

# The CORDEX initiative

**CO**ordinated **R**egional climate **D**ownscaling **EX**periment

**Jesús Fernández**

jesus.fernandez@unican.es

Santander Meteorology Group

Dept. Applied Mathematics and Comp. Sci.

Universidad de Cantabria, Santander, Spain

**Thanks to:**

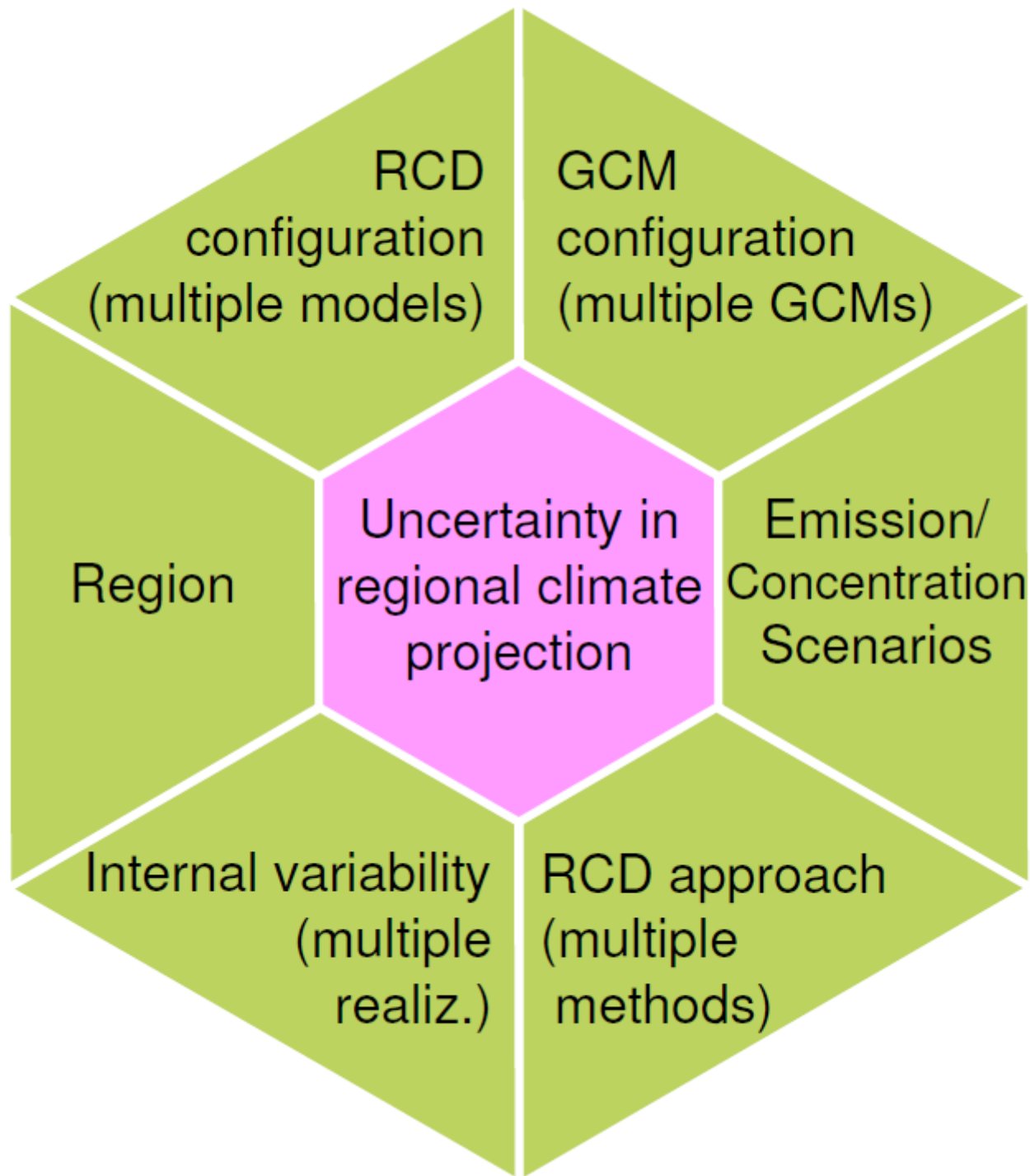
Colin Jones

Chris Lennard

Grigory Nikulin

Silvina Solman



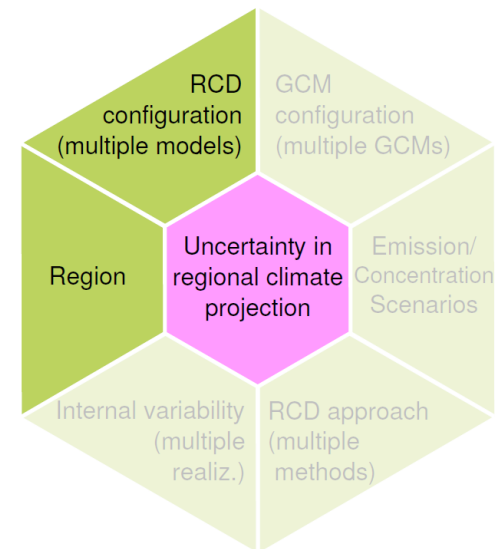
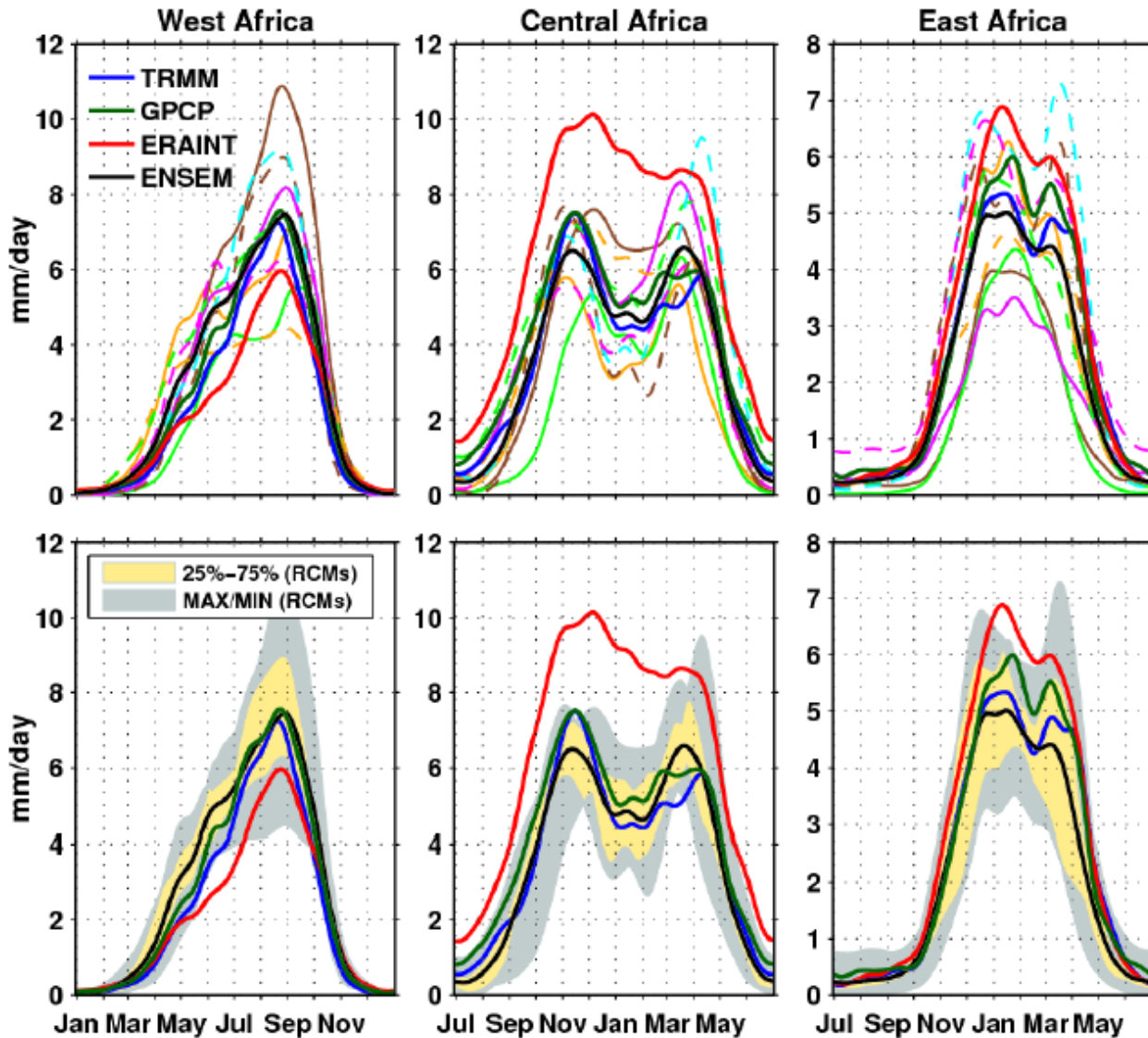


# Santander Meteorology Group

A multidisciplinary approach for weather & climate

# Added value

- SMHI-RCA
- KNMI-RACMO
- - UC-WRF
- DMI-HIRHAM
- - CNRM-ARPEGE
- - UQAM-CRCM
- CCLMcom-CCLM
- - ICTP-RegCM
- - UCT-PRECIS
- MPI-REMO



Source: Nikulin et al. (2012)  
J. Clim. 25:6057-6078

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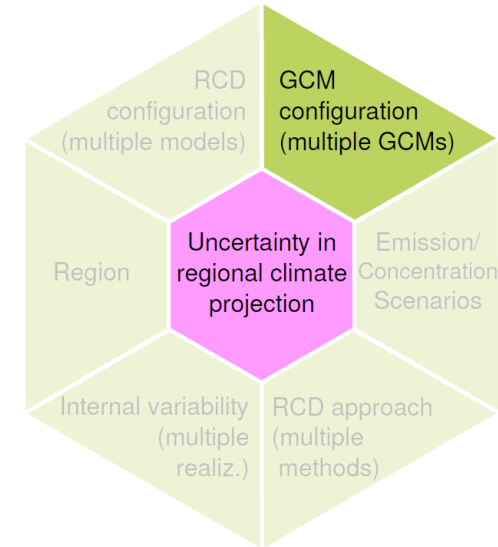
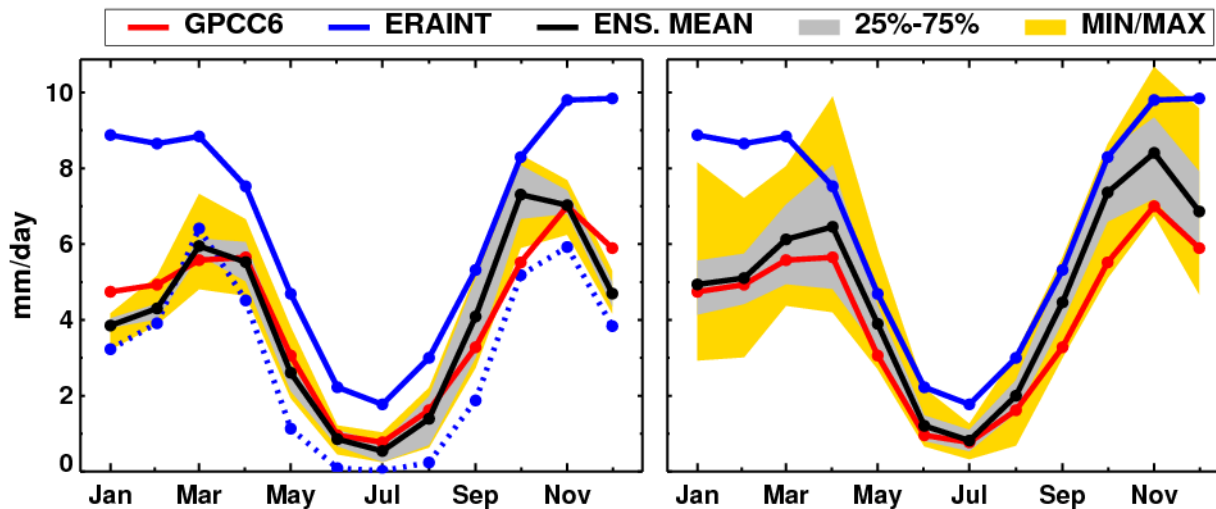
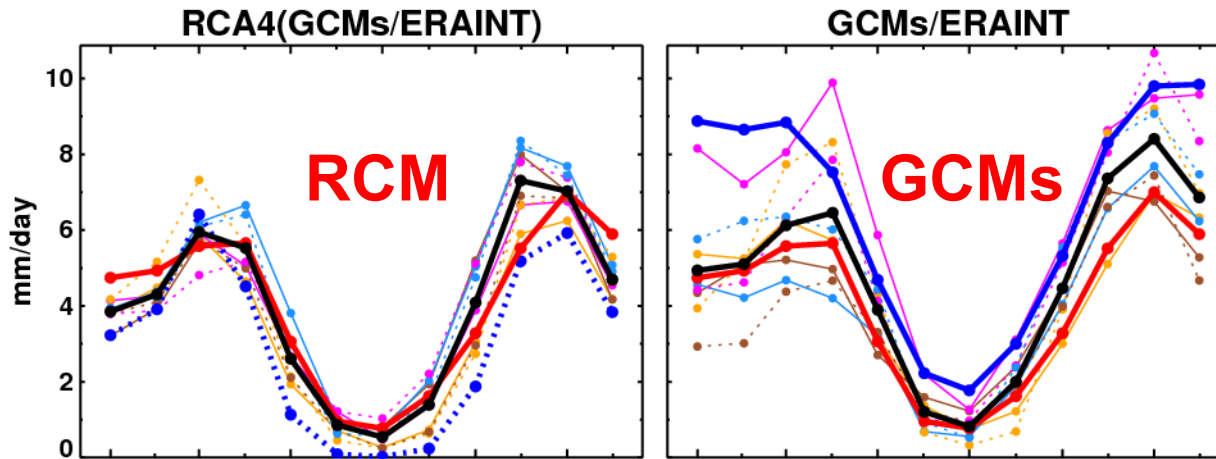
A multidisciplinary approach for weather & climate

# Potential to narrow uncertainty

## Precipitation (pr) | 1980-2005

Central Africa, SH (CA-SH) | 10E-25E 10S-0N | land

- RCA4 (CanESM2)
- RCA4 (MIROC5)
- RCA4 (CNRM-CM5)
- RCA4 (HadGEM2-ES)
- RCA4 (NorESM1-M)
- RCA4 (GFDL-ESM2M)
- RCA4 (EC-EARTH)
- RCA4 (MPI-ESM-LR)
- RCA4 (ERAINT)



RCA4 nested into 8 ESMS

Source: SMHI



Generate a coordinated ensemble of high-resolution, historical/future regional climate projections for land-regions of the globe sampling; multiple GCM/RCP/RCM/ESDs methods. 1st phase based on CMIP5 historical-projection runs and/or ERA-int boundary data

