

First CORDEX Conference, ICTP, 21-26 March 2011

Why regional climate downscaling?





Dynamical Downscaling

Generation of small scales by a high-resolution RCM driven by low-resolution GCM data (900 hPa specific humidity)



Large scales Short scales

The added value of RCMs





The importance of resolution

Mean annual precipitation (mm/day)



From Christensen et al. 2005

CRU obs

RCM (RegCM)

GCM (FVGCM)

DJF precipitation 30-year nested RCM simulation, 1961-1990, 20 km grid spacing Courtesy of X. Gao

The effect of topography on the climate change signal (Gao et al. 2006)

Mean precipitation change, A2 - Present

DJF



SUMMER TEMPERATURES in the 2080s compared to the present day, due to A2 emissions



Climate on islands changes very differently to the surrounding Mediterranean Sea, and can only be predicted using an RCM



Why the COordinated Regional climate Downscaling Experiment CORDEX





The use of RCMs in the literature has been steadily growing

Number of papers in the ISI under "regional climate model"



Was this development reflected in the AR4? Most regional climate change information in the AR4 was still derived from AOGCMs





Only 3 figures in Chapter 11 from RCMs or SD (out of 30)







Why is RCM information under-utilized in the generation of climate change scenarios for impact/adaptation work?



RCM studies have not been coherent and comprehensive enough to sufficiently characterize uncertainties in regional climate change projections

Regional Climate Change "Hyper-Matrix Framework" (HMF)



Sources of uncertainty in the simulation of temperature and precipitation change (2071-2100 minus 1961-1990) by the ensemble of PRUDENCE simulations (whole Europe) (Note: the scenario range is about half of the full IPCC range, the GCM range does not cover the full IPCC range) (Adapted from Deque et al. 2006)



Regional intercomparison projects



The inception of CORDEX

- Proposal to WCRP at WGCM-12 (Paris, 2008)
- Formal endorsement by WCRP (Dec. 2008)
- Formation of the Task Force on Regional Climate Downscaling (TFRCD) (Dec. 2008)
- Series of meetings
 - Toulouse (Feb 2009)
 - Lund (May 2009)
 - Lille (June 2010)
- Definition of CORDEX Phase I experiment set up (2009)

Task Force on Regional Climate Downscaling (TFRCD)

- Mandate: Design a framework to
 - Evaluate and improve RCD models and techniques
 - Provide a coordinated set of RCD-based projections/ predictions over regions worldwide for use in impact assessment/adaptation studies
 - Facilitate communication with the impact/end user community and involvement of the research community from developing countries
- Current membership
 - F. Giorgi (co-chair), C. Jones (co-chair), R. Benestad (Nor), J.H. Christensen (DK), P. Duffy (USA), G. Flato (Can), W. Gutowski (USA), B. Hewitson (SAF), R. Jones (UK), Krishna Kumar (In), W.T. Kwon (Kor), B. Lamptey (Ghana), S. Solman (AR)





Other CORDEX activities/issues

- Formation of regional diagnostics/evaluation teams
 - Compile suitable metrics for model evaluation
 - Gather relevant observational datasets
- Commitment by CMIP5 global modeling groups to provide fields for model nesting for the selected experiments
- Standardized output format following (as closely as possible) the CMIP5 protocol
- Creation of CORDEX databanks (DMI, KMA)

CORDEX: Progress to date (I)

- Publication describing the CORDEX framework and PHASE I plan.
 - Giorgi, Jones, Asrar, WMO Bulletin, July 2009.
- Creation of a CORDEX web-site and an email server (IA State)
 - <u>http://wcrp.ipsl.jussieu.fr/RCD_Projects/CORDEX/</u> <u>CORDEX.html</u>
- Distribution of ERA-Interim reanalysis fields (SMHI)
- 6-hourly fields included in core CMIP5 data
- Formation of Africa diagnostic team/metrics lead by B. Hewitson (UCT)
 - Three training workshops planned

CORDEX: Progress to date (II)

- Numerous CORDEX presentations at major meetings – WCC, EGU, AGU, GREENHOUSE09 etc.
- Purchase and activation of data server at DMI for CORDEX databank
- Regional CORDEX programs are self-organizing
 Med-CORDEX (Coupled ocean-atmosphere RCMs)
 Euro-CORDEX (High resolution, dx=10-12 km)
- Several groups completed or are completing the ERA-Interim driven simulations over one or more domains
 – ICTP/RegCM, SMHI/RACMO, MPI/REMO, HC/PRECIS, WRF, DMI/HIRHAM, CNRS/Aladin, others
- First multi-model set of ERA-Interim driven simulations for Africa completed and being analysed (SMHI)

CORDEX: Next Steps/issues

- Finalize and implement policies on data formats, variable list, delivery etc.
- Start delivery of data to the CORDEX databank at DMI
- Define common standard metrics
 - Quick-look general metrics (e.g. BIAS, MAB, RMSE)
 - Region-specific metrics

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- Fast-track the provision of global data for the production of first scenario runs
- Increase the involvement of the statistical downscaling community
- Enhance dialogue with the impact/adaptation community to maximize use of CORDEX data.

CORDEX: Next Steps/issues

- Develop analysis teams/activities for the different CORDEX regions
- Complete simulations and analyses in time for input into the IPCC AR5 process

- Papers accepted by July 1012?

 RCD/CORDEX poster session at the WCRP Open Science Conference, Denver, CO 24-28 October 2011

- Deadline: 30 April 2011

- Future of the TFRCD
 - Ask for a further renewal of the mandate
 - Develop into a standing WCRP WG
 - Incorporated as a sub-group within WGCM/WGNE

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- CORDEX LOGO??

