

The logo for WCRP CORDEX features the text 'WCRP' in a teal, sans-serif font above 'CORDEX' in a black, sans-serif font. A stylized globe of the Earth is positioned between the two words, with a blue and yellow swoosh line passing through it. The background of the slide is a collage of satellite-style maps of various regions, including North America, Europe, and Africa, with a central globe.

WCRP  
CORDEX

# Update on CORDEX

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Abdus Salam ICTP*

JSC-34, Brasilia, 27-31 May, 2013

# COordinated Regional Downscaling EXperiment CORDEX

- Changes in CORDEX management
- Update on CORDEX activities
- ICRC – CORDEX 2013

# CORDEX Management

- The original Task Force on Regional Climate Downscaling (TFRCDD) was terminated after successfully ending its mandate
- CORDEX is now a project within the newly formed Working Group on Regional Climate (WGRC)
- M. Rixen from WCRP assuming a coordinating/promoting role
- Science Advisory Team (SAT) was formed
  - F. Giorgi, C. Jones, C. Goodess, W. Gutowski, B. Hewitson, K. Krishnan, W.T. Kwon, S. Solman

# CORDEX Management

- Need to replace some members of the SAT
  - C. Jones (Co-chair) rotating off because of new job
  - C. Goodess, B. Hewitson rotating off because of WGRC commitment
  - Possible expansion of the SAT to cover other domains (Australia, Arctic, MENA, C. America)
- Proposal of the WGRC:
  - W. Gutowski (IAState), co-chair of the SAT
  - I. Anguelovski (UCB, VIA)
  - C. Lennard (Africa CORDEX)
  - G. Nikulin (SMHI, Data management)
  - T. Stephenson (U. W. Indies, SD and C. America)
  - B. Timbal (BOM, SD)



# CORDEX Phase I experiment design

Model Evaluation  
Framework

Climate Projection  
Framework

AMIP  
like

Multiple regions (Initial focus on Africa)  
50 km grid spacing

CMIP  
like

ERA-Interim LBC  
1989-2007

RCP4.5, RCP8.5  
1951-2100 or 1980-2050

Decadal predictions  
1980-2010, 1990-2000, 2005-2035

Regional Analysis  
Regional Databanks

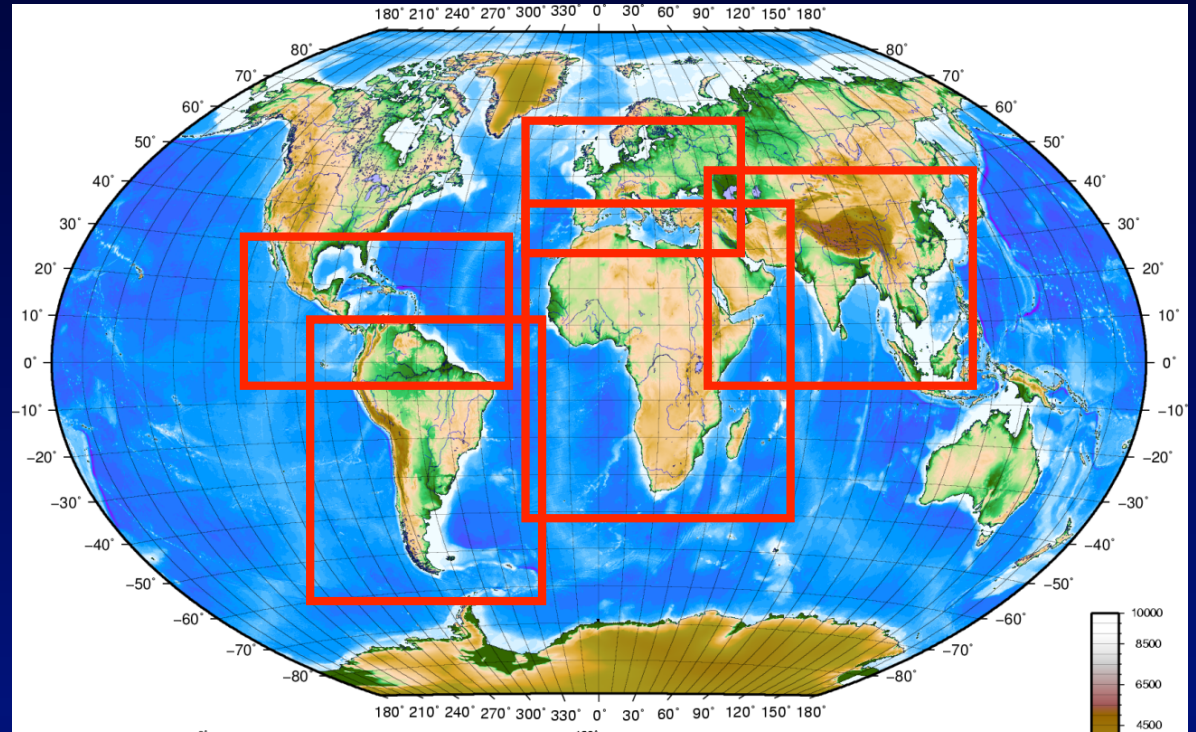
Multiple AOGCMs

# CORDEX: Recent Progress

- Numerous CORDEX presentations at major meetings
  - EGU RCM session still largest in the CL area (87 abstracts)
  - Regional modeling session at AGU
- Major pan-CORDEX conference ICRC-CORDEX 2013 (See later)
- Many groups and model communities (e.g. WRF, RegCM, PRECIS) completing ensembles of simulations over various domains
- Papers appearing with explicit use of CORDEX framework (JC, CD, JGR, CR, CC etc.)