**Make data accessible & useable in common format/file structure**

Foster coordination between downscaling efforts & encourage local participation, **in generating, analysing & communicating potential regional climate change and associated uncertainties & risks**

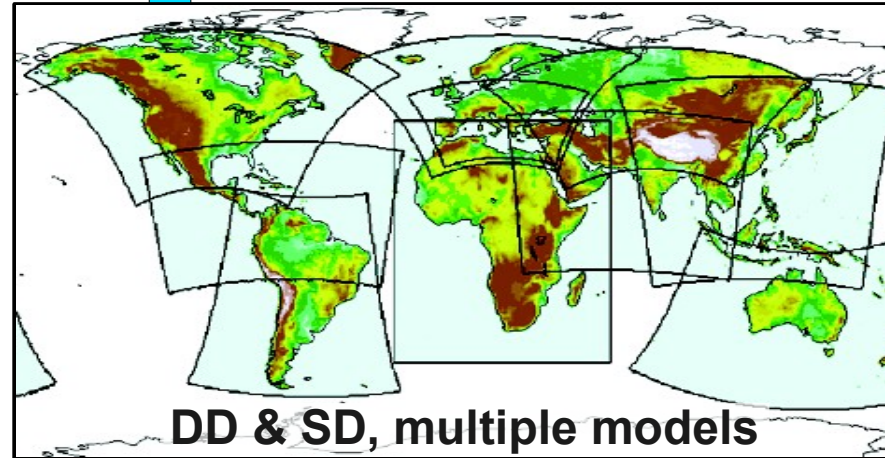
**Initial emphasis on African climate & IAV: START/WCRP sponsored 3 analysis/IAV workshops for an Africa-CORDEX team in 2011-12**

**Similar activities now starting for South Asia, East Asia and South/Central America**

# CORDEX Phase I experiment design

Model Evaluation  
Framework

Already done by  
many groups



ERA-Interim BC  
1989-2008

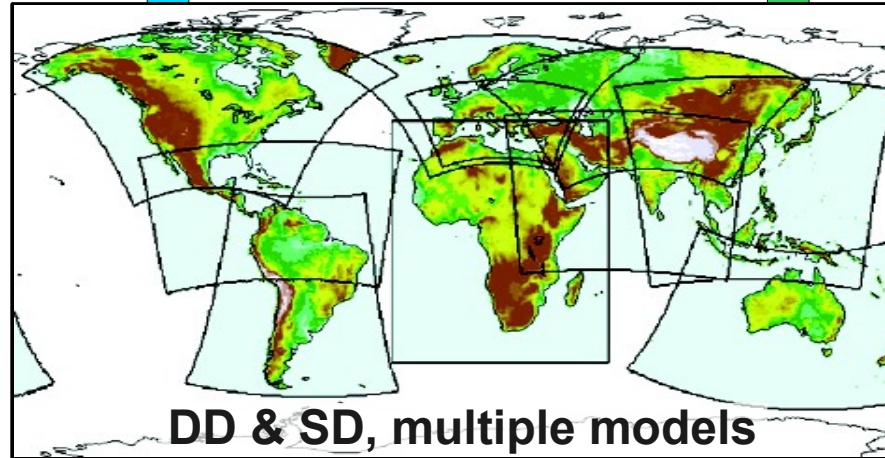
Regional analysis  
Regional databanks

# CORDEX Phase I experiment design

Model Evaluation  
Framework

Climate Projection  
Framework

Already done by  
many groups



ERA-Interim BC  
1989-2008

RCP4.5, RCP8.5

Multiple AOGCMs

Projections  
1951-2100

Regional analysis  
Regional databanks

<http://cordex.dmi.dk>

## CORDEX climate data archive

Home



### CORDEX: A COordinated Regional climate Downscaling EXperiment

#### Some changes

Written by Ole Bøssing Christensen

Thursday, 07 June 2012 11:03



A lot of things are going on. There will soon be data access through the same software (ESG) as used by CMIP5. During these discussions we have reread the specifications and come up with some necessary changes, and I will very shortly edit the specifications hosted here.

Very concretely: There ought to be an institution as part of the driving model specification in the file name. For consistency reasons we will now change the file name for reanalysis-driven runs from ...\_ERAINT\_... to ...\_ECMWF-ERAINT\_...

Do remember that a reanalysis-driven simulation is NOT "historical" but "evaluation", since "historical" is reserved for GCM simulations of the past with observed forcing!

I will also standardise the specifications of regular domains; sorry that I had not done that before!

**Update** 120607.1500: I have now put the regular domains into the specifications, as well as the ECMWF correction. In the near future we should also be defining a data policy. I will keep you up to date wrt. ESG.

**Update** 120608 Some minor corrections in the specifications (consistent file name and attribute example; proper revision date).

**Update** 120611: An error was found in the Excel list: the word "Air" was missing in the long\_name attribute for Near-Surface Air Temperature -like variables. I have added a link to the most recent sheet.

**Update** 120622: An inconsistency between driving\_experiment and driving\_model\_id in the SMHI example has been corrected. I now also stress, that only fields with a non-zero level needs the redundant level dimension.

#### Main Menu

Home

Specifications

Output specs

All news

Direct download

OpenDAP

Relevant Links



<http://cordex.dmi.dk>

- Currently (Nov. 2012), holds only 2 evaluation simulations: DHMZ (EUR44) and UCLM (AFR)
- In the future, the archive will be distributed using the ESG2 technology (as CMIP5).

**Jens will present more info on this**

- There are different regional repositories to exploit/quality-check the RCD data before public release. E.g. MedCORDEX, EuroCORDEX, CORDEX-Africa, CORDEX South Asia.
- Expected release of evaluation runs: mid-2013?

- **CORDEX now has a Science Advisory Team (3 year mandate) that will report to the new WG on Regional Climate (Science & Information)**
  - Colin Jones (co-chair, Eur, Arctic)
  - Filippo Giorgi (co-chair, Med)
  - Bill Gutowski (N Am, Arctic)
  - Silvina Solman (S Am)
  - Won Tae Kwon (East Asia)
  - R. Krishnan (South Asia)
  - Bruce Hewitson (Africa)
  - Clare Goodess (IAV)
  - Michel Rixen (WCRP)
- **1<sup>st</sup> telco was held on Sept 13, 2012**

Areas not directly covered  
by SAT:  
Australasia,  
ARAB-MENA

**2<sup>nd</sup> CORDEX Conference**, Nov 4-7 2013, Brussels  
organized by the EC, WCRP and IPCC WG1

- ~end 2012 : Call for papers
- ~March 2013: Close of call for papers
- ~May/June 2013: Notification of acceptance
- ~summer 2013: Registration

# Regional CORDEX communities

## **CORDEX-Africa**

<http://www.csag.uct.ac.za/cordex/cordex-africa-2>

## **Euro-CORDEX**

<http://euro-cordex.net/>

## **MedCORDEX**

[www.medcordex.eu](http://www.medcordex.eu)

## **CORDEX-AustralAsia**

<http://cordex-australasia.wikidot.com>

## **CORDEX South Asia**

<http://cccr.tropmet.res.in/cccr/home/CORDEX/aboutCordex.jsp>

...

# Regional CORDEX communities

## **CORDEX-Africa**

<http://www.csag.uct.ac.za/cordex/cordex-africa-2>

**Eu** Analysis; Developing methods and tools to analyse atmospheric processes over Africa and how these may change into the future

**htt** Foci;

Addressing key meteorological and impacts knowledge gaps

**Regional messages;**

**Me** Presenting information for key regions in the continent

**ww** Integrated approach; Bringing together climate and vulnerability-impact-adaptation scientists to identify and address key climate vulnerabilities

**CC** Capacity development; Long-term collaboration between African scientists and key global institutions for career development

**htt** Application and Adaptation; Bridging the science-society divide through transforming climate data to actionable information

## **CORDEX South Asia**

<http://cccr.tropmet.res.in/cccr/home/CORDEX/aboutCordex.jsp>

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## **CORDEX-Africa**

<http://www.csag.uct.ac.za/cordex/cordex-africa-2>

## **Euro-CORDEX**

<http://euro-cordex.net/>

### **Aims:**

- Me  
ww 1. Coordinate **joint evaluation** in the European region:  
GCM evaluation, RCM evaluation, reference datasets.
- CC  
htt 2a. Coordinate the design of the EURO-CORDEX **simulation matrix**.
- 2b. Coordinate **joint analysis of climate projections** in the European region.
- 3a. Foster **cooperation with GCM community**: GCM analysis for Europe.
- 3b. Foster **cooperation with impact, adaptation, and mitigation community**:  
Error correction, ens. based products, regionally relevant CC indicators, ...
- CC  
htt 3c. Foster **dissemination** of EURO-CORDEX results: AR5, users

...

## **CORDEX-Africa**

<http://www.csag.uct.ac.za/cordex/cordex-africa-2>

## **Euro-CORDEX**

<http://euro-cordex.net/>

## **MedCORDEX**

[www.medcordex.eu](http://www.medcordex.eu)

Some specific actions of MED-CORDEX would be:

- **production** of an ensemble of **simulations with coupled Regional Climate System Models (RCSM)**, i.e with fully interactive Atmosphere-Land surface-River-Ocean components, covering the whole Mediterranean basin at high resolution;
- development of **stand-alone simulations** for all the components;
- **extending the ERA-Interim CORDEX runs to present** in order to use the most recent validation data available and the HyMeX field campaign results;
- development of **common strategies for ocean model initialization** for decadal-to-scenario simulations;

... One of the key features of MED-CORDEX is to create a **close collaboration with observational and satellite communities** (Hymex, Med-CLIVAR) in order to improve model components, and to increase the **link with the impact communities**.

**Santander Meteorology Group**

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# Regional CORDEX communities

**CC** The CORDEX South Asia program **brings together researchers/scientists** from the **Climate Science and those involved in vulnerability, impacts and adaptation (VIA)** research from the Asian region to interpret raw downscaled data for information on how climate processes over the continent may change, and to analyze how these changes may impact important sectors, such as health, agriculture and water security in multiple regions across the continent. The CORDEX South Asia activities are envisaged towards **building capacity and expertise within the region** to analyze, interpret and apply CORDEX results for decision making that are relevant to the knowledge needs of the South Asian region.

**Me** The keys to success of this initiative in South Asia will be in developing a means for **analysis and translation of CORDEX data in terms that are relevant to South Asia's** knowledge needs, and in developing the internal capacity to perform the analyses and in doing so create expertise at regional levels in South Asia. The first cadre of people trained on CORDEX can be called upon to help train the next generation of regional experts and advise on future expanded effort on CORDEX analysis and interpretation in South Asia, as well as on the **application of CORDEX results to inform** climate compatible development in South Asia.

## **CORDEX South Asia**

<http://cccr.tropmet.res.in/cccr/home/CORDEX/aboutCordex.jsp>

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## Cross-RCC communities

### **CORDEX-Africa**

<http://www.csag.uct.ac.za/cordex/cordex-africa-2>

### **Euro-CORDEX**

<http://euro-cordex.net/>

### **MedCORDEX**

[www.medcordex.eu](http://www.medcordex.eu)

### **CORDEX-AustralAsia**

<http://cordex-australasia.wikidot.com>

### **CORDEX South Asia**

<http://cccr.tropmet.res.in/cccr/home/CORDEX/aboutCordex.jsp>

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**CORDEX-WRF**

## CORDEX opportunities for WRF

- WRF presents some singularities w.r.t. other RCMs
  - The model is run by many different groups, which are not coordinated by the developing institution (as is the case in other community models: RegCM, PRECIS, CCLM, ... )
  - Huge set of configuration options
  - It will, probably, be the only RCM run in **all** CORDEX regions, including polar regions.
- WRF is a “young” RCM
  - WRF is under very active development, including the addition of long term run capabilities: varying SST, deep soil temp. update, GHG variation, detailed radiation and soil schemes, output of averaged variables, ...
  - New missing features need to be identified and developed.



- Coordinates WRF users contributing to CORDEX
- Organized along several meetings:
  - March 2011: 1<sup>st</sup> CORDEX conference, Trieste
  - Nov 2011: 1<sup>st</sup> Euro-CORDEX meeting, Hamburg
  - Oct 2012: 1<sup>st</sup> **CORDEX-WRF Workshop**, Tenerife
- Information available in the Wiki site  
<http://www.meteo.unican.es/wiki/cordexwrf>
- Distribution list:  
[cordexwrf+subscribe@googlegroups.com](mailto:cordexwrf+subscribe@googlegroups.com)
- Simulation list (+ observational data collection):  
<http://tinyurl.com/cordex-wrf-simulations>

# CORDEX WRF Aims

1. **Produce** evaluation, historical and scenario simulations using WRF for all CORDEX regions
2. **Coordinate** the design of the evaluation simulations and their joint evaluation
3. **Collaborate** with the
  - a. Region-specific CORDEX Communities (RCC).
  - b. WRF community to improve the model for regional climate, by identifying key problems and through aims 4.a and 4.b, below.
4. **Develop**
  - a. WRF improvements for regional climate modelling
  - b. common tools to process model input & output
  - c. common metrics to compare RCD results across regions
5. **Collect** suitable observational data for evaluation
6. **Foster** the exchange of data, knowledge and tools among the groups

## Santander Meteorology Group

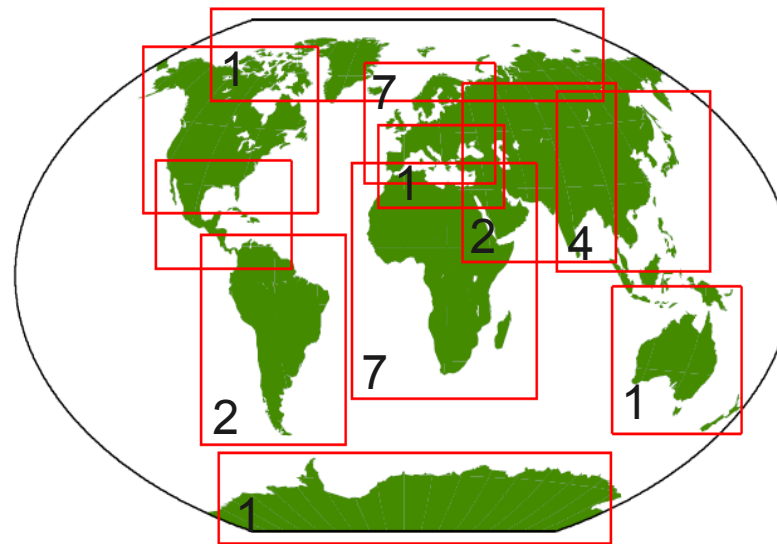
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# CORDEX-WRF

According to the CordexWrfWiki 23 groups are using WRF as a regional climate downscaling tool to perform CORDEX simulations.

