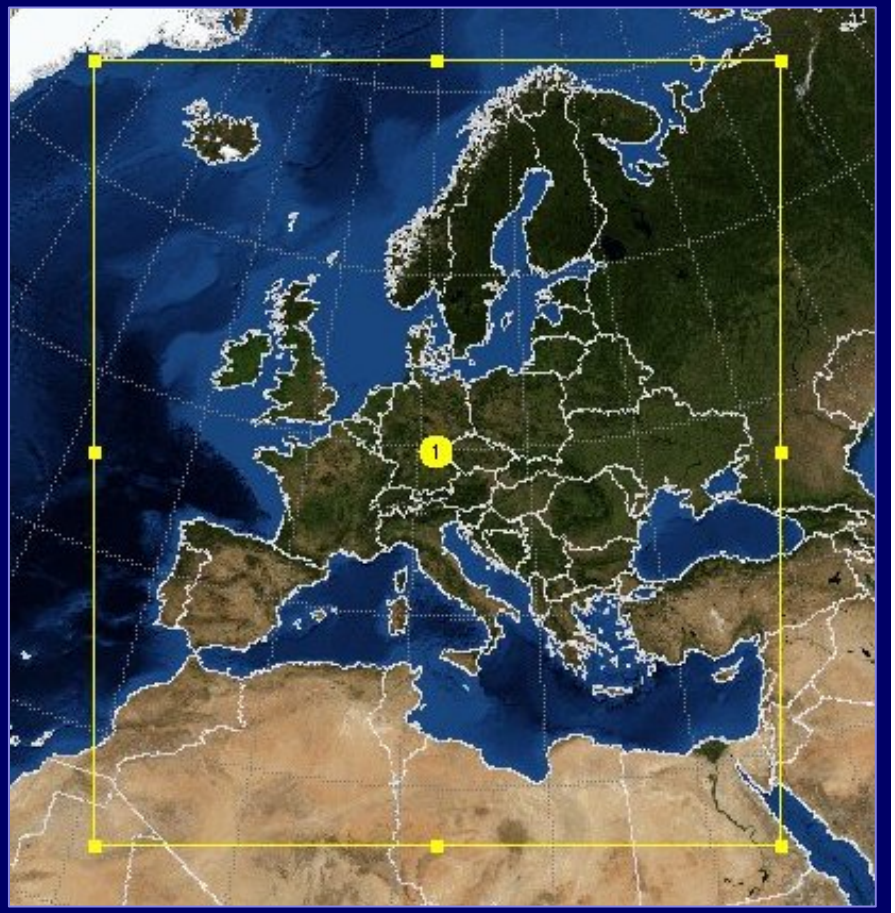
210 x 100

Region 3: North America (NARCCAP)

[~155W-55W;20-75N] 140 x 110

Region 4: Europe (ENSEMBLES)

[~20W-45E;25-70N] 91 x 90



Region 5: Africa

[25W-62E;38S-47N]