# The CORDEX RegCM Matrix (CREMA) Phase I Experiment

Contribution to the  
Coordinated Regional  
Downscaling Experiment  
(CORDEX) by the  
RegCM community



**Collaboration across  
ICTP  
U. San Paolo (Brazil)  
CICESE (Mexico)  
Indian Institute of technology  
U. Dakar (Senegal)  
DHMZ (Croatia)**

**Special Issue of  
Climatic Change**

**34 Scenario simulations (1970-2100)  
over 5 CORDEX domains  
with RegCM4 driven by  
three GCMs, 2 GHG  
scenarios (RCP4.5/8.5) and  
different physics schemes**

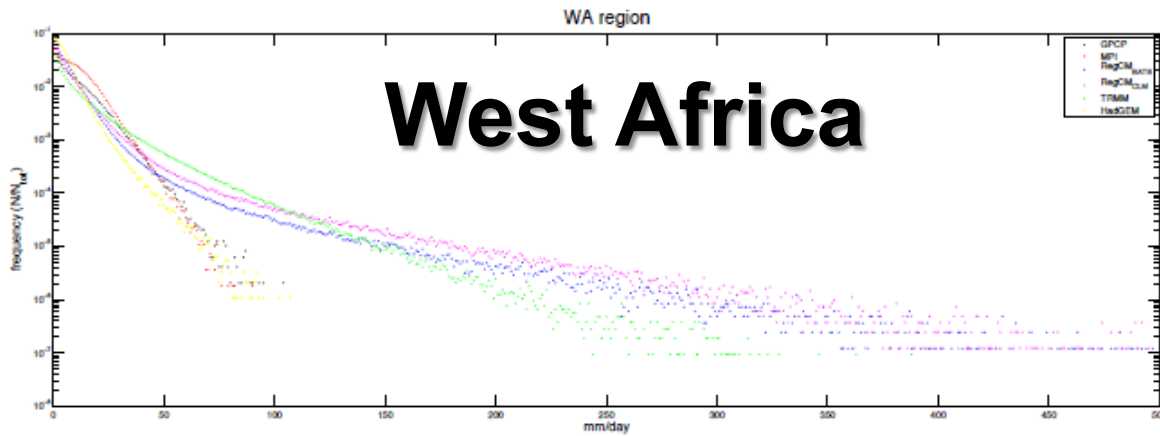
**3 months dedicated time on ~700  
CPUs at the ARCTUR HPC  
~200 Tbytes of data produced**

# The CREMA Phase I Matrix

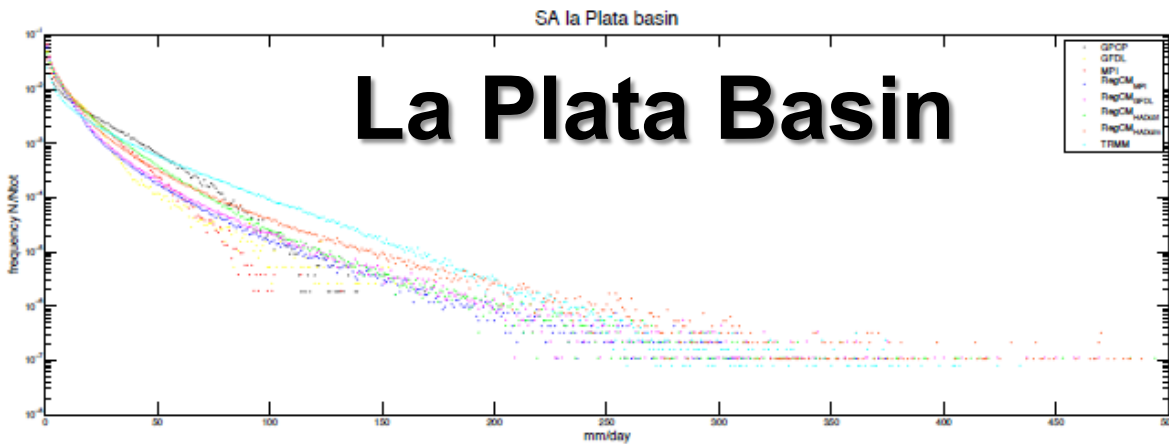
	Africa	C America	India	Med	S. America
HAD-CLM-GE	2			1	
HAD-CLM-E		2		3	2
HAD-BATS-G		2		3	
HAD-BATS-GE				3	2
MPI-CLM-E		1	1	3	1
MPI-BATS-G	1	1		3	
MPI-BATS-GE				3	
MPI-CLM-GE				1	
GFDL-CLM-E			2		1
GFDL-CLM-EG			2		

Table 1 The CREMA simulation ensemble divided by land-surface (CLM or BATS) and convection scheme (G=Grell, E=Emanuel, GE=Grell over land-Emanuel over ocean, EG=Emanuel over land Grell over ocean). 1 indicates only the RCP 8.5 scenario was completed, 2 indicates that both the RCP 8.5 and 4.5 scenarios were completed.