Wiki site: <http://www.meteo.unican.es/wiki/cordexwrf>

Mailing list: [cordexwrf+subscribe@googlegroups.com](mailto:cordexwrf+subscribe@googlegroups.com)



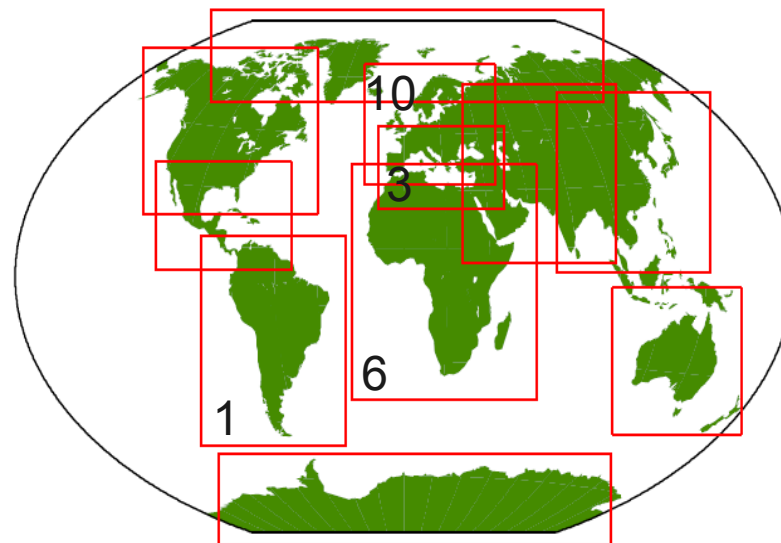
Number of WRF groups interested in each region

Bjerknes Centre for Climate Research (Uni Research, Bergen, Norway)  
Center for Monsoon System Research (Institute of Atmospheric Physics, CAS, Beijing)  
Climate Change Research Centre (University of New South Wales, Australia)  
Climate Dynamics and Climate Change Group (Indian Institute of Tropical Meteorology, India)  
Climate System Analysis Group (University of Cape Town, South Africa)  
Dept of Earth & Environmental Science (New Mexico Tech, USA)  
Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan  
Grupo AIRE (Universidad de Extremadura, Spain)  
Grupo de Observación de la Tierra y la Atmósfera (University of La Laguna, Spain)  
Hydro-Meteorology Monitoring and Modeling Group (Amazonas State University, Brazil)  
ICARUS (National University of Ireland Maynooth, Ireland)  
Institute for Physics and Meteorology (University of Hohenheim, Germany)

Instituto Dom Luiz - Center for Geophysics (IDL-CGUL, University of Lisbon, Portugal)  
Institut Pierre Simon Laplace (Paris, France)  
National Institute of Meteorological Research (Korea Meteorological Administration, Korea)  
Polar Climate and Weather Group (University of Colorado, USA)  
Regional Atmospheric Modeling Group (University of Murcia, Spain)  
Regional Climate Modeling Lab (Iowa State University, USA)  
Santander Meteorology Group (University of Cantabria, Spain)  
School of Atmospheric Sciences, Nanjing University, Nanjing, P.R. China)  
Weather and Climate Modeling Group (Western Kentucky University, USA)  
Wegener Center for Climate and Global Change, University of Graz, Austria  
Wind & Site Competence Centre (Vestas Technology R&D, Denmark)

According to a recent survey on a shared spreadsheet, only 12 groups have **finished evaluation simulations** with WRF

Source: <http://tinyurl.com/cordex-wrf-simulations>



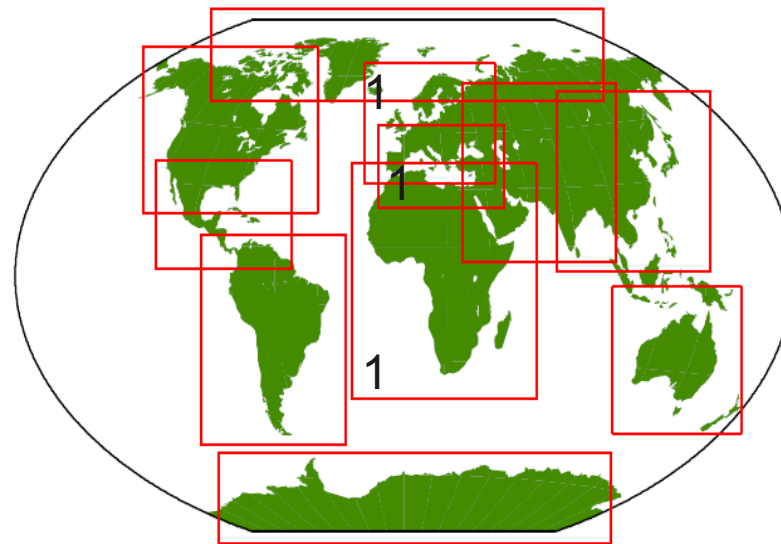
Number of evaluation simulations finished for each region

**Bjerknes Centre for Climate Research (Uni Research, Bergen, Norway)**  
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Wegener Center for Climate and Global Change, University of Graz, Austria  
Wind & Site Competence Centre (Vestas Technology R&D, Denmark)

According to a recent survey on a shared spreadsheet, only 3 groups have **finished historical or scenario** simulations with WRF

Source: <http://tinyurl.com/cordex-wrf-simulations>



Number of historical /  
scenario simulations  
finished for each region

**Bjerknes Centre for Climate Research (Uni Research, Bergen, Norway)**  
Center for Monsoon System Research (Institute of Atmospheric Physics, CAS, Beijing)  
Climate Change Research Centre (University of New South Wales, Australia)  
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<http://www.meteo.unican.es/wiki/cordexwrf>



Login

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Groups

Domains

Scientific contributions

Software tools

Ongoing studies

Events

Links

The [CO](#)ordinated Regional climate Downscaling [EX](#)periment (CORDEX) is a framework aimed at improving coordination of international efforts in regional climate downscaling research. CORDEX was initiated as a result of the task Force on Regional Climate Downscaling, formed by the World Climate Research Program (WCRP). For details on CORDEX, visit the [CORDEX website](#).

The CORDEX-WRF community has been established to coordinate the community of [WRF model](#) users within the CORDEX framework. The main mechanisms for coordination are:

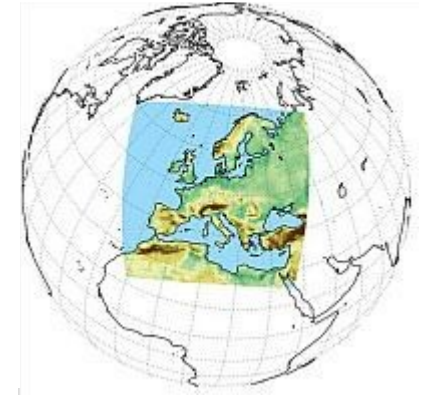
- Regular [meetings](#)
- This CORDEX-WRF Wiki site
- The CORDEX-WRF distribution list ([cordexwrf+subscribe /AT/ googlegroups /DOT/ com](mailto:cordexwrf+subscribe@googlegroups.com))
- The simulation list ([tinyurl.com /SLASH/ cordex /DASH/ wrf /DASH/ simulations](http://tinyurl.com/slash/cordex/dash/wrf/dash/simulations))

Specifically, the CORDEX-WRF aims are:

1. Produce evaluation, historical and scenario simulations using WRF for all CORDEX regions
2. Coordinate the design of the evaluation simulations and their joint evaluation



- ENSEMBLES-like domain
- Resolutions: **0.11°** and **0.44°**
- 19 institutions from 11 countries
- Current status:
  - Analysis of the evaluation simulations (obs: station + E-OBS)
  - Running scenario simulations
- 70+ scenario simulations planned
- Next meeting in Hamburg, Jan 2013.



# CLARIS-LPB contribution to CORDEX-South America

## **CLARIS-LPB**

The EU FP7 CLARIS LPB project (2008-2012)

### **Goals**

- To predict the regional climate change impacts on La Plata Basin (LPB).
- **To provide an ensemble of regional hydroclimate scenarios and their uncertainties for climate impact studies.**

## **CORDEX**

Initiative promoted by the WCRP

### **Goals:**

- To Provide a quality-controlled data set of RCD-based information for the recent historical past and 21st century projections, covering the majority of populated land regions on the globe
- to provide a more solid scientific basis for impact assessments and other uses of downscaled climate information



## **CORDEX-Africa**

<http://www.csag.uct.ac.za/cordex/cordex-africa-2>

- Africa is the first key region for CORDEX  
<http://euro-cordex.net/>
- The CORDEX-Africa community is, by far, the most organized community within CORDEX  
[www.medcordex.eu](http://www.medcordex.eu)
- START/WCRP promoted a series of workshops with African scientists and key global institutions.  
<http://cordex-australasia.wikidot.com>
- An example of the goals of CORDEX put into action  
<http://cccr.tropmet.res.in/cccr/home/CORDEX/aboutCordex.jsp>

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# Cordex - Africa

## Putting the 'CO' in CORDEX - Series of 4(5) Workshops

April 2010

March 2011

July 2011

November 2011

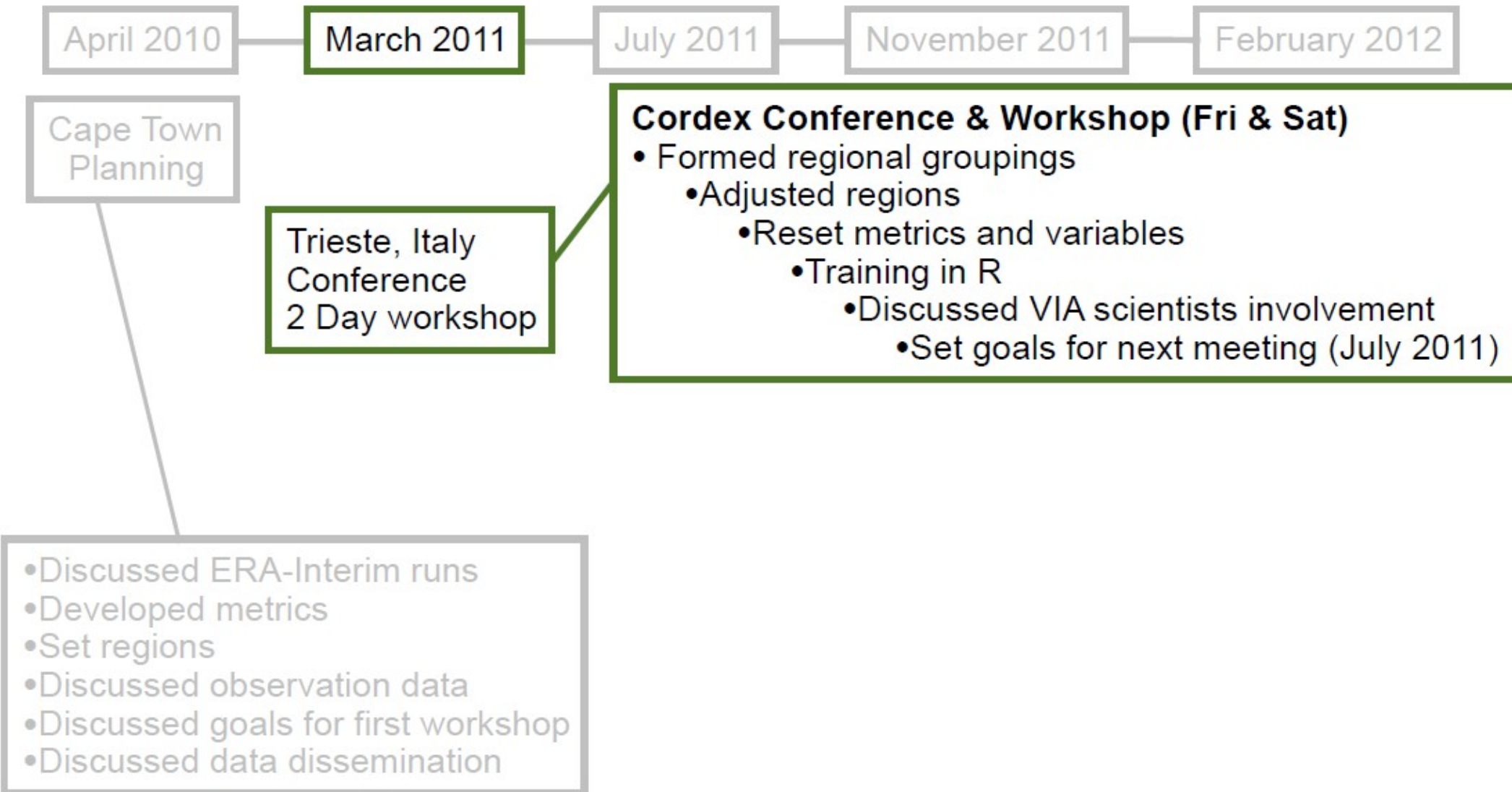
February 2012

Cape Town  
Planning

- Discussed ERA-Interim runs
- Developed metrics
- Set regions
- Discussed observation data
- Discussed goals for first workshop
- Discussed data dissemination