174 x 170

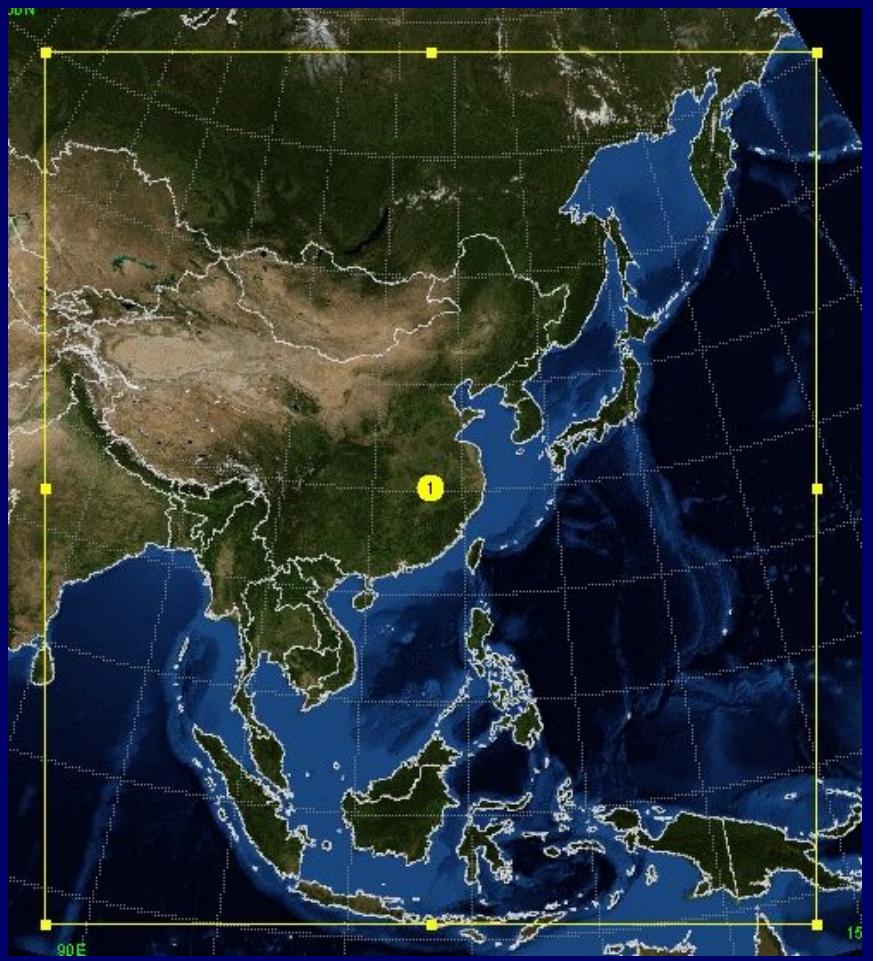
Region 6: West Asia

[20E-110E;12S-40N]