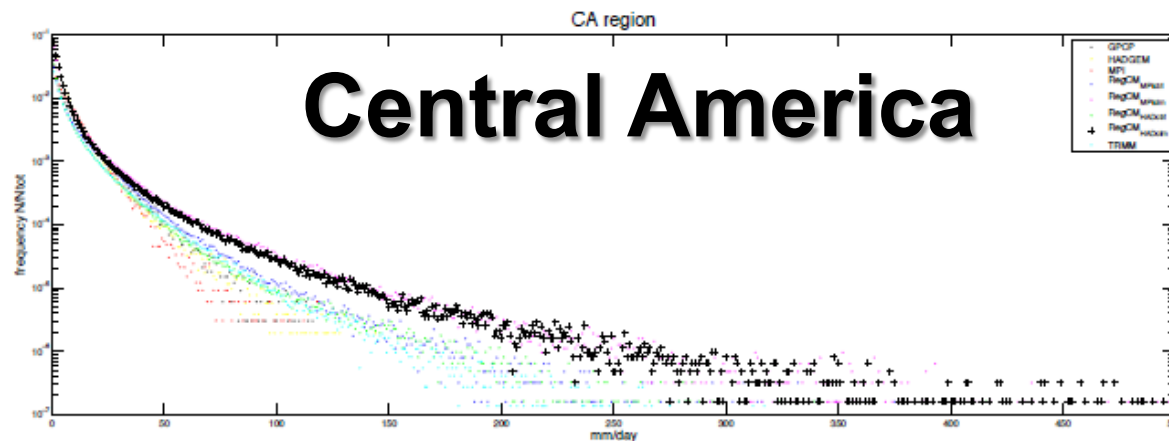
# West Africa



# La Plata Basin



# Central America



Empirical PDFs  
of daily  
precipitation  
events in models  
and observations  
(GPCP, TRMM)  
**CREMA RUNS**



# Regional activities

## Africa - CORDEX

- Africa diagnostic team/metrics formed under the leadership of B. Hewitson (UCT)
  - Sponsorship by START, WCRP, SMHI, ICTP
  - Meeting in Cape Town, April 2010
  - Training workshop in Trieste, March 2011
  - Training workshop in Cape Town, November 2011
  - Paper writing workshop in Trieste, April 2012  
(three papers produced)
- 10 groups completed the first ERA-Interim driven runs (J. Climate paper)
- 14 groups completing different scenario runs



# CORDEX-Africa Matrix

RCP4.5											RCP8.5																				
	BCCR-greenWRF	CCCma-CanRCM4	CLMcom-CCLM4-8	CNRM-ALADIN	CSC-REMO	DMI-HIRHAM5	ICTP-RegCM4	KNMI-RACMO2.2	MOHC-GA3RCM	SMHI-RCA4	UCLM-PROMES	ULL-WRF311	UCAN-WRF34	UQAM-CRCM	sum		BCCR-greenWRF	CCCma-CanRCM4	CLMcom-CCLM4-8	CNRM-ALADIN	CSC-REMO	DMI-HIRHAM5	ICTP-RegCM4	KNMI-RACMO2.2	MOHC-GA3RCM	SMHI-RCA4	UCLM-PROMES	ULL-WRF311	UCAN-WRF34	UQAM-CRCM	sum
CanESM2		■								■				■	3	CanESM2	■									■					2
CNRM-CM5			■	■						■				■	3	CNRM-CM5		■	■							■					3
NorESM1-M	■									■					1	NorESM1-M	■									■					1
EC-EARTH (r1)							■								1	EC-EARTH (r1)						■									1
EC-EARTH (r3)						■									1	EC-EARTH (r3)					■										1
EC-EARTH (r12)			■		■					■				■	3	EC-EARTH (r12)		■		■					■	■					3
HadGEM2-ES			■			■			■					■	3	HadGEM2-ES		■		■		■		■							3
MIROC5														■	1	MIROC5															1
MPI-ESM-LR			■		■									■	4	MPI-ESM-LR		■		■		■				■					4
GFDL-ESM2M										■				■	1	GFDL-ESM2M									■						1
HADCM3																HADCM3										■					
<b>sum</b>		1	4	1	2	1	1	1		8				2	21	<b>sum</b>	1	4	1	2	1	2	1		8					19	