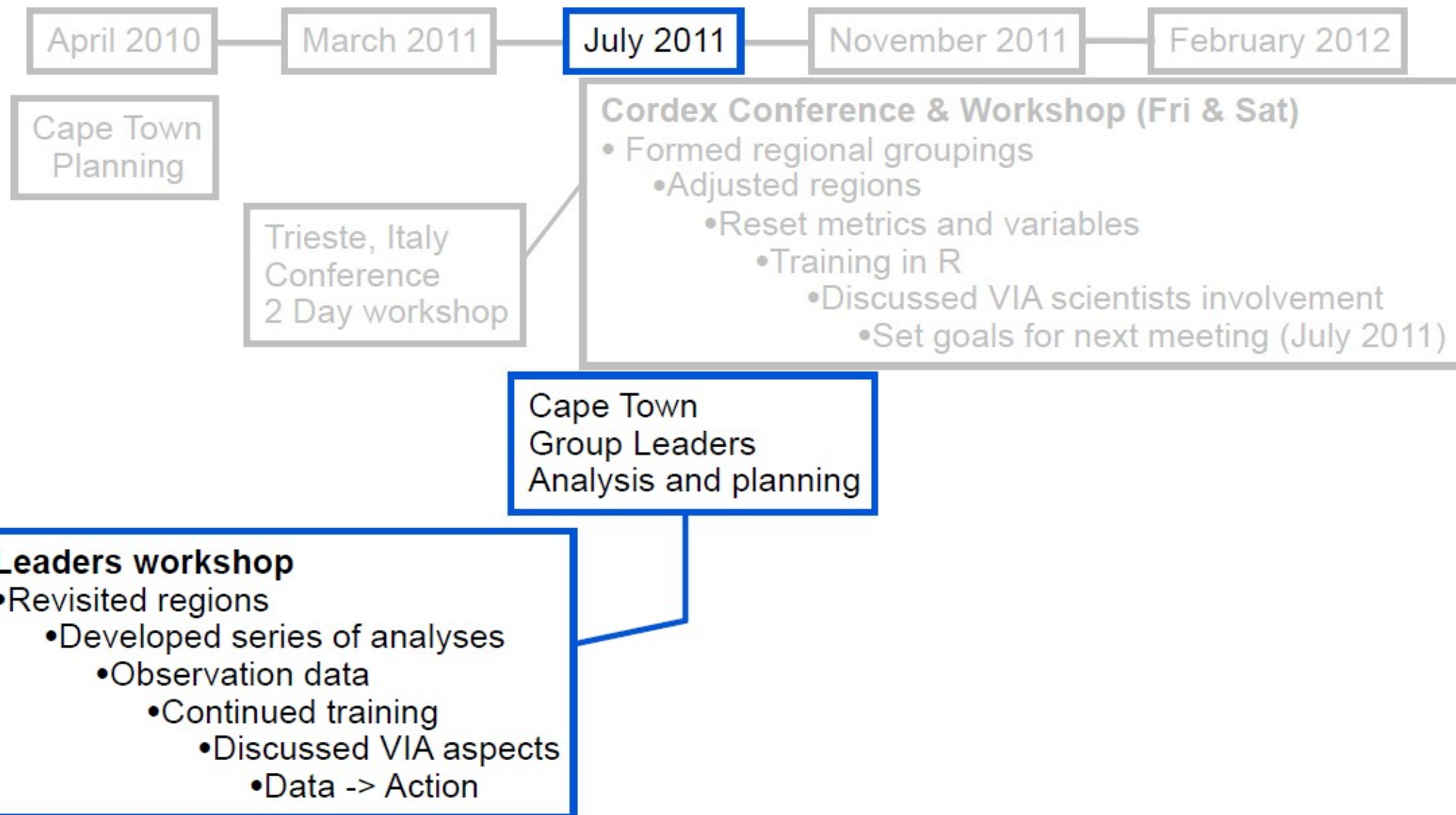
# Cordex - Africa

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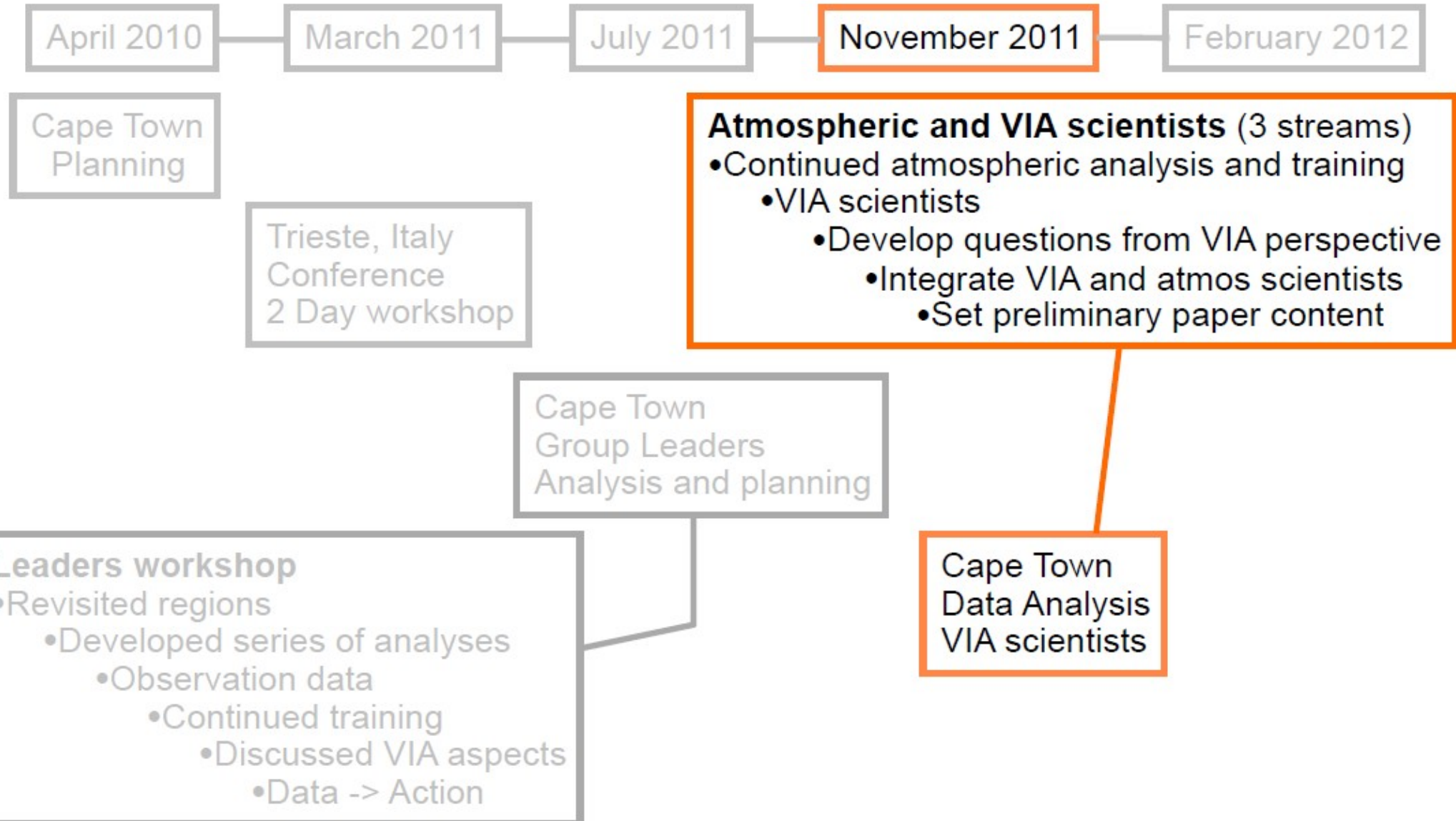
# Cordex - Africa

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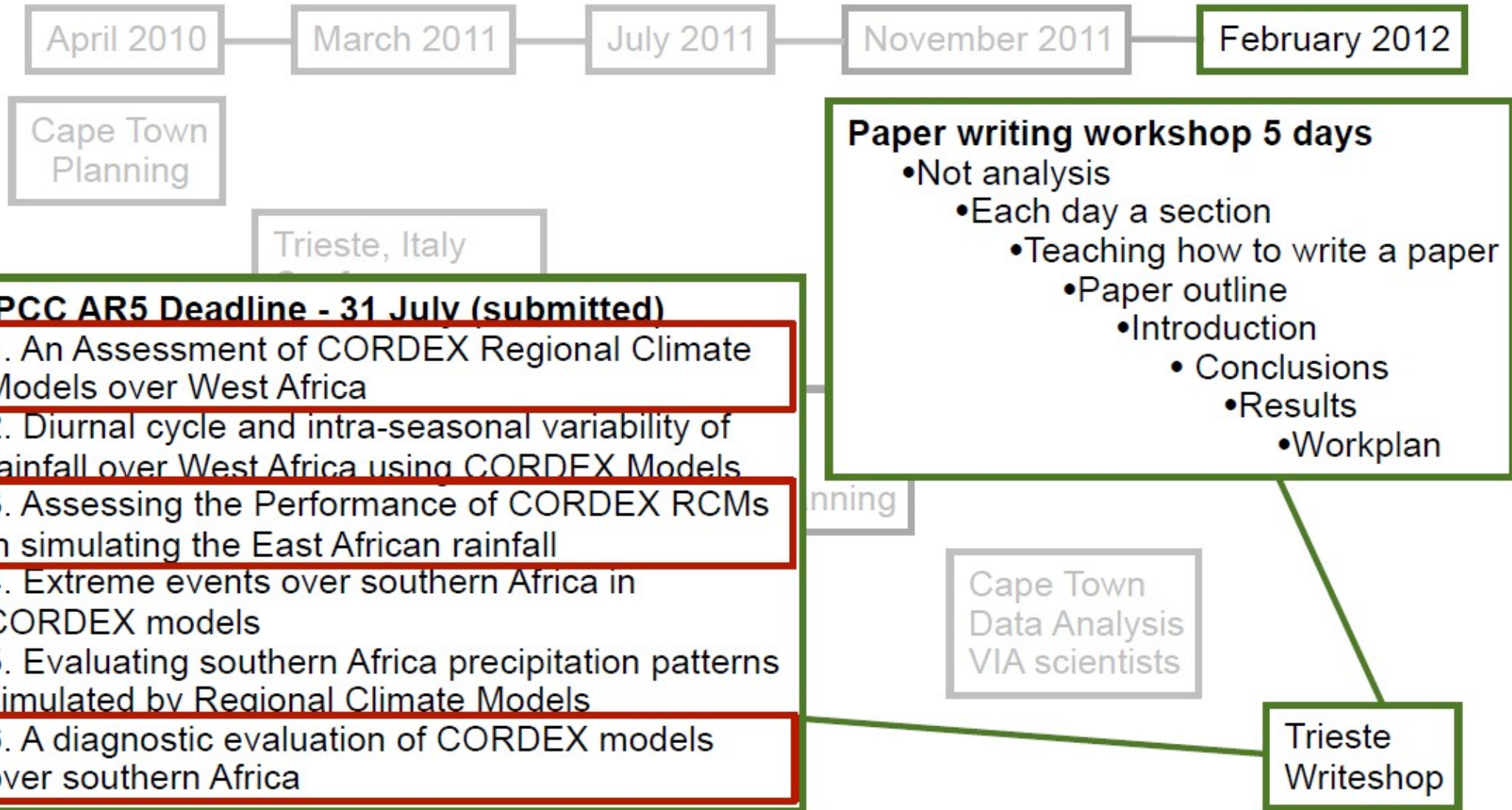
# Cordex - Africa

## Putting the 'CO' in CORDEX - Series of 4(5) Workshops



# Cordex - Africa

## Putting the 'CO' in CORDEX - Series of 4(5) Workshops





# Cordex - Africa

What is next.....

April 2010

March 2011

July 2011

November 2011

February 2012

February/March 2013

## Analysis workshop

- SMHI - RCA4
  - 6 GCMs - Historical & 6 Future
- Others...?
- Re-evaluate regions
- Data dissemination
- How do we deal with so much data?
- How do we evaluate ND vs SD?
- Engagement of user communities?

June/July 2013

## Writeshop

- Follow up on ERA papers
- Method papers?
- Data dissemination

**Putting the 'CO' in  
CORDEX.....**

**..... A LOT OF WORK!**

# Cordex – Africa Analysis

Ethos:

**A – Analysis; Developing methods and tools to analyze atmospheric processes over Africa and how these may change into the future**

**F – Foci; Addressing key meteorological and impacts knowledge gaps**

**R – Regional messages; Presenting information for key regions of the continent**

**I – Integrated approach; Bringing together climate and vulnerability-impact-adaptation scientists to identify and address key climate vulnerabilities**

**C – Capacity development; Long-term collaboration between African scientists and key global institutions for career development**

**A – Application and Adaptation; Bridging the science-society divide through transforming climate data into actionable information**

# Cordex - Africa

## *Downscaling Groups*

SMHI

ICTP

UKMO

DMI

Univ. Cantabria (Spain)

EU Joint Research Centre

ISU

IPSL

KNMI

CNRM

MPI

UQAM

**CSAG** – Univ. Cape Town

- Precis model

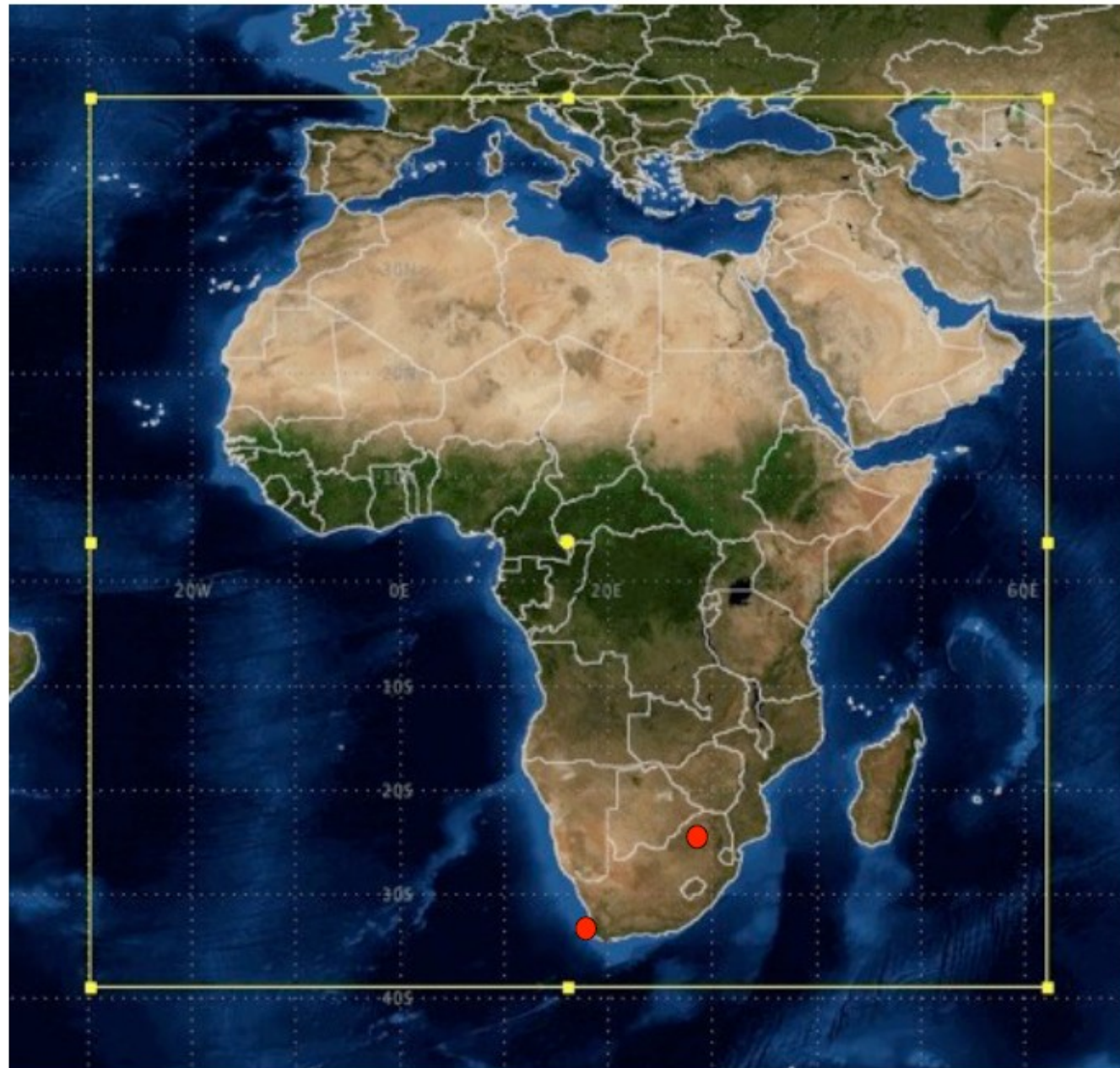
- WRF model (3 yrs to go)