190 x 104

Region 7: East Asia

~ [75E-155E; 8S-68N] 160 x 152



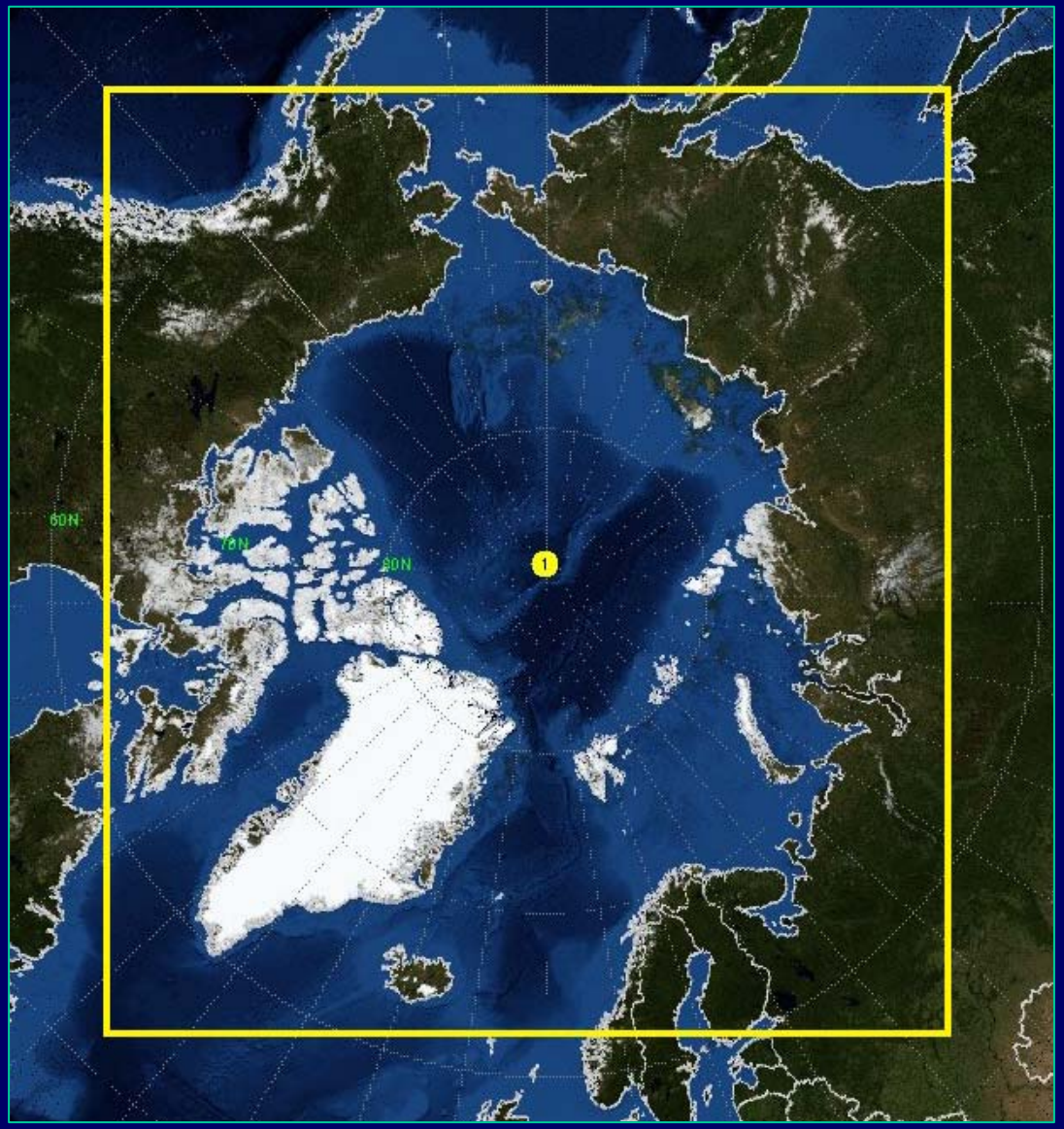
Region 8: Central Asia

~ [30E-125E;25N-70N] 135 x 90