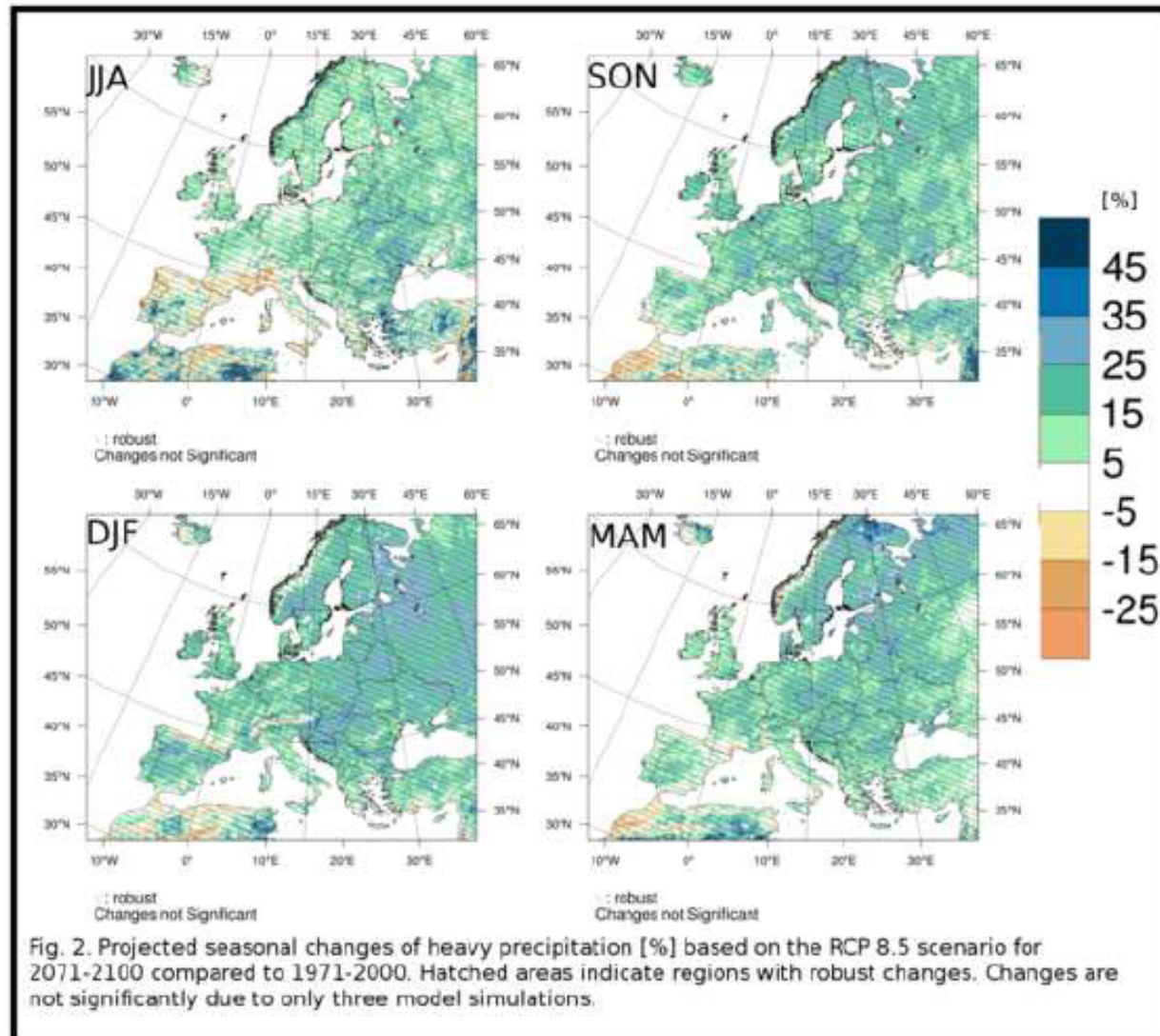


# Regional activities

## Euro-CORDEX

- Coordinator: A. Gobiet (U. Graz)
- <http://www.euro-cordex.net>
- 27 modeling groups participating
- Meetings in November 2011 (Hamburg) and at EGU 2012/2013
- Simulations completed or planned at 50 km and 12 km horizontal grid spacing
  - Publication submitted on high resolution scenario runs
- Data stored at DKRZ, SMHI, BADC, DMI

# EURO-CORDEX, 6 RCMs, 13 projections, dx=12.5 km



# Regional activities

## MED-CORDEX

- Coordinator: S. Somot (MeteoFrance), P. Ruti (ENEA)
- 11 modeling groups participating
- Meeting in March 2012 (Toulouse), EGU2013
- Coupled A-O and A-only models
- Simulations under way or planned at 50 km, 25-30 km (coupled) and 12 km horizontal grid spacing
- Connections with HYMEX and MEDCLIVAR
- Data stored at ENEA

# Regional activities

## CORDEX – East Asia

- Coordinator: W.T. Kwon (KMA)
- 9 modeling groups participating
- Meeting in September 2012 (Jeju), APCC training workshop in Busan, S. Korea, August 2013
- Simulations under way or planned at 50 km and 12 km horizontal (for some sub-regions) grid spacing
- Data stored at KMA



# Regional activities

## CORDEX – South Asia

- Coordinator: K. Krishnan (IITN)
- 10 modeling groups participating
- Planning meeting in February 2012 (Pune) and training meeting in October 2012 (Pune)
- Three training workshops planned, first in Kathmandu, August 2013
- Data stored at IITN

