

WCRP Working Group on Regional Climate

The WGRC's mission is to coordinate regional climate research and science-based knowledge development for decision makers



Co-Chairs:

Clare Goodess, CRU UEA United Kingdom Bruce Hewitson, CSAG UCT South Africa

Ex Officio: CORDEX chairs -Filippo Giorgi ITALY Bill Gutowski USA



WCRP Secretariat SWITZERLAND: Roberta Boscolo, Officer





WGRC Members





D. Behar USA

W. Landman S. AFRICA



J. Polcher



S. Emori JAPAN



C. K. Gotango

PHILIPPINES



S. Mason USA (CLIVAR)



I. Shkolnik **RUSSIA**



A. Rinke

(CLIC)

GERMANY



T. Carter

FINLAND





S. Dean N. ZEALAND (SPARC)







- To facilitate coordination of WCRP research activities relevant to the provision of regional climate information and related climate services.
- To integrate the regional user and decision maker context into the design and development of regional climate science through two-way communication and co-production activities.
- To facilitate, in co-operation with other relevant international organisations, the provision of good practice guidance for potential users on the identification, selection, processing, application and interpretation of regional climate information.
- To provide advice to the WCRP regarding research activities needed to support and improve regional climate science and prediction.
- Six more bullet points.....





- First meeting, Vienna, Austria, 6/7 April 2013
- Second meeting, Montevideo, Uruguay, 14/15
 March 2014



• Third meeting - April 2015, Manila? Hosted by Kendra Gotango

Plus several teleconferences of full group and sub-groups, and informal meetings at other events





Meetings



WGRC Terms of Reference

To oversee and promote specific WCRP regional climate research initiatives including the Coordinated Regional Downscaling Experiment (CORDEX)



To foster communication between the WCRP and the GFCS and Future Earth, and to serve as the point of contact between the WCRP and regional climate information/service entities (e.g. WMO Regional Climate Centres, the Climate Services Partnership (CSP) etc)







Regional climate modelling and robust foundations for climate services What does the CORDEX initiative have to offer climate service providers and users?

> Working Group on Regional Climate Side Event at the International Climate Services Conference Montego Bay, Jamaica, 3 December 2013



http://www.wcrp-climate.org/images/documents/conferences_minutes/ICCS3_WCRPevent.pdf





Some key recent developments within the WGRC portfolio

 Users survey to assess the accomplishments and gaps of CMIP5 and inform the ongoing design for CMIP6 – explicitly to include input from the IAV community (with Richard Moss and Linda Mearns)

 Document on definitions of critical variables used by the wider climate community – a glossary (supporting TGICA)

• With Climate Services Partnership (CSP): Ethics of climate services (ICCS3 side event, White papers in 2014 on principles of practice & metrics of quality)

• With IPCC TGICA: Criteria of confidence in data sets + Guidance paper on downscaling (2014)

- WGRC "Distillery" expert meeting (Oct 2014, Spain)
- CORDEX-Africa-Analysis (CAA) pilot project and paper
- Working paper on regional climate information

Regional GC JSC-34 Action items 14 & 15



Networking



JSC-34 action item 8

CLIC (A. Rinke) SPARC (S. Dean)

GEWEX (J. Polcher) CLIVAR (S. Mason) Regional climate GC Pan-Clivar/Gewex

GFCS - Filipe Lucio Future Earth - Frans Berkhout

- International Conference on Climate Services (Clare, Bruce, Roberta, Bill, Simon)
- Climate Services Partnership (Bruce, Clare, Simon)
- WMO co-ordination Meeting on DRR (Simon Mason)
- Task Group on Scenarios for Climate & Impact Assessment (TGICA) Bruce Hewitson & Tim Carter
- ICONICS (International Committee on new Integrated Climate Change Assessment Scenarios) Tim Carter



Latin America and the Caribbean:

- LACC (2nd WGRC meeting was held ahead of this)
- Two VAMOS/CORDEX workshops Lima/Santo Domingo

Africa:

• Arusha, ACC2013 (agenda item 6.7)

Arctic:

 Annette Rinke & Igor Shkolnik – Adaptation Actions for a Changing Arctic – Arctic Monitoring & Assessment Prog.

Asia:

 Seita Emori and Kendra Gotangco – session on Downscaling applications in climate information & services for IAV assessments, Asia-Oceania Geosciences Society Annual Meeting, Sapporo, August 2014





JSC-34 Action item 10!!

CORDEX SAT

- F. Giorgi (Co-Chair)
- W. Gutowski (Co-Chair)
 - I. Anguelovski (Spain)
 - R. Krishnan (India)
 - H.S. Kang (Korea)
 - C. Lennard (S. Africa)
 - G. Nikulin (Sweden)
 - S. Solman (Argentina)
 - T. Stephenson (Caribbean)
 - F. Tangang (Indonesia)
 - B. Timbal (Australia)



CORDEX: Recent Progress

- Numerous CORDEX presentations at major meetings
 - EGU RCM session largest in the CL area
 Regional modeling session at AGU
- Major pan-CORDEX conference ICRC-CORDEX 2013 (See next slide)
- Many model communities completing ensembles of simulations over various domains
- Papers appearing with explicit use of CORDEX framework (JC, CD, JGR, CR, CC etc.)