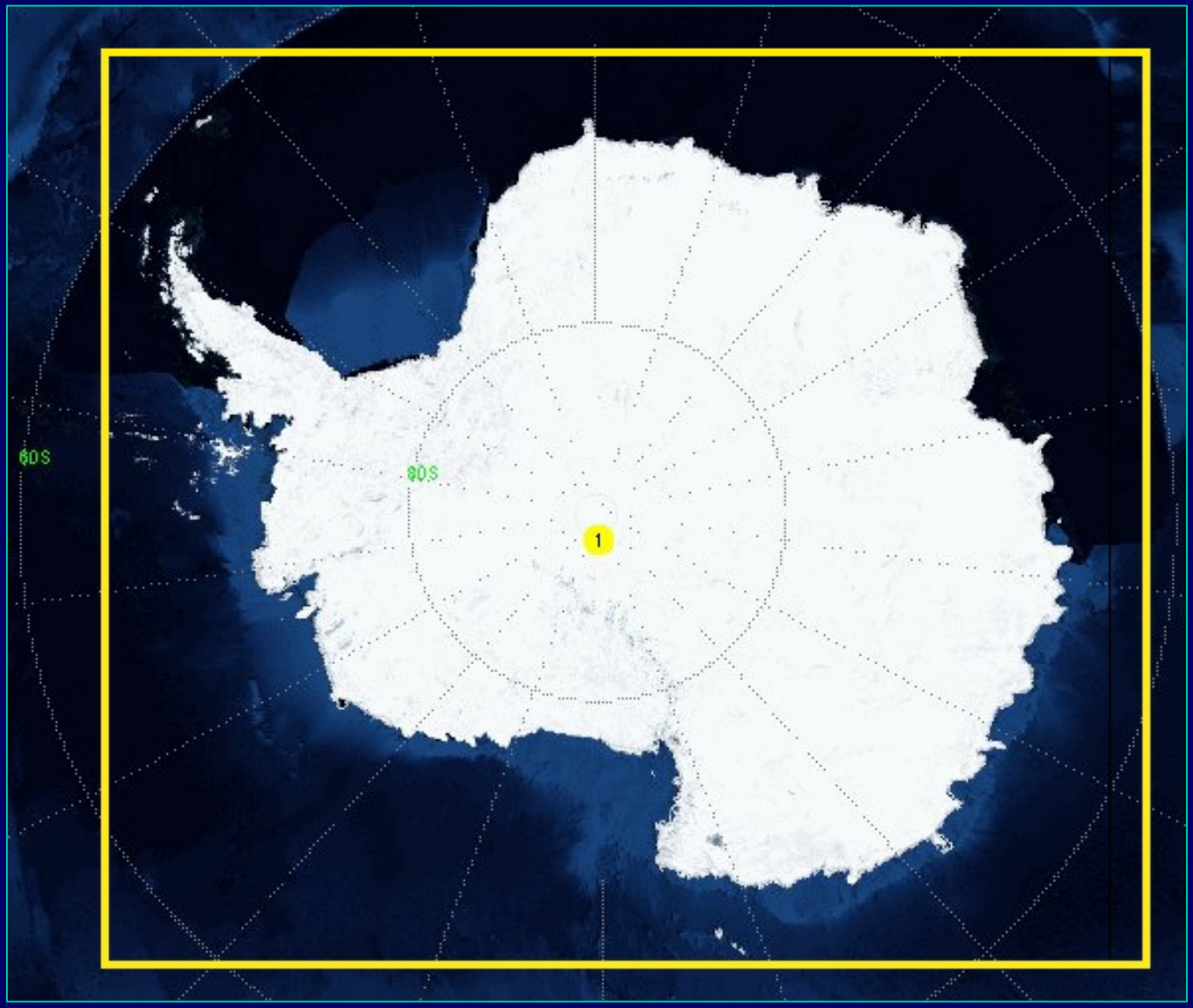
Region 9: Austral Asia

[100E-170W;50S-10N] 180 x 120

Polar Regions: Pan-arctic



Polar Regions: Antarctica



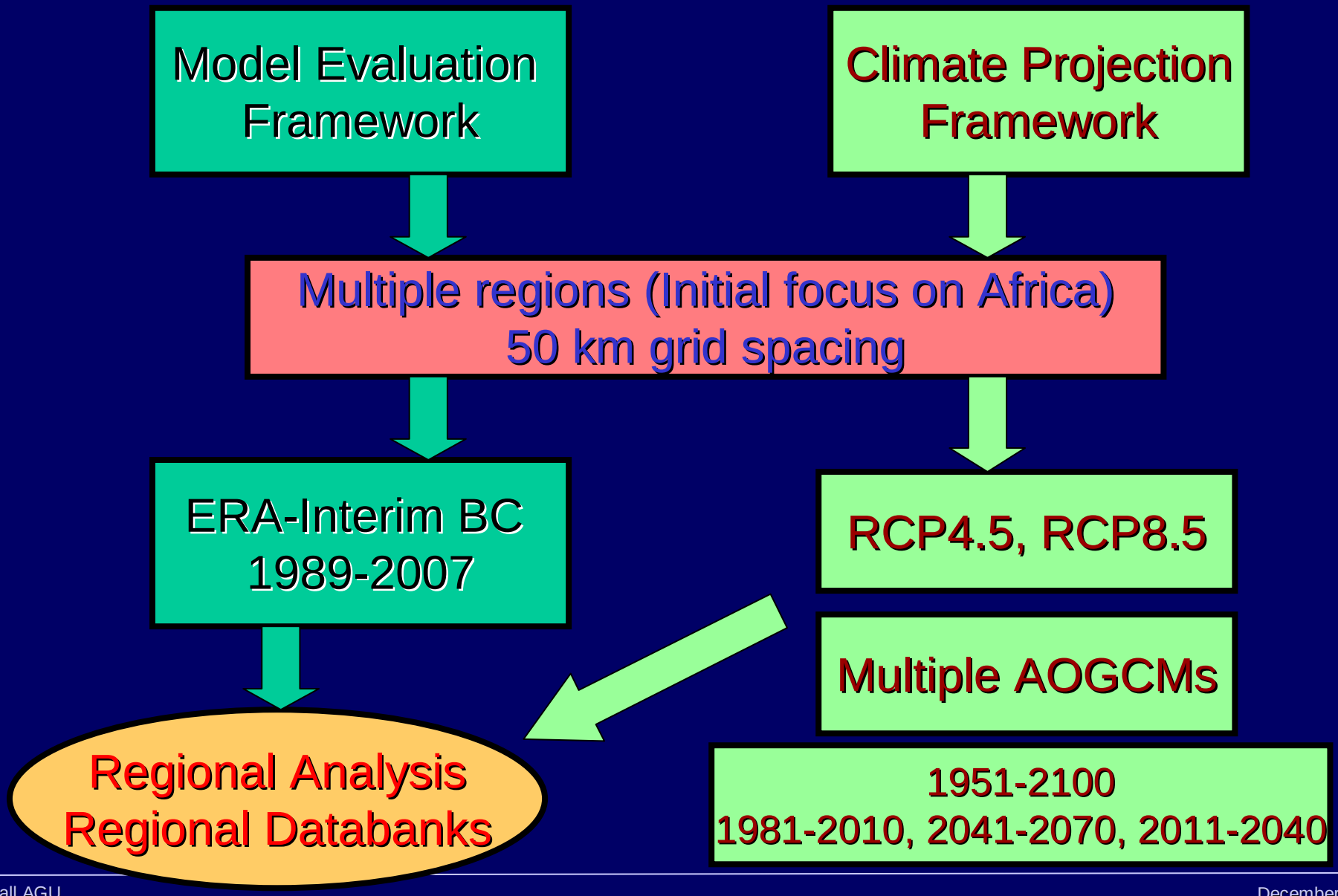