# Other Regional activities

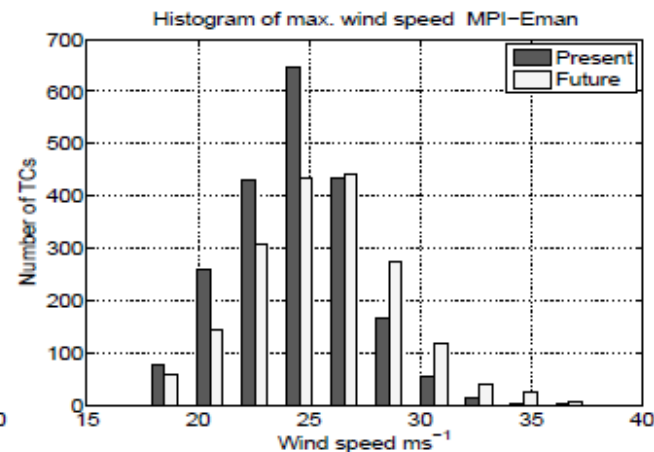
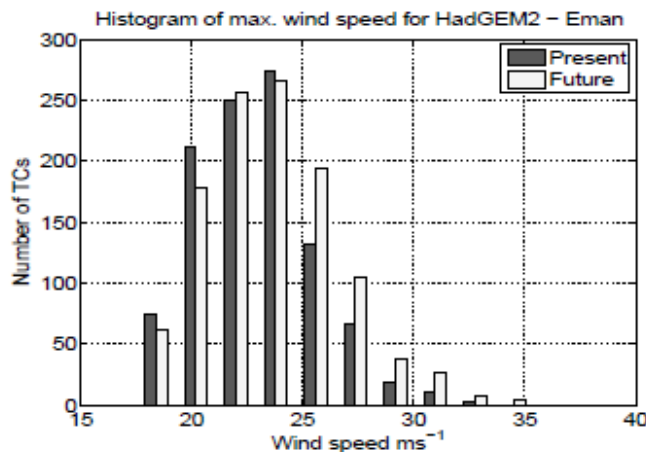
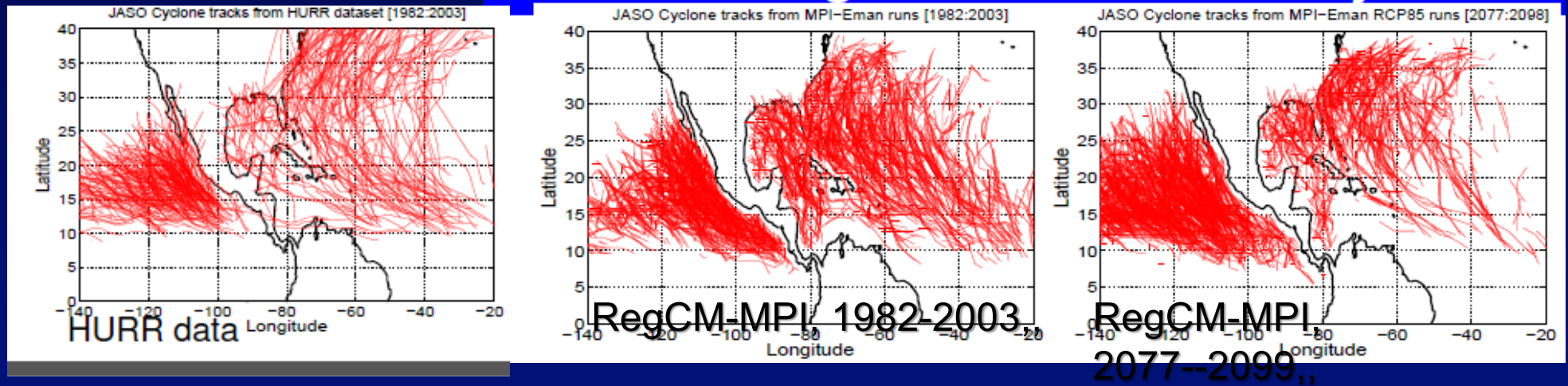
## Central/South America

- Coordinator: S. Solman (CIMA)
- Joint VAMOS/CORDEX training workshop in Lima, September 2013
- Training workshop in Encenada, Mexico, October 2014

## North America

- Activities ongoing, mostly related to NARCCAP, but no formal CORDEX coordination

# Change in tropical cyclones (Diro, Fuentes-Franco et al. 2013)



A decrease in the weak TCs but an increase in the frequency of the strongest TCs

# Other Regional activities

## MENA

- Meeting planned during ICRC-2013

## Polar

- Meeting planned during ICRC-2013

## Statistical Downscaling

- Planning meeting at ICTP, Trieste, in September 2013

# Change in the data management of CORDEX

- CORDEX data will be saved and distributed through the Earth System Grid (ESG) as for CMIP5
- The system will include a file/format compliancy checker prior to the data upload
- CORDEX nodes planned at BADC, DKRZ, DMI, SMHI, ENEA (MedCORDEX), UCT, IITN, KMA
- Current testing of the system by SMHI (virtually functional)



# WCRP

World Climate Research Programme



# ipcc

INTERGOVERNMENTAL PANEL ON  
climate change



**International Conference on Regional Climate - CORDEX 2013**  
A partnership between WCRP, the European Commission and IPCC  
4 - 7 November 2013 - Brussels, Belgium

The Conference will bring together the international community of regional climate scientists to present and discuss results from WCRP regional climate studies, with a particular emphasis on the CORDEX initiative.

#### **4 Nov: High-Level Session**

- High-Level Session: key findings from the IPCC AR5 WGI: The Physical Science Basis
- Stakeholder Dialogue: regional climate information for decision-makers