- Statistical downscaling

(end 2012)

**CSIR** – Pretoria

- CCAM global model



	<b>CNRM ARPEGE5.1</b>	<b>DMI HIRHAM5</b>	<b>ICTP RegCM3</b>	<b>CLMcom CCLM4.8</b>	<b>KNMI RACMO2.2b</b>	<b>MPI REMO</b>	<b>SMHI RCA35</b>	<b>UCT PRECIS</b>	<b>UC WRF3.1.1</b>	<b>UQAM CRCM5</b>
Institute	Centre National de Recherches Météorologiques, France	Danmarks Meteorologiske Institut, Danmark	Abdus Salam International Centre for Theoretical Physics, Italy	CLM community (www.clm-community.eu)	Koninklijk Nederlands Meteorologisch Instituut, Netherlands	Max Planck Institute, Germany	Sveriges Meteorologiska och Hydrologiska institut, Sweden	University of Cape Town, South Africa	Universidad de Cantabria, Spain	Université du Québec à Montréal, Canada
Short name	<b>ARPEGE</b>	<b>HIRHAM</b>	<b>RegCM3</b>	<b>CCLM</b>	<b>RACMO</b>	<b>REMO</b>	<b>RCA</b>	<b>PRECIS</b>	<b>WRF</b>	<b>CRCM</b>
Projection resolution	polar, stretching factor 2 (TL179)	rotated pole 0.44°	Mercator 50 km	rotated pole 0.44°	rotated pole 0.44°	rotated pole 0.44°	rotated pole 0.44°	rotated pole 0.44°	Mercator 50 km	rotated pole 0.44°
Vertical coordinate/levels	hybrid/31	hybrid/31	sigma/18	terrain following/35	hybrid/40	hybrid/27	hybrid/40	hybrid/19	terrain following ETA/28	hybrid/56
Advection	semi-lagrangian	semi-lagrangian	eulerian	5th order upwind Baldauf (2008)	semi-lagrangian	semi-lagrangian	semi-lagrangian	eulerian	eulerian	semi-lagrangian
Time step (sec)	1200	600	100	240	720	240	1200	300	240	1200
Convective scheme	Bougeault (1985)	Tiedtke (1989)	Grell (1993) Fritsch and Chappell (1980)	Tiedtke (1989)	Tiedtke (1989)	Tiedtke (1989)	Kain and Fritsch (1990, 1993)	Gregory and Rowntree (1990) Gregory and Allen (1991)	Kain (2004)	Kain and Fritsch (1990) Kuo (1965)
Radiation scheme	Morcrette (1990)	Fouquart and Bonnel (1980) Mlawer et al. (1997)	Kiehl (1996)	Ritter and Geleyn (1992)	Fouquart and Bonnel (1980)	Morcrette et al. (1986) Giorgetta and Wild (1995)	Savijärvi (1990) Sass et al. (1994)	Edwards and Slingo (1996)	Dudhia (1989) Mlawer et al. (1997)	Li and Barker (2005)
Turbulence vertical diffusion	Mellor and Yamada (1982)	Louis (1979)	Holtstlag et al. (1990)	Herzog et al. (2002) Buzzi et al. (2011)	eddy-diffusivity (1st order K) mass flux approach	Louis (1979)	Cuxart et al. (2000)	Wilson (1992)	Hong et al (2006)	Benoit et al. (1989) Delage (1997)
Cloud microphysics scheme	Ricard and Royer (1993)	Tiedtke (1989) Tompkins (2002)	SUBEX Pal et al. (2000)	Doms et al. (2007) Baldauf and Schulz (2004)	Tiedtke (1993)	Lohmann and Roeckner (1996)	Rasch and Kristjánsson (1998)	Smith et al. (1990)	WSM5 Hong et al (2004)	Sundqvist et al. (1989)
Land surface scheme	ISBA Douville et al. (2000)	Schulz et al.(2001) Hagemann (2002)	BATS1E Dickinson et al. (1993)	TERRA-ML Doms et al. (2007)	TESSEL ECMWF (2006)	Hagemann (2002) Reichid et al. (2009)	Samuelsson et al. (2006)	MOSES2 Essery et al. (2003)	Smirnova et al. (2000)	CLASS 3.5 Verseghy (2000)
Latest reference and comments	Déqué (2010)	Christensen et al. (2006)	Pal et al. (2007)	Rockel et al. (2008) Baldauf et al. (2011)	Meijgaard et al. (2008); based on ECMWF cycle 31r1 ECMWF (2006)	Jacob (2001) Jacob et al. (2007)	Samuelsson et al. (2011)	Jones et al. (2004)	Skamarock et al. (2008)	Zadra et al. (2008)

Source: Nikulin et al. (2012)  
J. Clim. 25:6057-6078

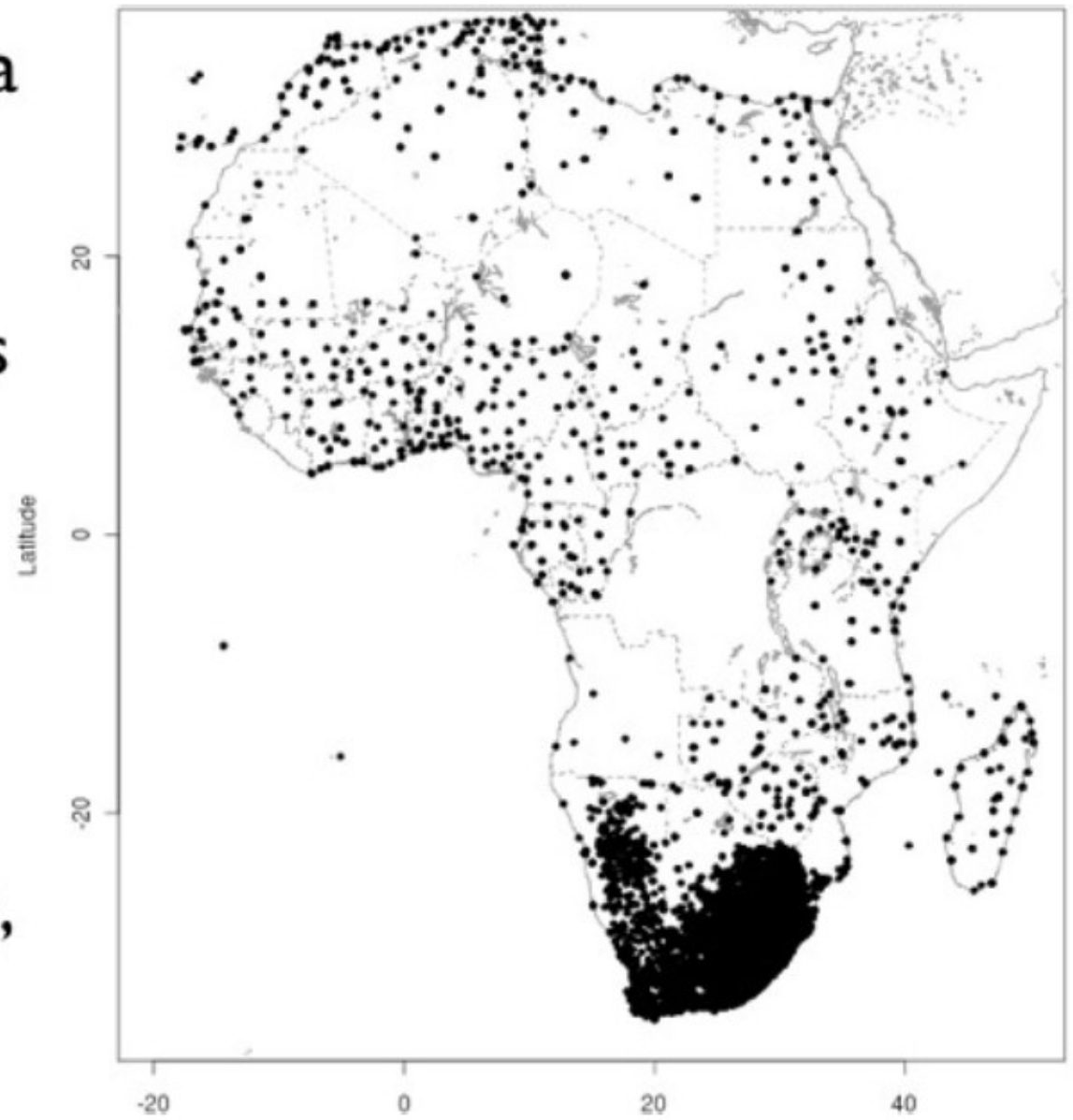
# Cordex – Africa Analysis

Our observational data  
problem

Some of these stations  
are private/restricted  
(e.g. Ghana)

or have closed down

These are ppt stations,  
temperature fewer



# Observational uncertainty

## Precipitation (pr) | JFM | 1998-2008

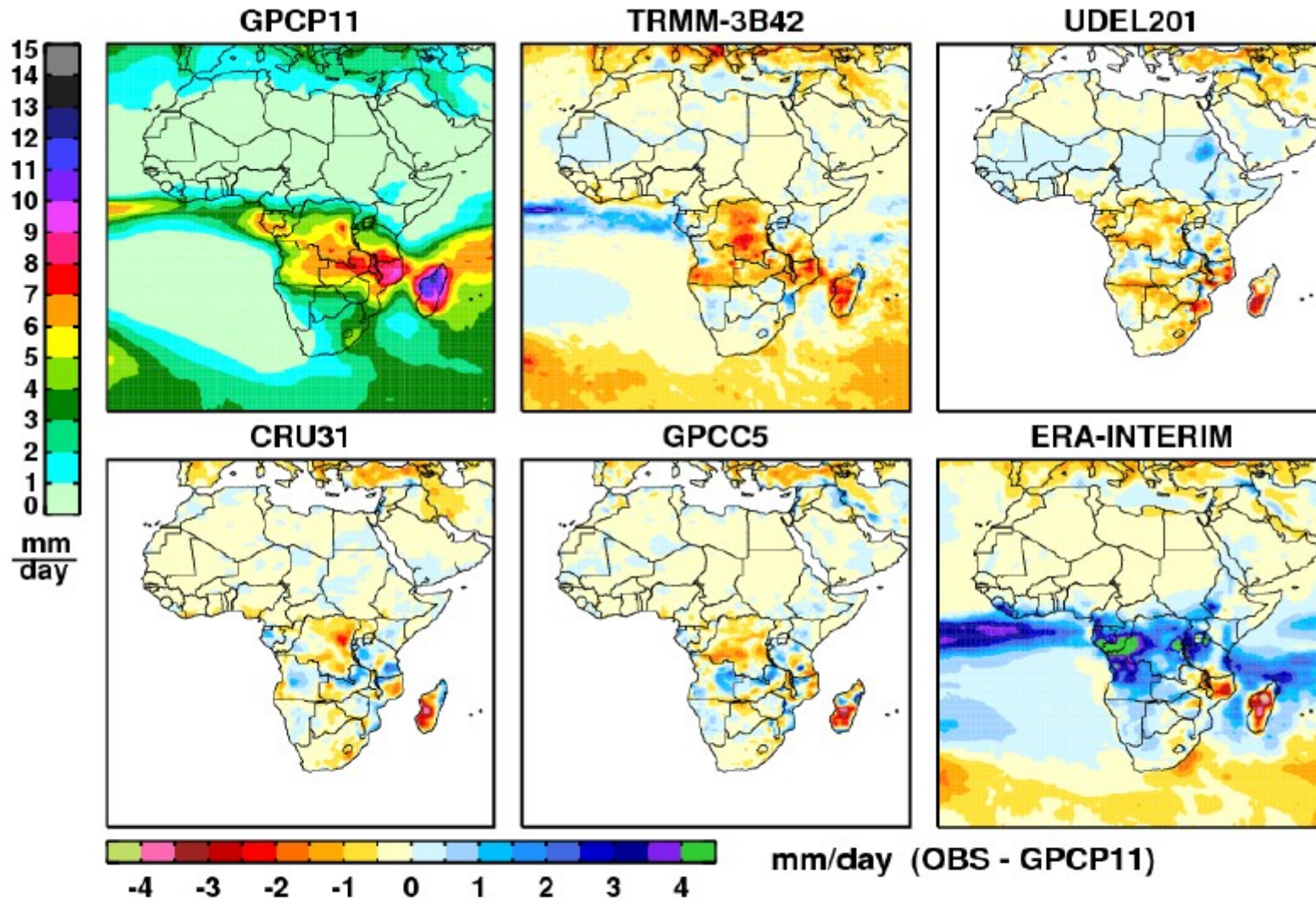
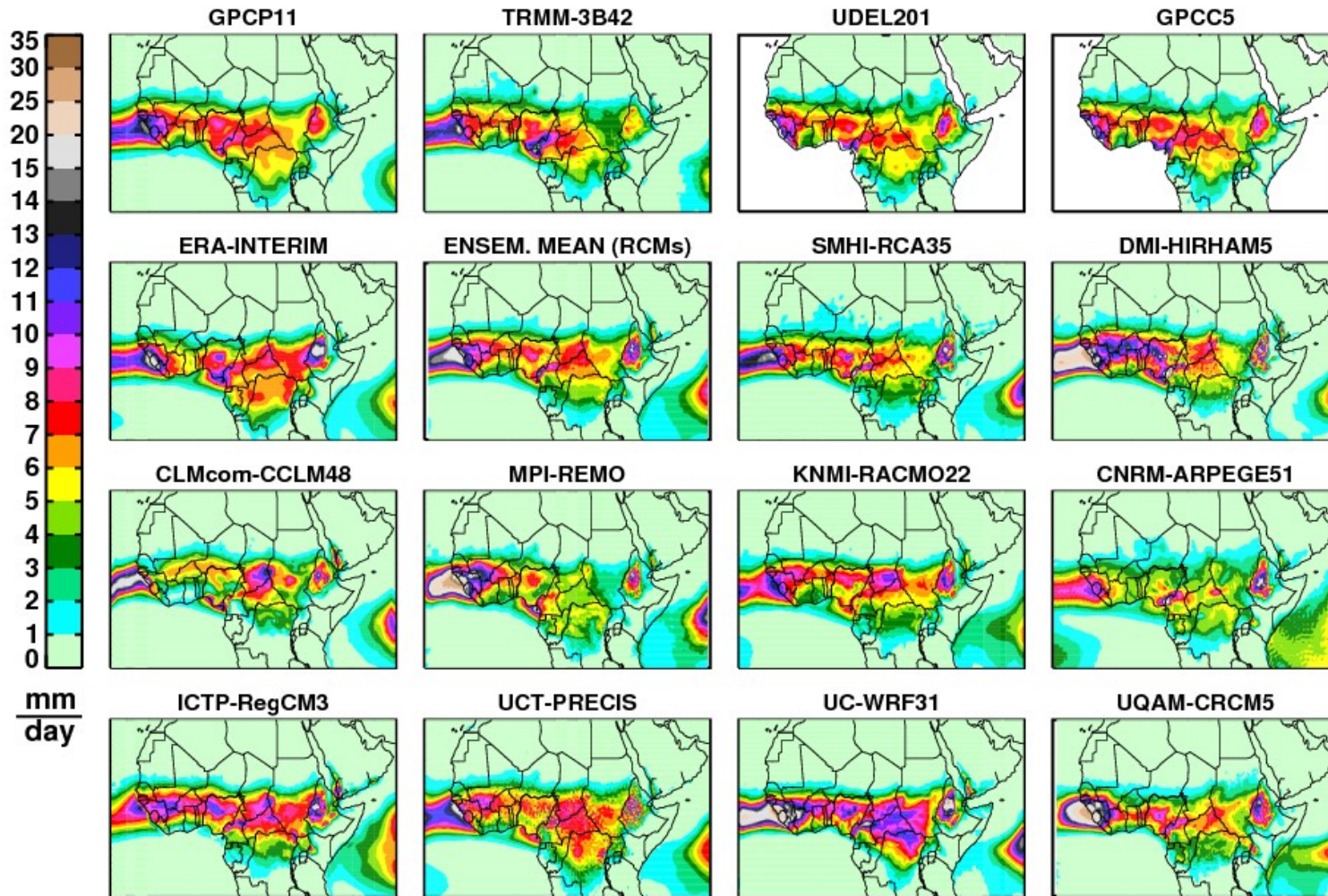


FIG. 2. GPCP mean JFM precipitation (1998-2008) and differences between other gridded precipitation products and GPCP.