Issues not yet fully resolved

1. Standard output data set (variables, frequency etc)

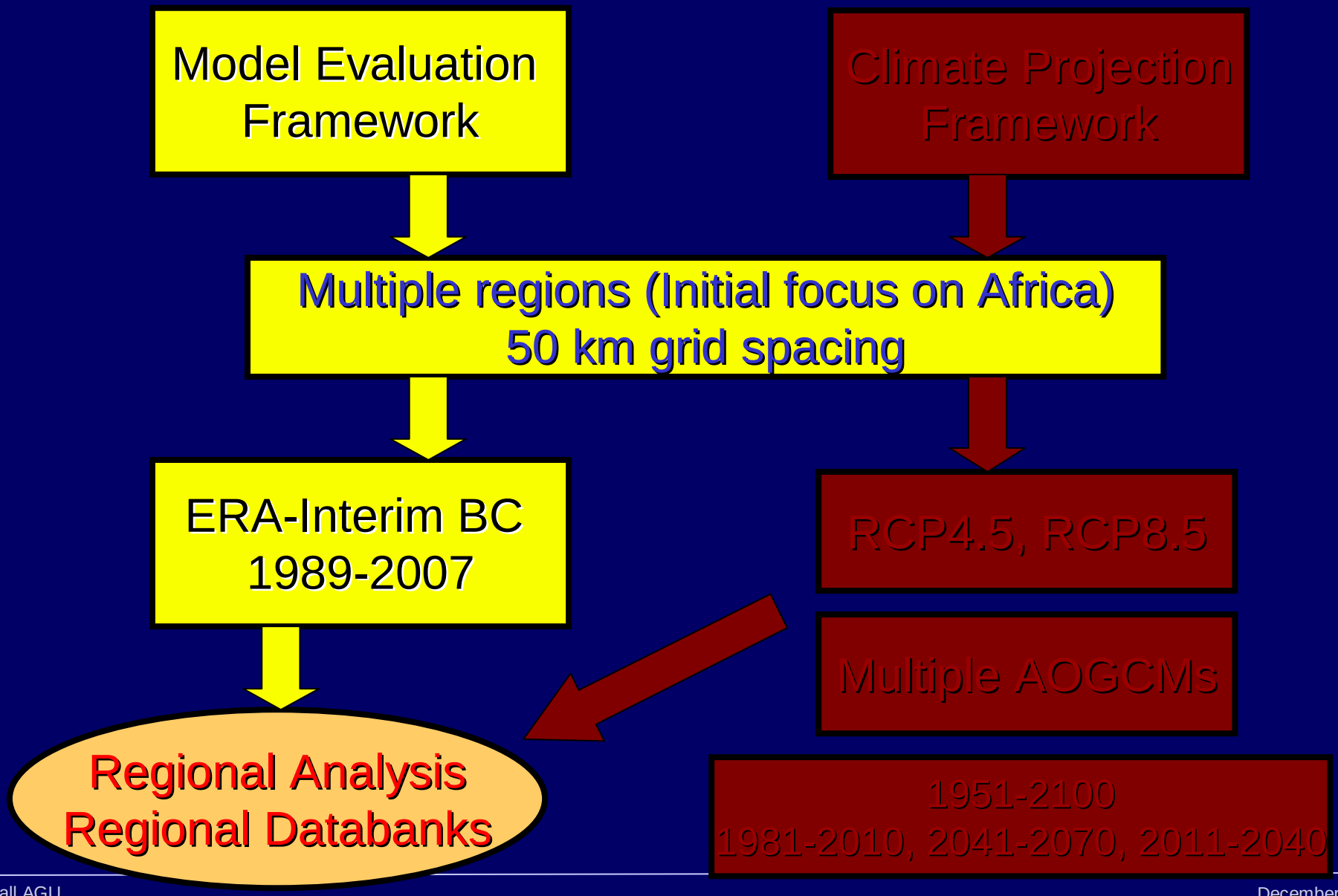
2. Format of output (most likely follow CMIP5 protocol)