#### **5-7 Nov: Science Segment**

- Key results from Regional Climate Research and Phase I of the CORDEX project



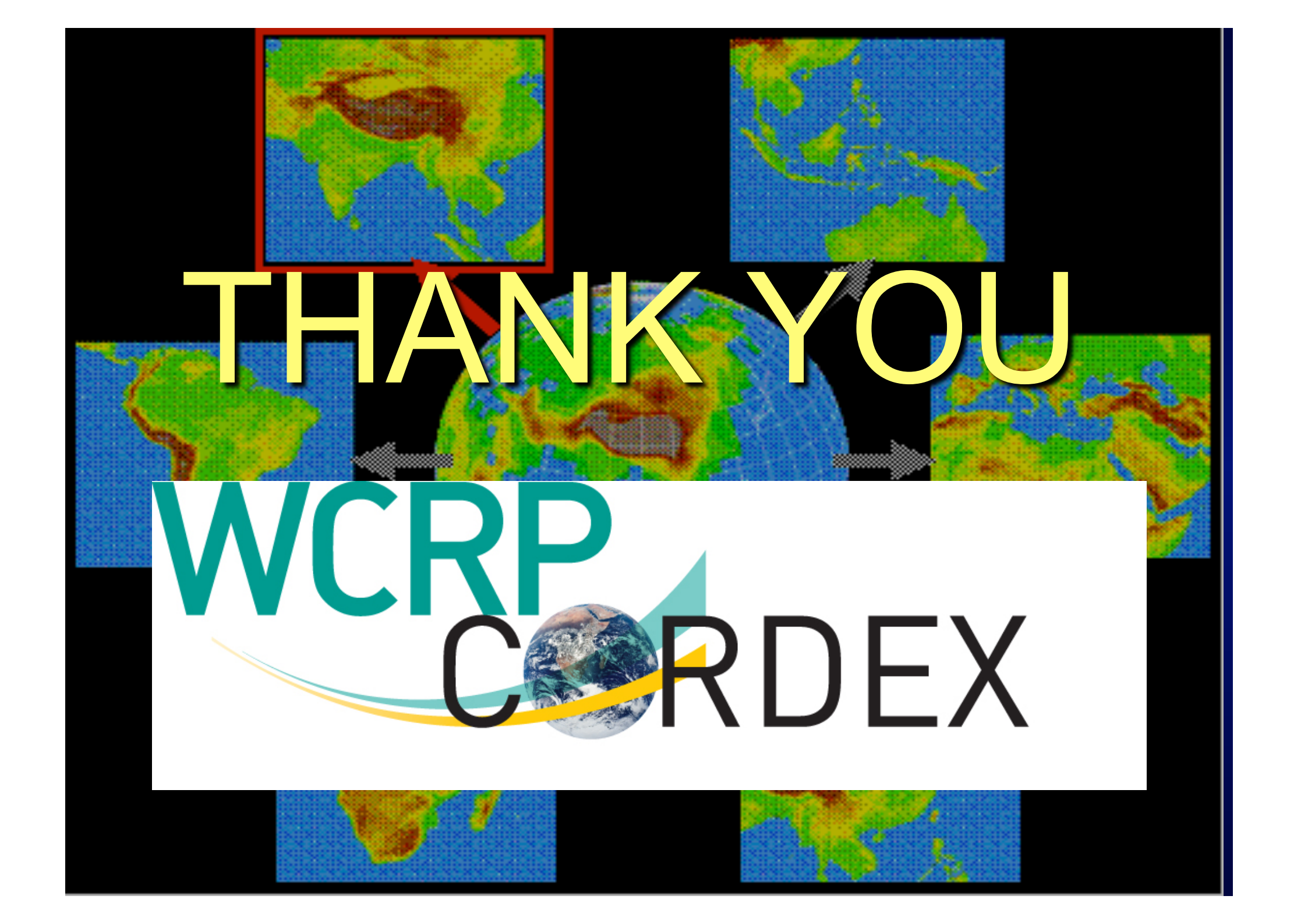


# ICRC-CORDEX 2013 conference

- Venue and time: Brussels, 4-7 November 2013
- Two segments
  - Day 1: High level IPCC segment
  - Day 2-4: Scientific conference
- Expected attendance
  - Over 500 registrations
  - ~470 abstracts submitted
- Plenary + Poster sessions+ side focused meetings
  - CORDEX progress/achievements
  - Issues in dynamical and statistical downscaling
  - Application to IAV work
  - Future developments/directions
- Co-sponsorship by the EU Com. and other agencies

# Some specific issues

- Need for a mechanism for better coordination across activities in the different CORDEX domains and more generally across the wider CORDEX community
- Better communication across the CORDEX community (ongoing)
- Improvement in the CORDEX web-site management (ongoing)
- Mechanism for approving new CORDEX domains and activities
- Search for some core funding (all CORDEX activities currently on voluntary basis)

The background features a central globe with a red arrow pointing to the top-left and two grey arrows pointing left and right. Surrounding the globe are several smaller map tiles showing different regions of the world, including North America, South America, Europe, and Asia, all rendered in a color-coded topographic style.