# Simulated seasonal precip.

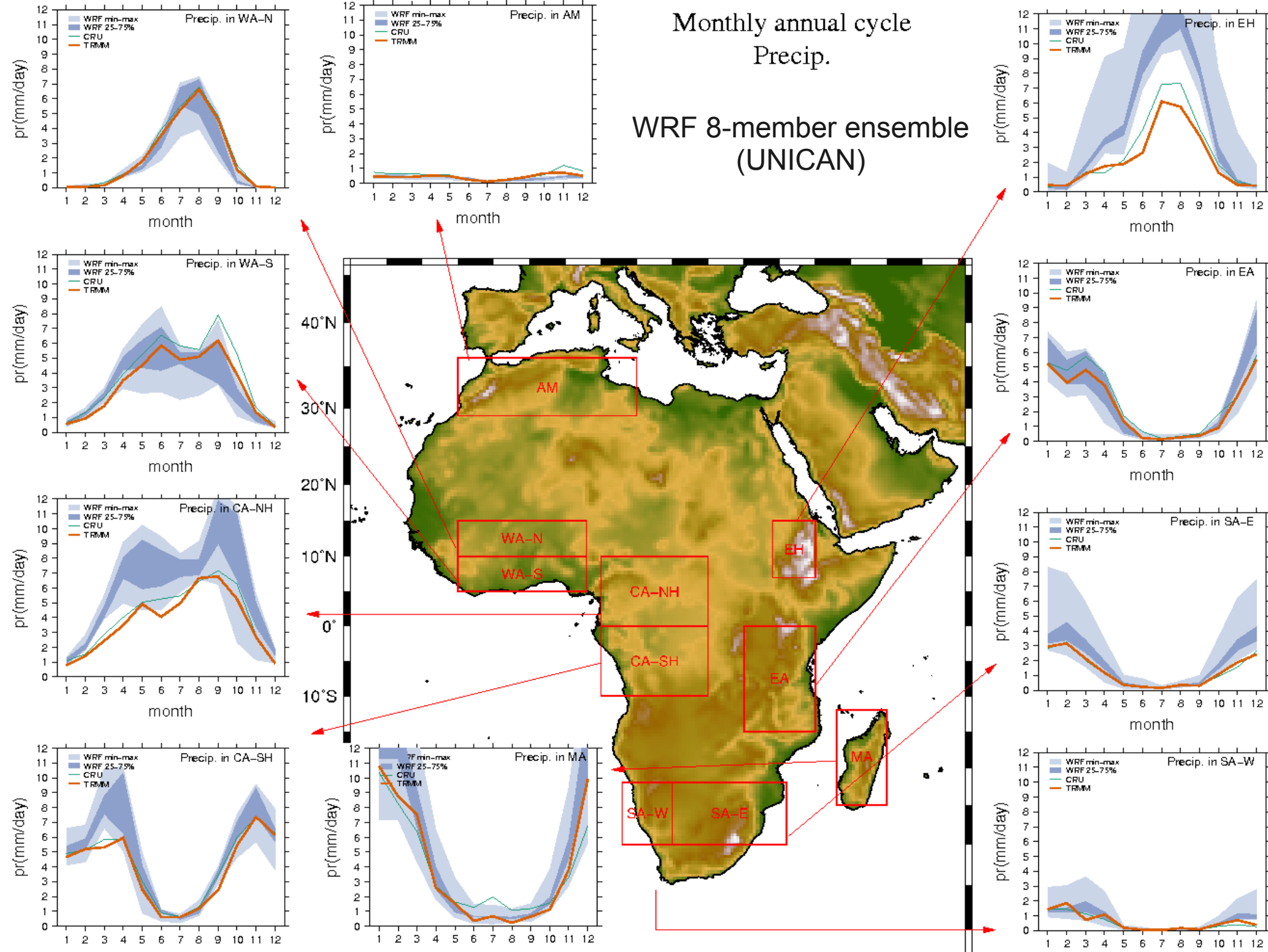
## Precip JAS (1998-2008)



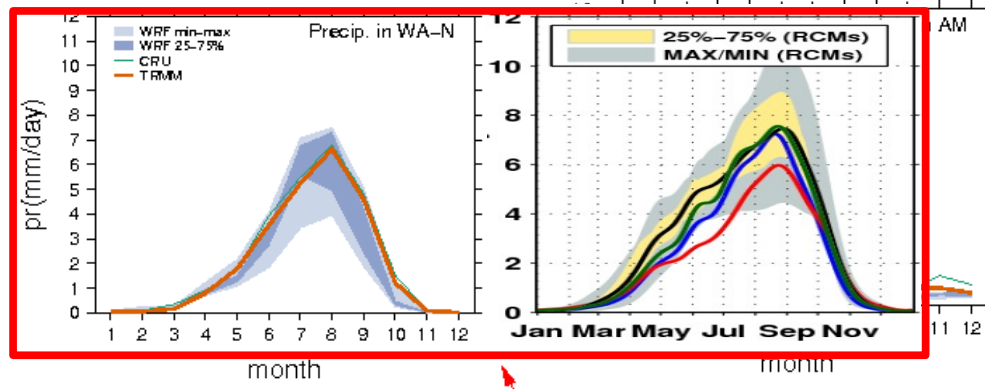
# Monthly annual cycle

## Precip.

### WRF 8-member ensemble (UNICAN)

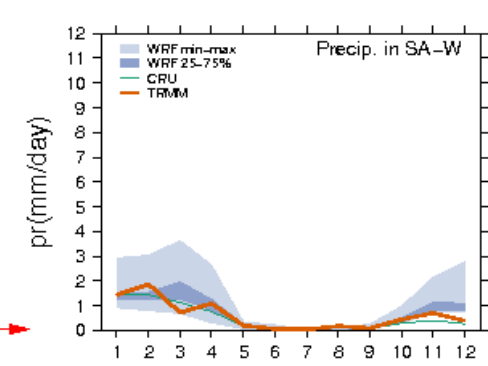
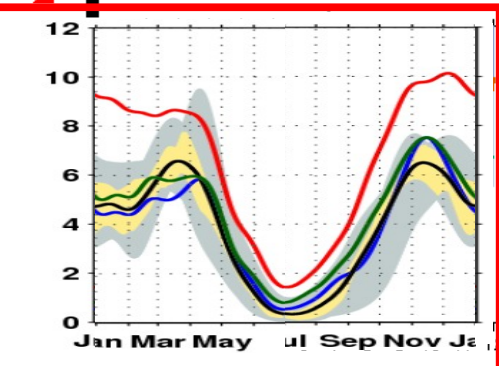
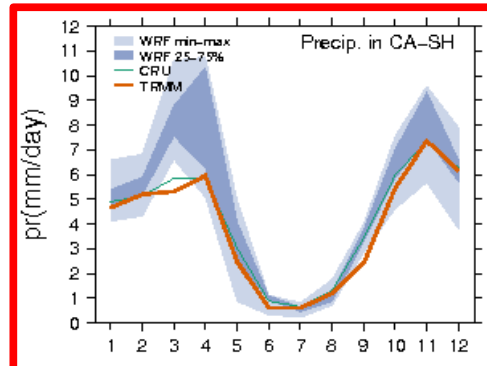
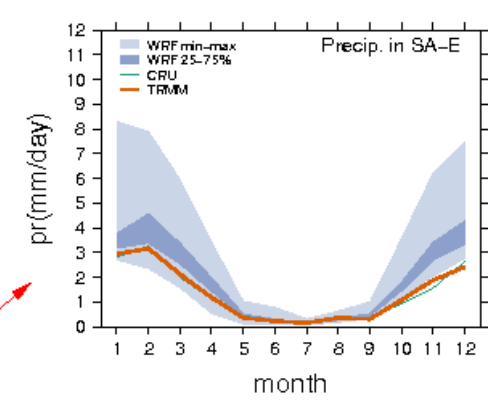
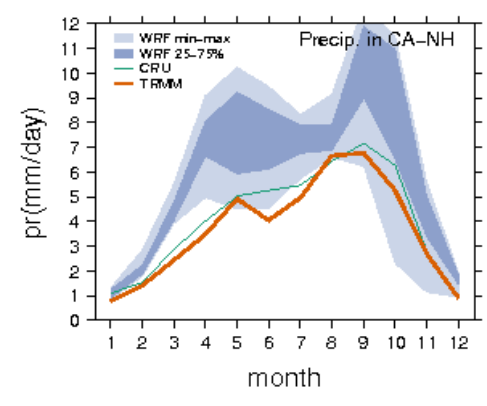
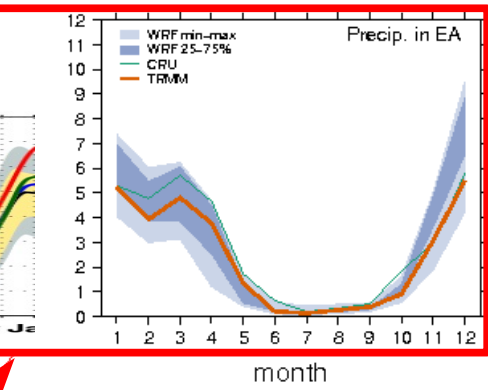
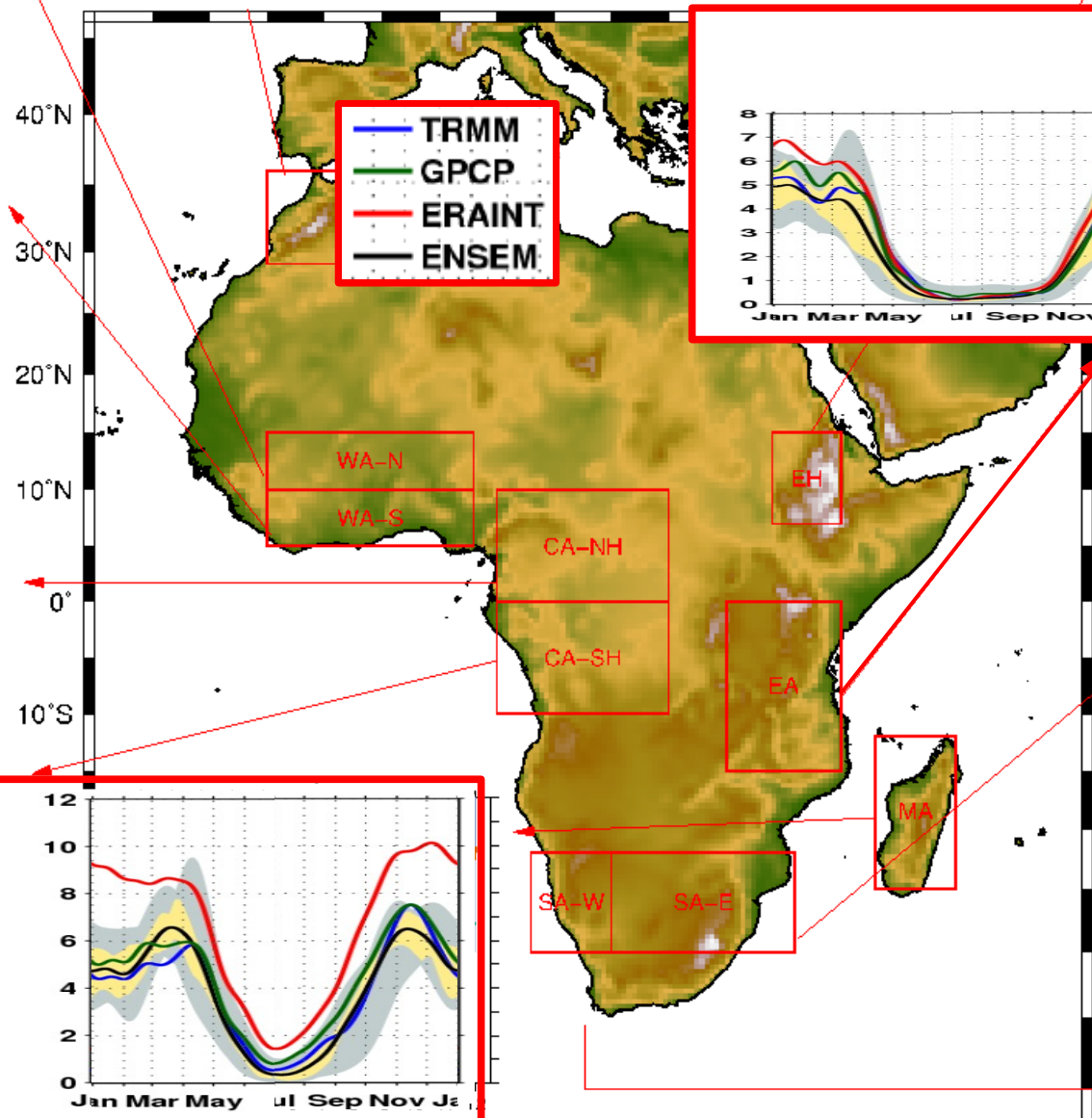
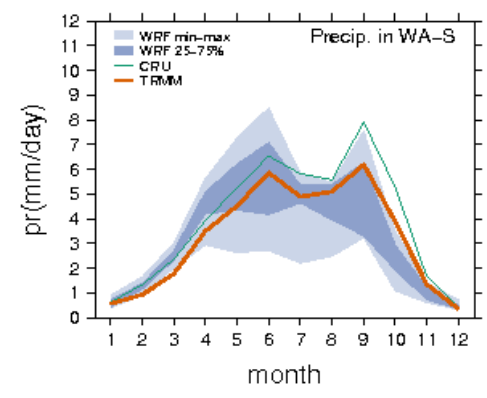
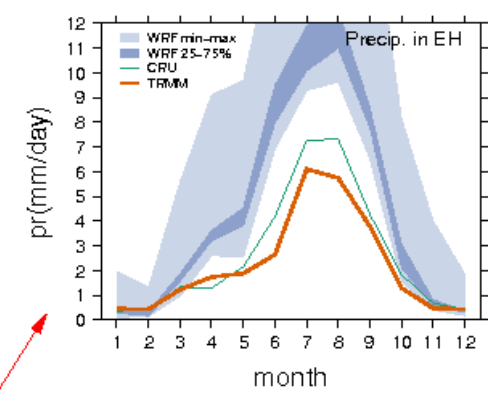