3. Location of ‘online’ RCM storage + mechanism for data access/distribution.

CORDEX Phase I experiment design



CORDEX – Current Status



Summary

1. The Regional Climate Downscaling community is getting better organized

1. Probabilistic assessments of regional change are emerging from coordinated ensemble simulations.

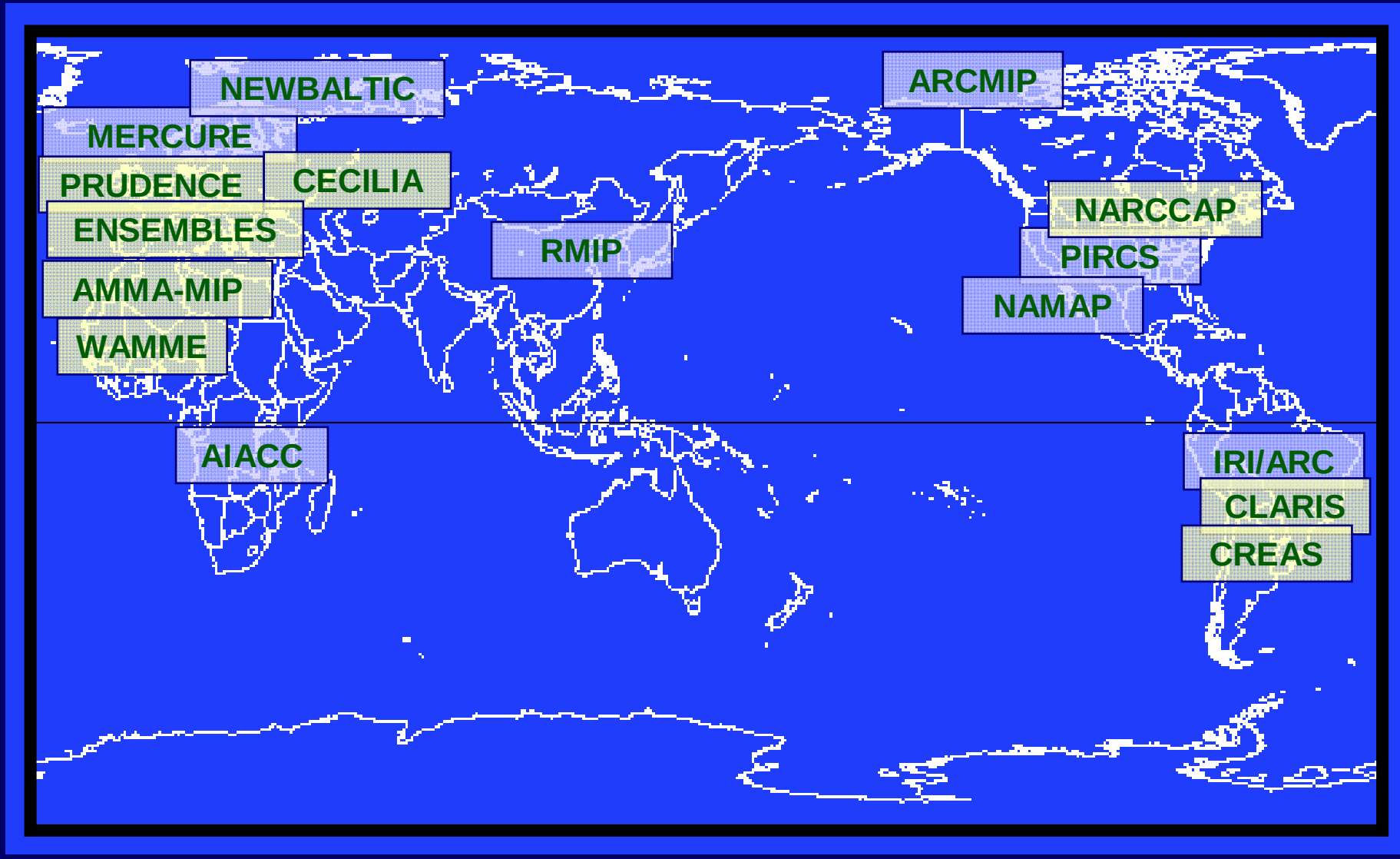
2. CORDEX is building on prior experiences to provide a global framework for assessing, advancing and utilizing regional-climate downscaling.