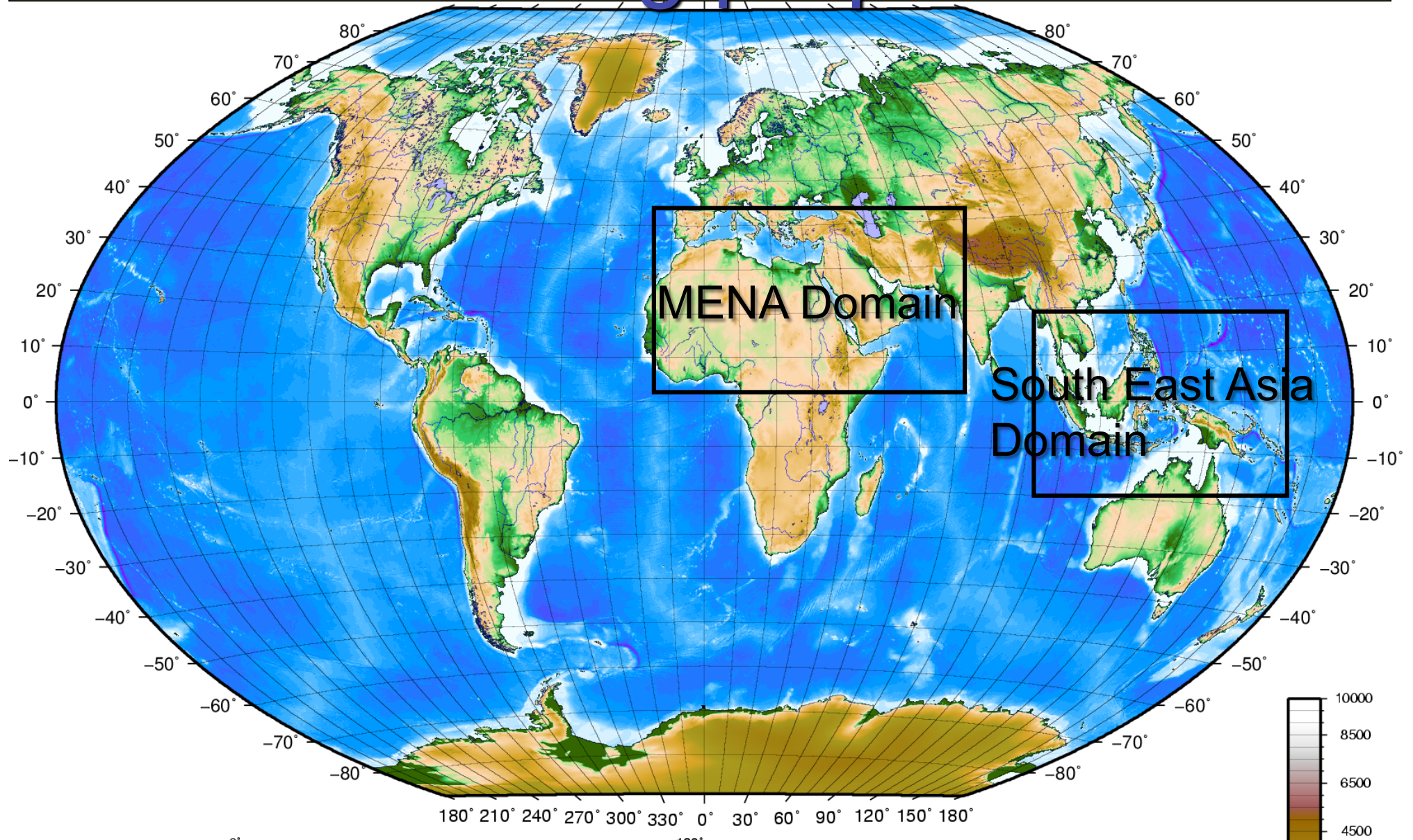
THANK YOU

WCRP

CORDEX



# Two new CORDEX domains are being proposed

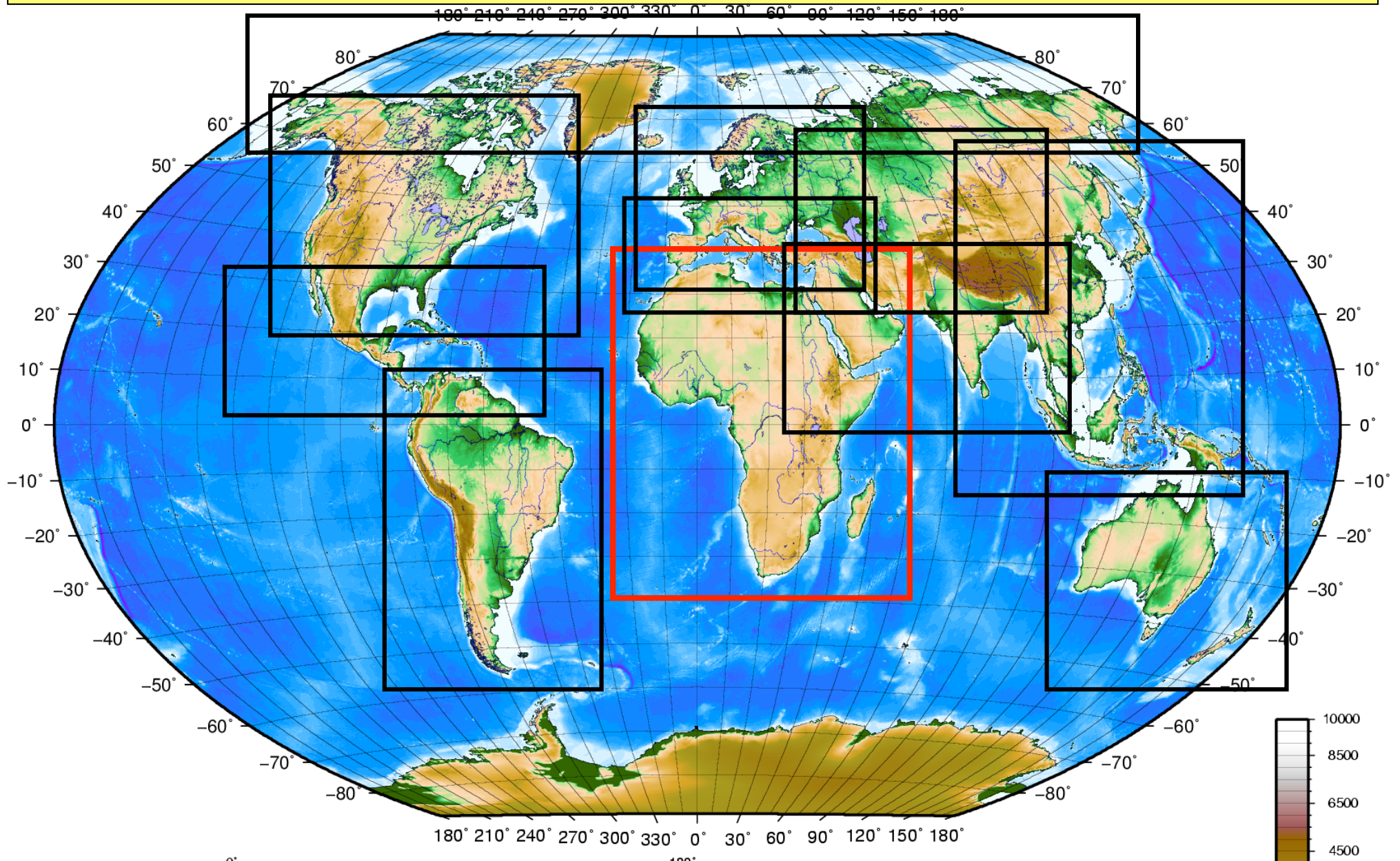


# COordinated Regional Downscaling EXperiment CORDEX

- Modeling framework designed to:
  - Evaluate and improve RCD models and techniques
  - Provide a coordinated set of RCD-based projections/predictions for regions worldwide
  - Facilitate the communication with the IAV community and the involvement of the research community from developing countries