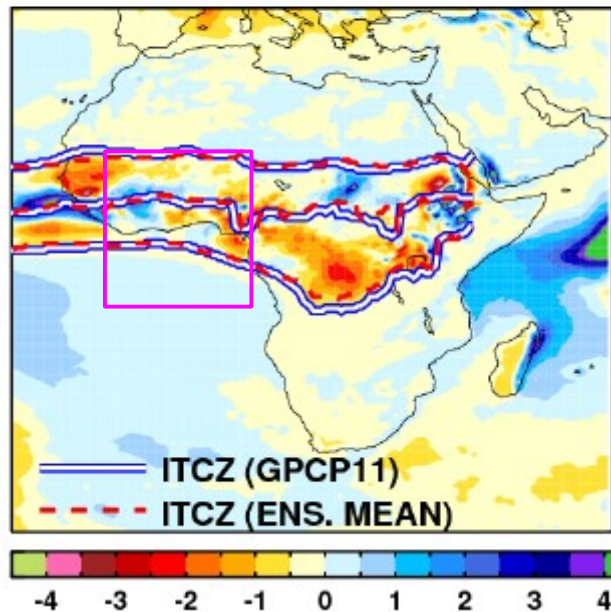
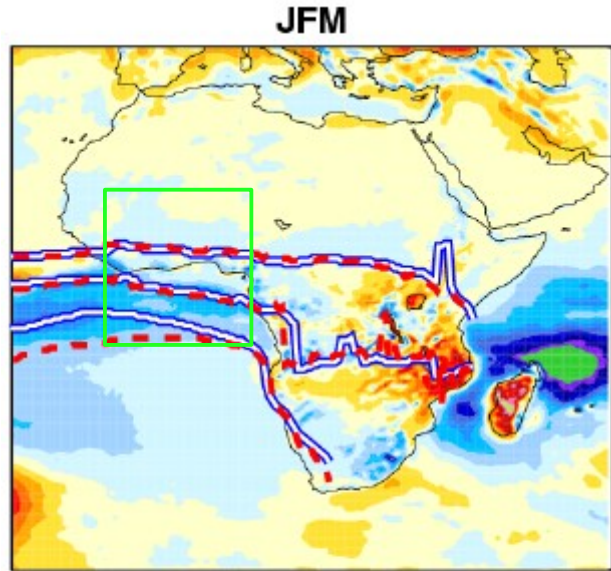


Monthly annual cycle  
Precip.

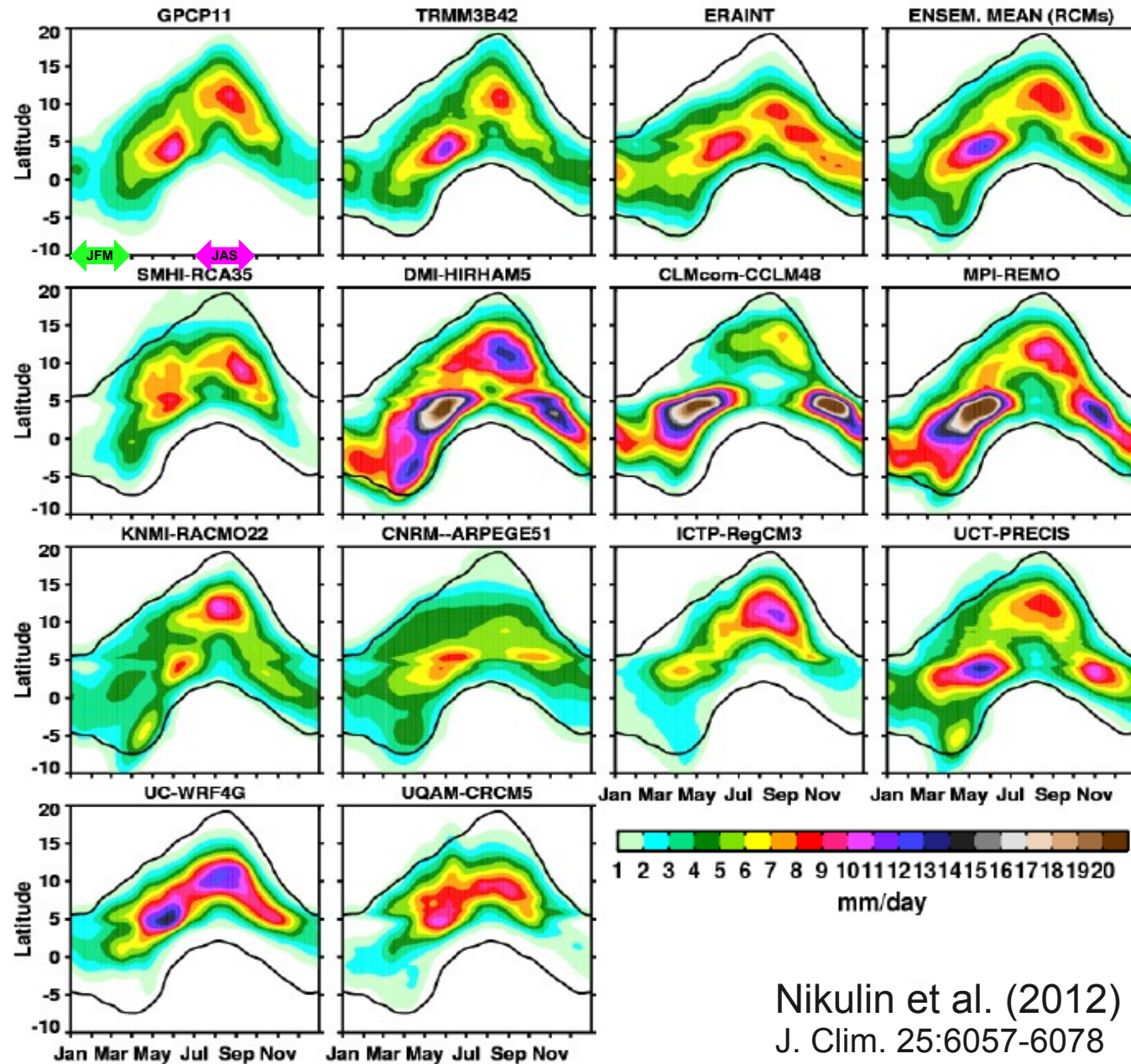
WRF 8-member ensemble  
(UNICAN)  
+  
Nikulin et al., 2012



# Monsoon evolution



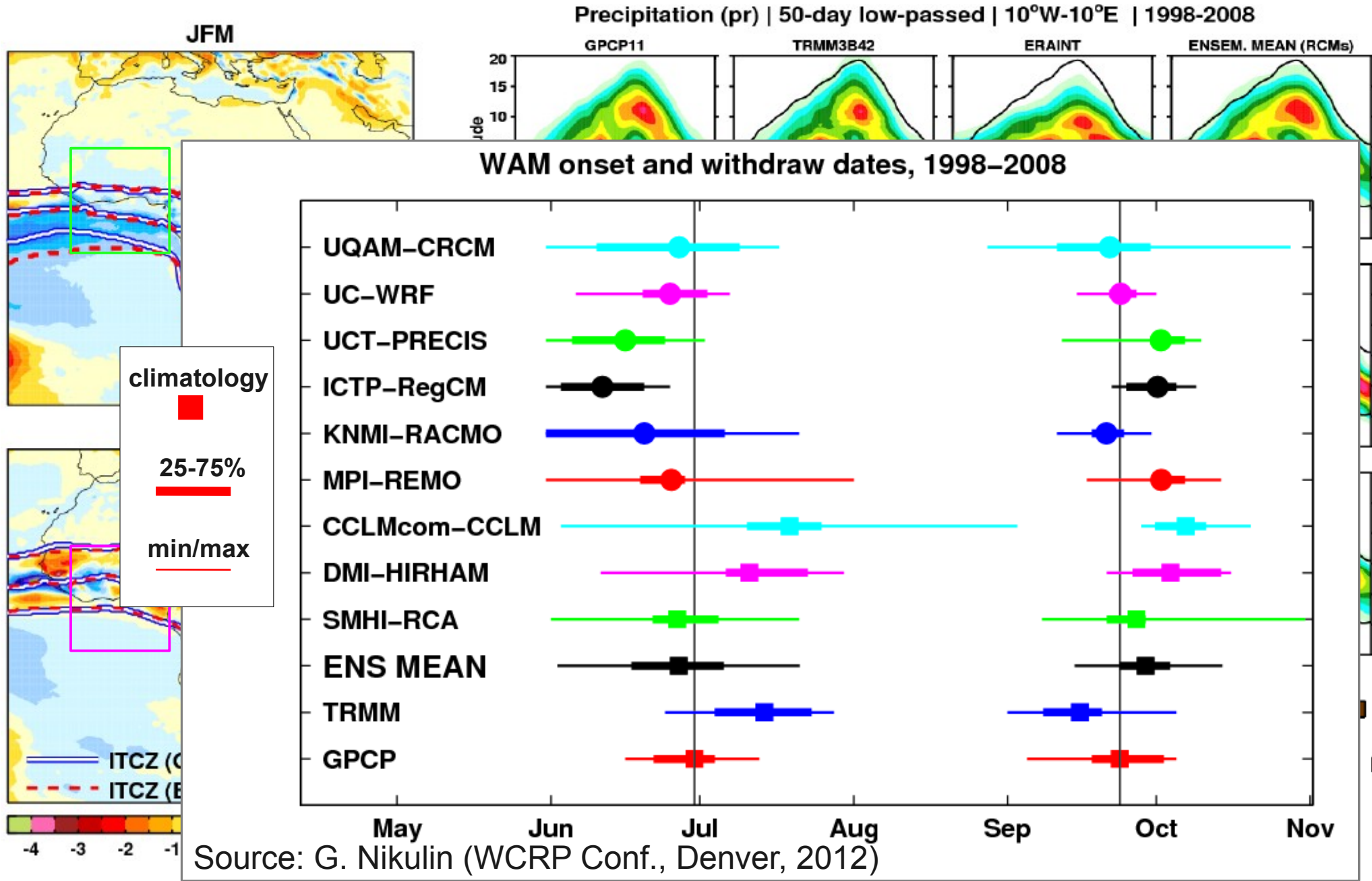
Precipitation (pr) | 50-day low-passed | 10°W-10°E | 1998-2008



# Santander Meteorology Group

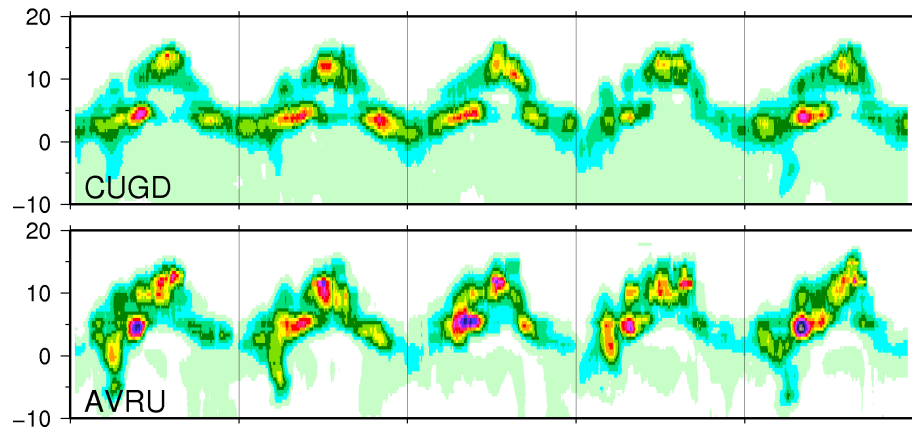
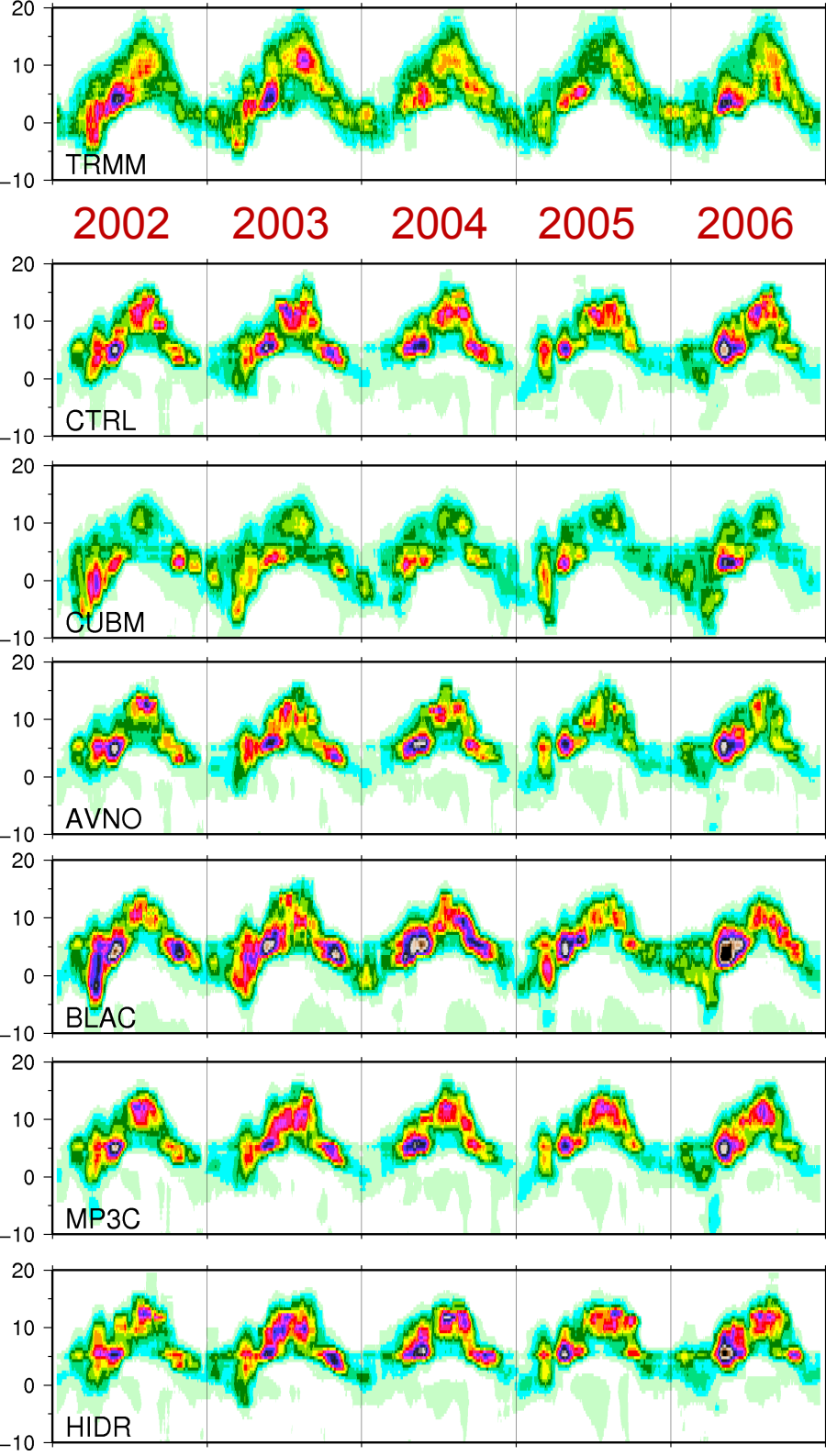
A multidisciplinary approach for weather & climate