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

• 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

Emerging issues

- Need for a mechanism for better coordination/ homogeneization across activities in the different CORDEX domains and more generally across the wider CORDEX community
 - The creation of an International Project Office for CORDEX (IPOC) will substantially help
 - WCRP-SMHI Letter of Agreement has been drafted with expectation to finalise by 10 August

Emerging issues

- Data management and distribution
 - Work being led by Grigory Nikulin (SAT/SMHI)
 - Based on ESGF nodes where possible (e.g., EUR)
 - Interaction with the end-user community
- Need of a clear protocol for the identification and "approval" of CORDEX domains (JSC-34 Action item 9)
 - New domains are being proposed based on different "regional" needs: MENA, SE Asia
 - Important issue as the target horizontal resolution increases



CORDEX Domains on ESGF (12 May 2014)

CORDEX Domain	Number of Datasets	Number of groups
Europe (44, 22, 11)	6091/113/3894	8/1/5
Africa (44)	6234	4
North America (44)	1752	2
Arctic (44)	2718	1
MENA (44, 22)	1551/700	1/1
South Asia (44)	830	2
South America (44)	564	1
Antarctica (44)	604	1
Australia (44)	171	1
East Asia (44)	171	1

- 10 CORDEX domains are available (different number of simulations)
- a RCM group publishes simulations on its own datanode (if available)
- where to publish is decided within the CORDEX domains: ESGF non-ESGF EUR-11 to DKRZ and EUR-44 to DMI (Euro-CORDEX)



Africa-CORDEX downloads (AFR-44)

Most popular variables: precipitation, minimum, mean, maximum temperature and wind

Total number of downloads per variable (SMHI-RCA4) CORDEX AFR-44 | http://esg-dn1.nsc.liu.se | 20140512 120 number of downloads (x100) 100 80 60 40 20 0 stewind va500 evspsbl hus850 evspsblpot tasmin tasmax rsds mrro tas ' nuss vas uas γq

Integration of Empirical-Statistical Downscaling within the CORDEX framework

- 26-27 Sept 2013 ICTP, Trieste, Italy
- 30 July-1 Aug 2014 Uni. Buenos Aires, Argentina
 - http://www-atmo.at.fcen.uba.ar/cordex/
- Early 2015 (?) Univ. Cape Town, South Africa

Experimental plan was identified in Trieste, has since been refined, necessary inputs identified and implementation will be advanced during the more technical UBA meeting



Metrics for CORDEX

<u>Goals</u>

- 1. Model performance versus variety of observations
- 2. Succinct
- 3. Side-by-side comparison of models on same graph

Some Challenges

1. Appropriate observations + obs. uncertainties



Two categories

A.Basic assessment common to all regions to provide a baseline B. Region-targeted assessment to be determined by regional activities

Bill Gutowski

Emerging scientific questions from the CORDEX Phase I activities

- Need of very high resolution (cloud resolving)
- Process based analysis of models
- Technical downscaling issues (domain, model top, LBC, etc)
- Added value
- Regional earth system interactions/coupling
- Regional forcings (land-use, aerosols)
- Need of an Ocean-CORDEX
- Methods for producing "actionable" information ("distillation")

An example of the added value of the RCM resolution (EURO-CORDEX)

CMIP5 GCM

441

5E

0.2

0

CORDEX "standard" RCM (50 km)

15E

15

12

10



44N

8

g

Another example of added value

Frequency distribution of daily precipitation events





25

30

-10 -5 -2 2

10 15 20

5

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5 10 -10 -5

-5 -2 2 5 10

Transition to CORDEX Phase II

- Increase of "base" resolution: 50 km \rightarrow 25 km
- Revisitation of "base" large domains
- Development of "Flagship" Pilot Studies (FPSs)



Flagship pilot studies

- Examples of possible approaches within the FPS framework to address the emerging scientific questions
 - Targeted suites of experiments
 - Targeted process-based analysis
 - Use of multiple downscaling techniques
 - Comprehensive comparison with observations (special observing programs)
 - End-to-end, climate-to-end user, studies
 - Model development

How to choose the flagship studies

- Examples of possible criteria
 - Based on physical science key issues/hotspots
 - Based on VIA key issues/hotspots
 - Based on availability of high quality, comprehensive (multi-discipline) data, observation campaigns etc.
 - Based on interactions with other WCRP programs (e.g. GEWEX)
 - Based on availability of (or potential for) funding



Completed LBA LPB MDB AMMA active BALTEX, HYMEX MAHASRI NEESPI proposed SaskRB HYVIC BALTEX-3 NAWP MDB-2

The road-map towards FPSs

- "Launch" of the CORDEX-FPS concept within WCRP
- Completion of a white paper on the scientific rationale for developing FPSs
- Poll regional science/application communities for identifying FPSs
- Development of a clear and transparent decision protocol for identifying FPSs