More details at:

http://wcrp.ipsl.jussieu.fr/RCD_Projects/CORDEX/CORDEX.html

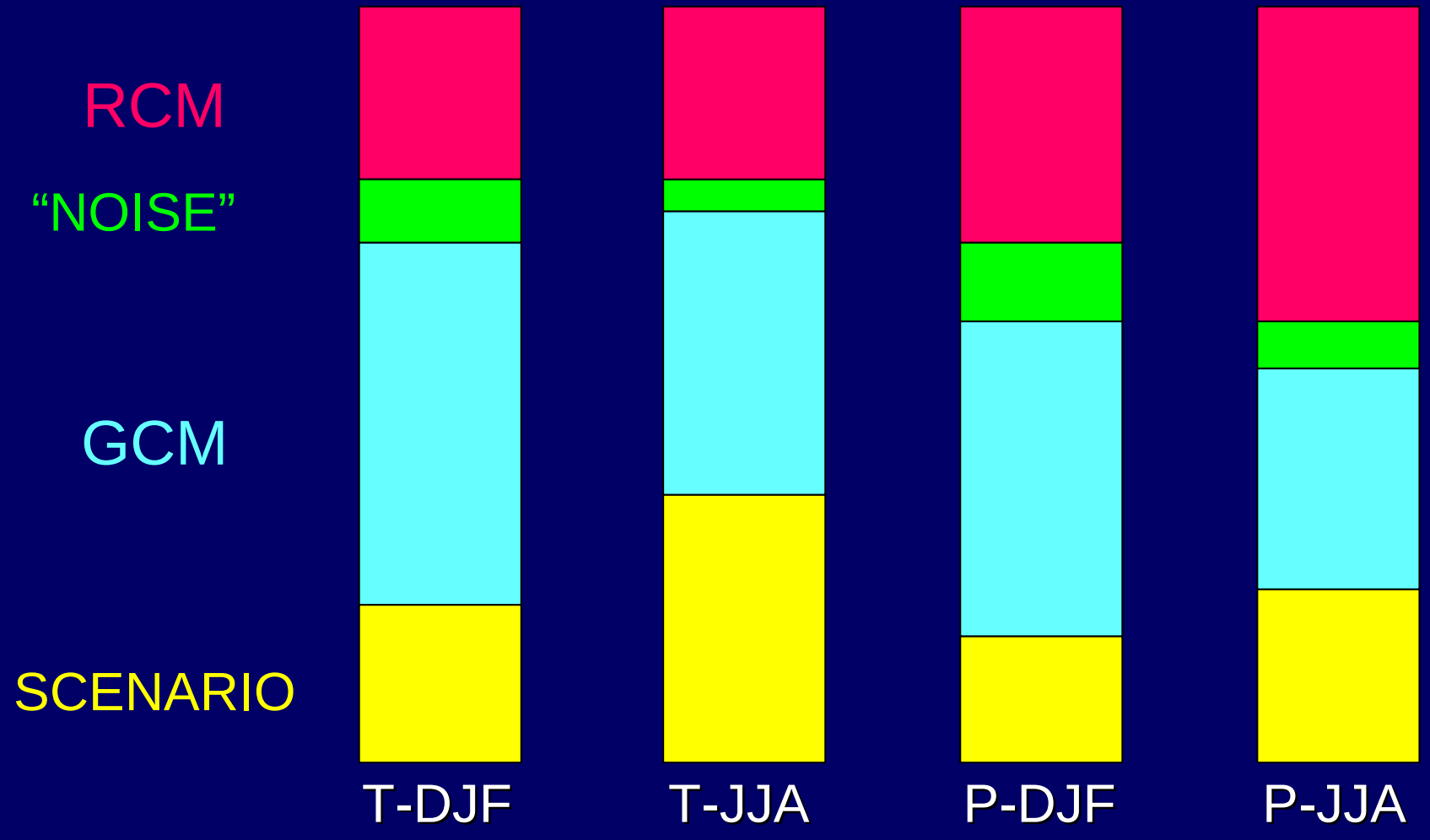
Thank you!