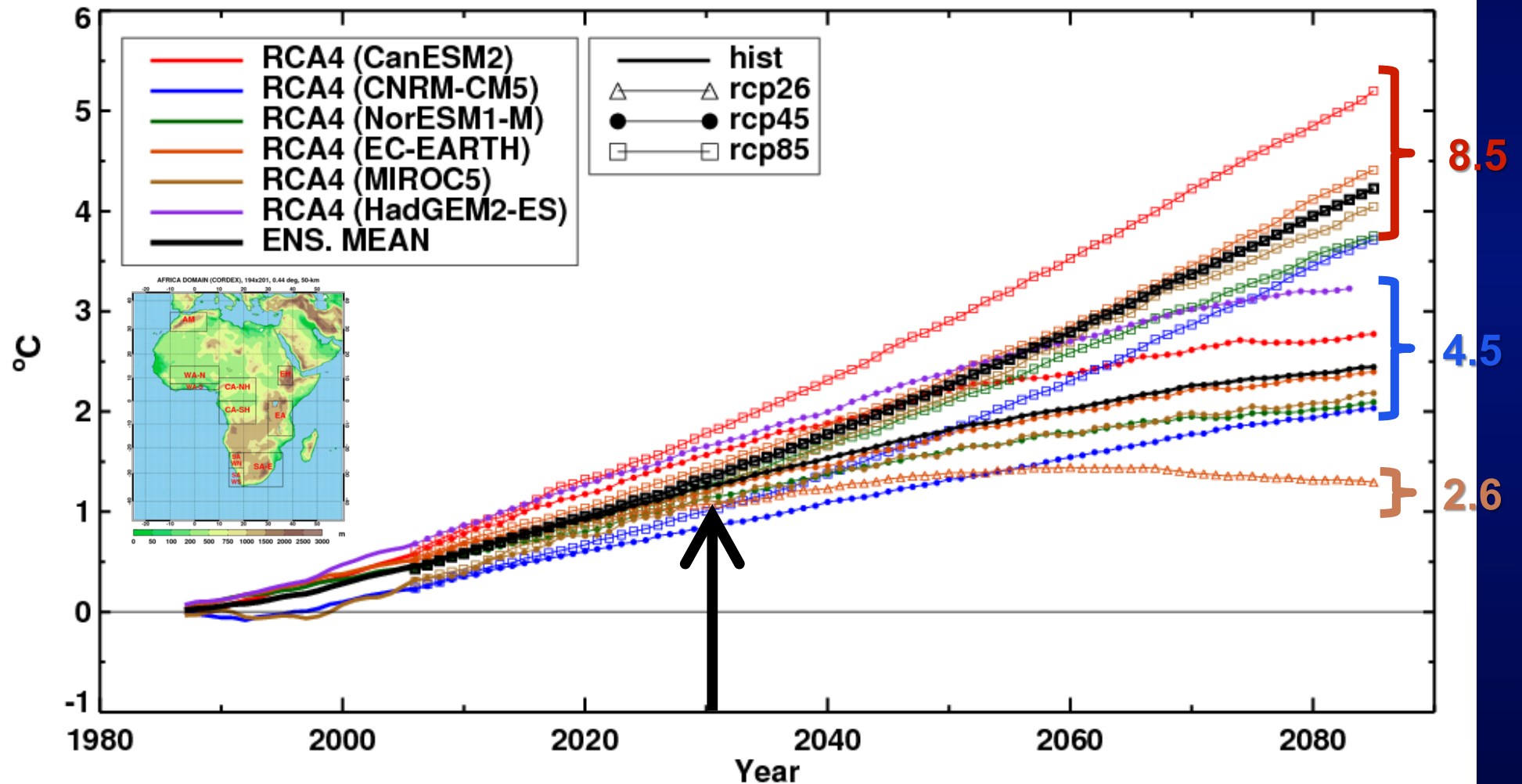
# CORDEX domains





# Trends on a continental scale

2m Temperature anomalies wrt 1970-2000 | 31-yr. mov. mean | (tas) | ANN |  
Africa (AFR) 20W-50E 40S-35N | land



# SMHI RCA4 Africa CORDEX 50km matrix

GCM	Historical 1950-2005	RCP8.5 2006-2100	RCP4.5 2006-2100	RCP2.6 2006-2100
EC-Earth	✓	✓	✓	✓
HadGEM	✓	✓	✓	✓
CNRM	✓	✓	✓	
MIROC5	✓	✓	✓	
NorESM	✓	✓	✓	
CanESM	✓	✓	✓	
GFDL-ESM	✓	✓	✓	
MPI-ESM	✓	✓	✓	✓
IPSL-CM	☑	☑	☑	
CSIRO	☑	☑	☑	
NCAR	?	?	?	

Courtesy of  
C. Jones  
(as of  
July 2012)

✓ Completed  
 ✓ Running  
 ✓ Planned  
 ☑ Possible  
 ? LBC status unknown

# Annual cycle (10W-10E)

All RCMs produce a version of the WAM onset with different degree of distortion

Ensemble mean corrects individual biases