# Monsoon evolution

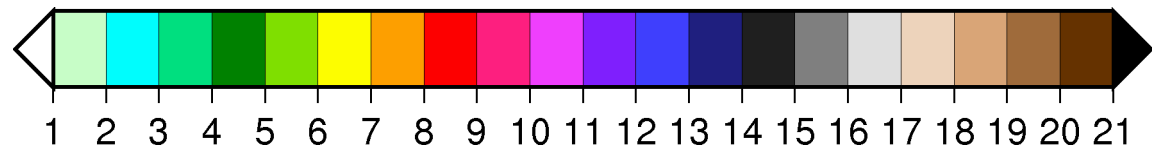
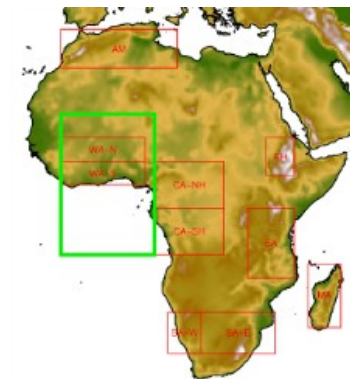


# Interannual variability

## 8-member WRF ensemble (UNICAN)



**10W-10E  
Zonally averaged  
precipitation  
(mm/day)**

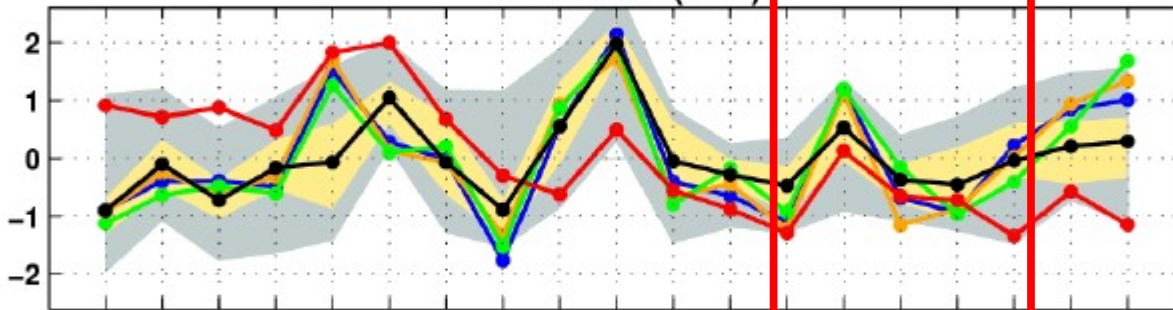


# Interannual variability

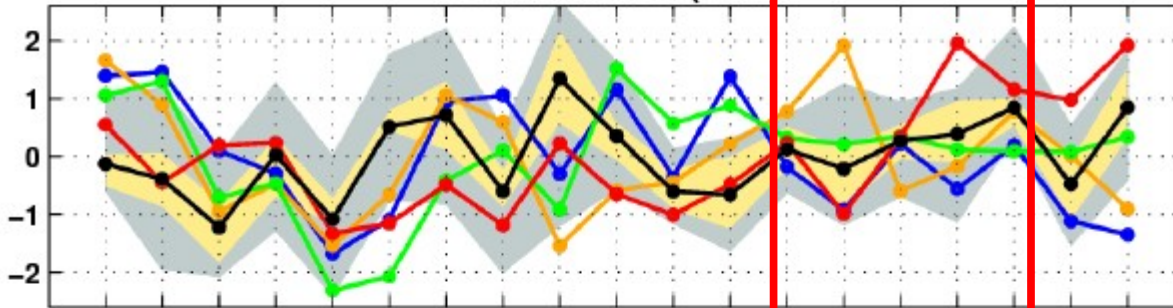
## Normalized Precipitation



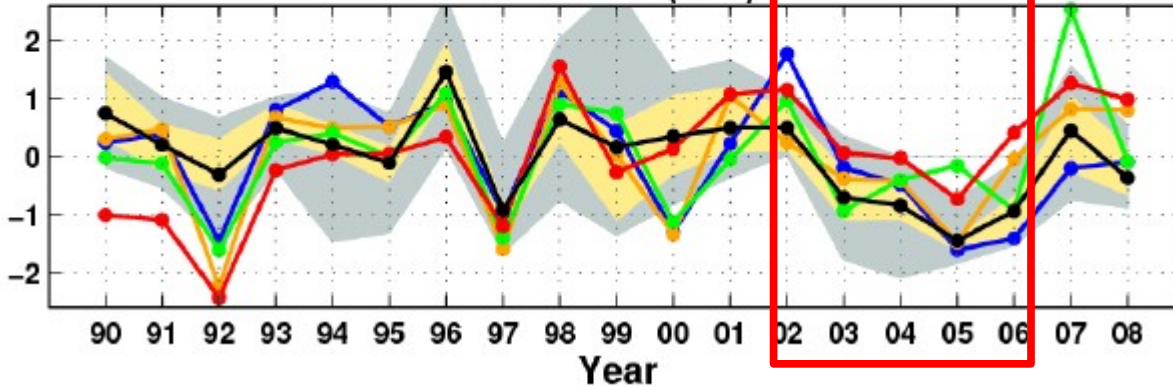
West Africa (JAS)



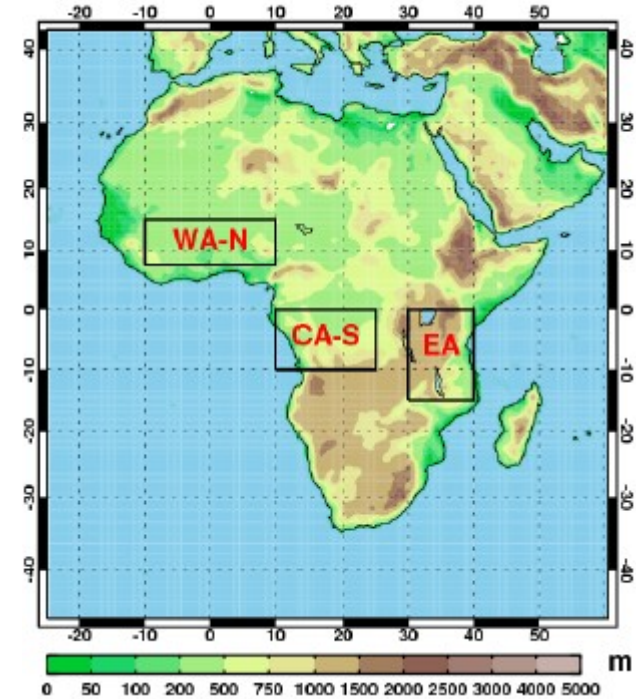
Central Africa (JFM)



East Africa (JFM)



CORDEX Africa | 0.44° (50 km)

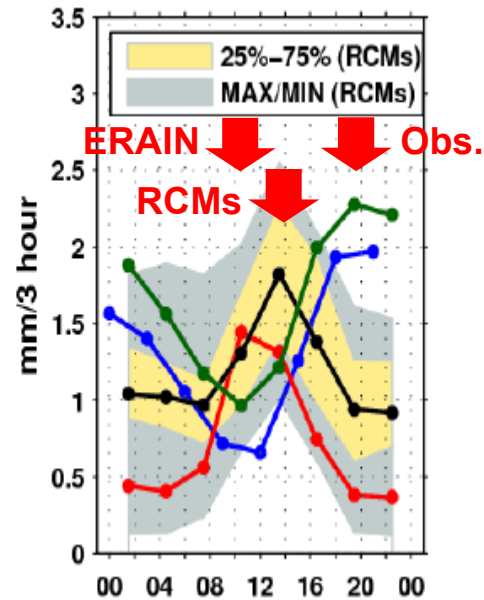
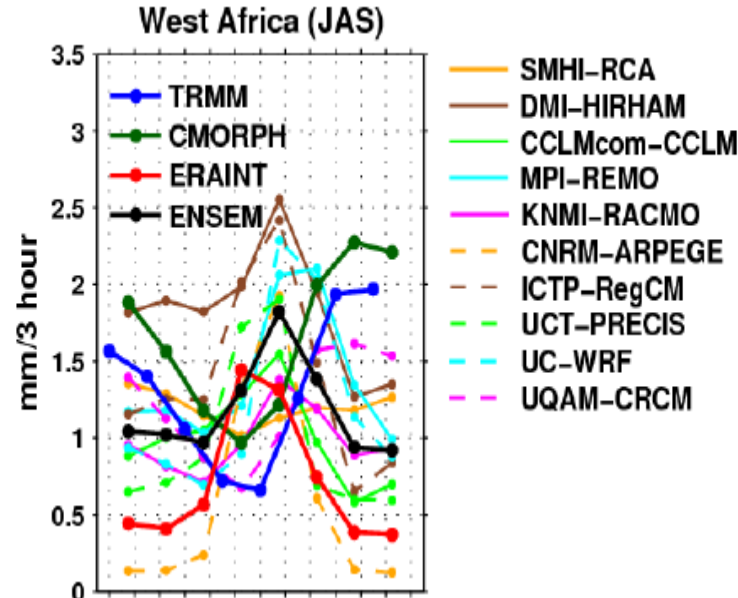


# Santander Meteorology Group

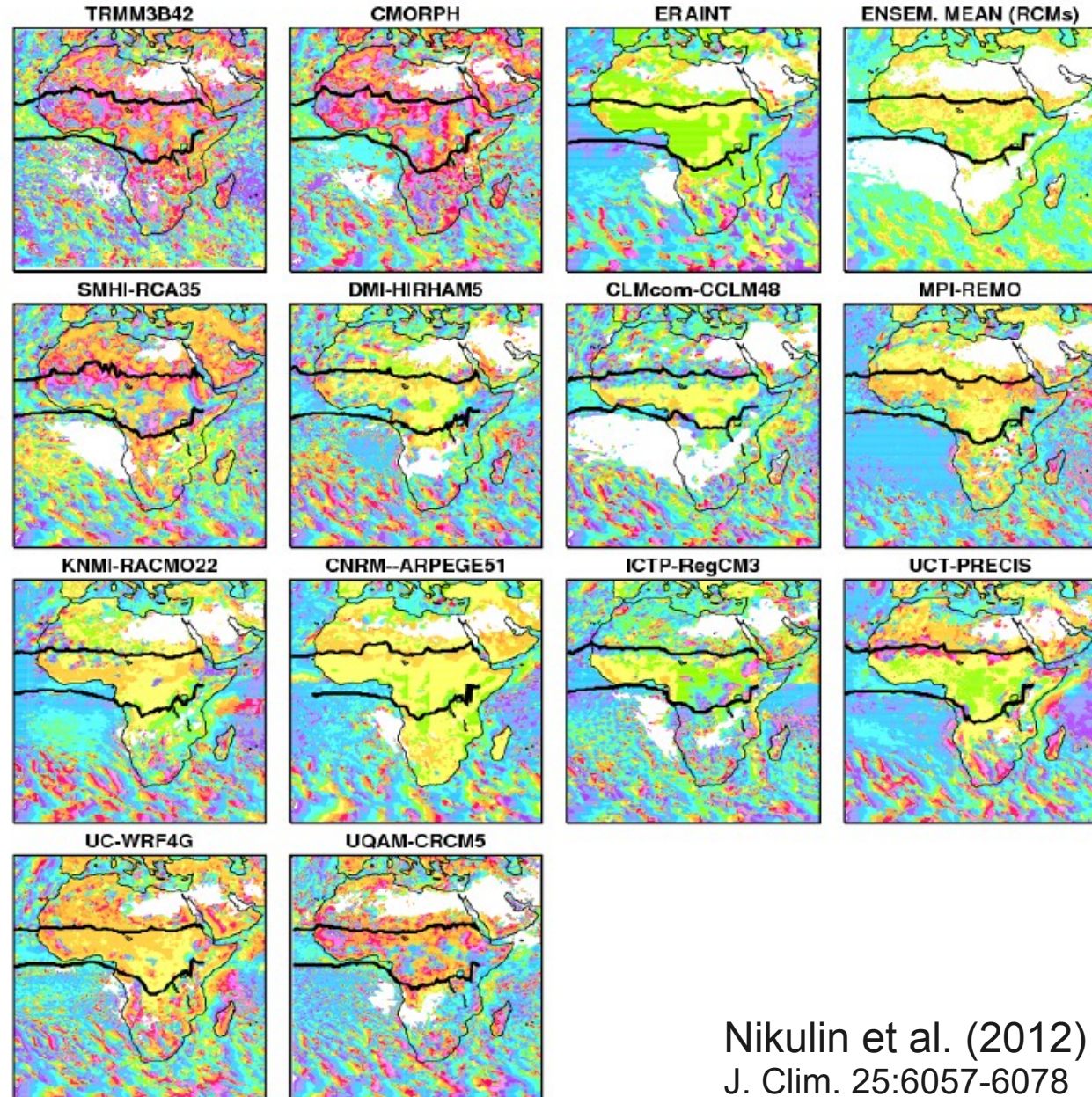
A multidisciplinary approach for weather & climate

# Daily cycle: rainfall

Diurnal cycle of precipitation: time of maximum | JAS | 2003-2008 | > 1 mm/day



Local time



- CORDEX coordinates RCD efforts internationally, promoting the engagement of regional climate & IAV communities
- Several RCC's organized, especially Africa
- Status:
  - Analyses of evaluation (ERA-Interim) simulations
  - Running historical+scenario (CMIP5) simulations
- First results indicate added value, but also common problems

# Thank you!

**Contact:** [jesus.fernandez@unican.es](mailto:jesus.fernandez@unican.es)