Multi-Model Project Locations



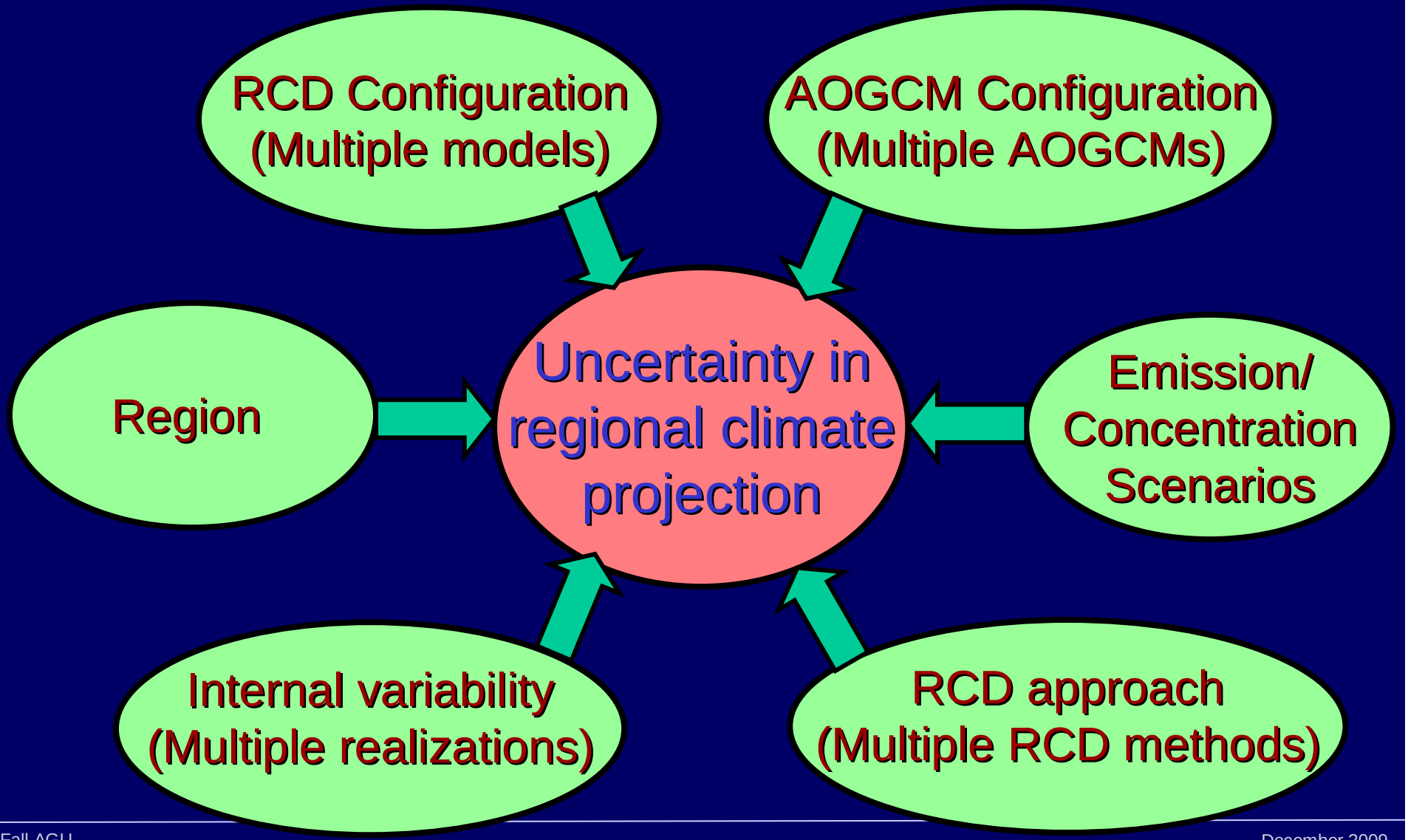
PRUDENCE : Sources of uncertainty in temperature and precipitation change (2071-2100 minus 1961-1990)

(Adapted from Deque et al. 2007)



(F. Giorgi, 2008)

Sources of Uncertainty in RCD-based Regional Climate Projections



Regional Multi-Model Projects

Early projects:

- Do these models work?
- Side-by-side simulations vs. observations
- Limited time periods

Later projects:

- Coordination with observing campaigns
- Coordination with GCM groups
- Coordination with statisticians
- Coordination with impacts assessments

More specific aims and plans for CORDEX
(resulting from a discussion meeting in Toulouse Feb 2009)

Develop a matrix of RCD simulations that employ:

1. Multiple GCMs as boundary conditions (BCs)
2. Multiple realizations of a given (single) GCM as BCs
3. Multiple RCMs driven by a given GCM over a given domain
4. More than 1 representative greenhouse emission scenario
5. With common RCM domains and resolution
6. With common RCM output variables and frequency
7. In a common format
8. Store the results online for subsequent access and use

What has been decided/suggested

3. Groups are encouraged to run as many of the RCM domains as possible using the ERA-interim data as boundary conditions (1989-2008) for model evaluation

4. Initial focus: Africa aiming at IPCC AR5

5. Emission scenarios: (a) RCP4.5 (b) RCP8.5 (c) RCP2.5

6. Either full transient runs 1950-2100
or time slices in order of preference:

(a) 1980-2010 (b) 2040-2070 (c) 2010-2040
(d) 2070-2100 (e) 1950-1980