

# MEETING SUMMARIES

## CORDEX

### Climate Research and Information for Regions

IRÉNE LAKE, WILLIAM GUTOWSKI, FILIPPO GIORGI, AND BORAM LEE

**M**ore than 300 scientists, all interested in regional climate, came together at Stockholm University, in Sweden, on 17–20 May 2016 for the Third International Conference on Coordinated Regional Climate Downscaling Experiment (CORDEX). Out of over 460 abstracts submitted to the conference, 89 oral presentations and 306 posters were presented during three conference days. The aim of the conference was primarily to bring together the international regional climate research community, focusing on high-resolution climate information and its applications to vulnerability, impacts and adaptation, and the full spectrum of potential end users of regional climate information. The conference also offered a platform for further capacity development, training and knowledge exchange for developing-nation scientists, and an opportunity to expand existing or

#### THE THIRD INTERNATIONAL CONFERENCE ON REGIONAL CLIMATE (ICRC-CORDEX 2016)

**WHAT:** The international community of regional climate research scientists discussed high-resolution climate information and its applications to vulnerability, impacts, and adaptation.

**WHEN:** 17–20 May 2016

**WHERE:** Stockholm, Sweden

build new collaborations. In addition, the conference had an intention of demonstrating successes, both broadly across the discipline and through case studies (CORDEX in Action), and of facilitating cross-region collaboration around CORDEX Science Challenges, with the potential for keynote speakers

to address more thoroughly one of the Challenges. The conference also focused on the future of CORDEX, where discussion and development of plans including Flagship Pilot Studies, scientific challenges, and Coordinated Output for Regional Evaluations were key issues.

**KEY TOPICS.** The Third International Conference on Coordinated Regional Climate Downscaling Experiment (CORDEX) brought together the international community of regional climate scientists and stakeholders; there was a particular emphasis on the added value, vulnerability, impact and assessment issues, and the use and future of regional climate information and



**FIG. 1.** Jan Olsson, environment ambassador, Ministry of the Environment and Energy, Sweden, speaking at the opening session of ICRC-CORDEX 2016.

CORDEX results. This landmark event offered a platform for addressing key topics such as “CORDEX in Action: achievements and lessons learned,” current status, and future perspectives. Another major topic was the benefits of downscaling where the added value, compared to global climate models, and distillation issues (i.e., how do we boil down all the available information from different sources to something comprehensible and usable), were discussed. The different methods and tools for downscaling has been another key issue in the CORDEX community where some of the prominent questions involve the pros and cons and possible combinations of statistical downscaling and dynamical downscaling and the trade-offs between higher resolution and higher computational costs. This is also connected to the interaction with the vulnerability, impacts, and adaptation (VIA) community; how to respond to the needs of users and stakeholders; and how to convey results to make sure they are used effectively, which is a challenge facing most scientists today.

**HIGHLIGHTS.** The first day of the conference featured a general introduction to the challenges faced in relation to climate and climate change as well as an overview of the current status of CORDEX and examples of CORDEX, including the use of CORDEX data.

The future of CORDEX was the main issue in the subsequent plenary discussion where the cochairs of the Intergovernmental Panel on Climate Change (IPCC) Working Groups I and II (WGI and WGII) talked about how to best engage with CORDEX and how CORDEX can best provide information to IPCC, the panel’s Sixth Assessment Report (AR6) and their special reports. According to the cochairs the AR6 would need to better meet the end-user needs and for more regional experts to be involved than in the previous assessment reports. In relation to what policy-makers and other users need, the

## COORDINATED REGIONAL DOWNSCALING EXPERIMENT (CORDEX)

The vision of CORDEX is to advance and coordinate the science and application of regional climate downscaling through global partnerships. The CORDEX framework addresses regional-climate downscaling needs. CORDEX was created within the World Climate Research Programme, after the IPCC’s Fourth Assessment Report in 2007. The International Project Office for CORDEX is hosted by the Swedish Meteorological and Hydrological Institute ([www.cordex.org](http://www.cordex.org)).

question of distillation of climate information from data arises; the boiling down of vast amounts of data with various quality, credibility, resolution, and availability considerations and how messages from general circulation models (GCMs)/regional circulation models (RCMs) and empirical statistical downscaling (ESD) often differ. If you also add bias-corrected results, the various methods and outcomes create confusion among users. Related challenges such as interfaces with and between producers and end users, the understanding and communication between sectors, and how tailored information is demanded are an essential part of scientists’ tasks today. This theme was present in most of the presentations during the week in one way or another. CORDEX, with its world-wide span and excellent opportunities for networks and collaboration as well as coordinated datasets, has the potential to face these challenges and could well serve as a foundation for climate services.

The conference also offered some social events and the first day ended in a relaxed and welcoming way with an icebreaker offering finger food and jazz/contemporary music.

The following two conference days were organized in parallel sessions, with Wednesday and Thursday morning offering three parallel oral sessions whereas Thursday afternoon spanned six interactive parallel sessions. Discussions and presentations covered a range of topics whereas the Wednesday sessions focused mostly on different aspects of downscaling such as the benefits, various tools, and methods, and how to go from data to information. Discussions included the risk of losing information in ensembles: how results can be smeared out and how some large-scale processes, like the El Niño–Southern Oscillation (ENSO) interannual variability, may not be better captured in regional models while other frequencies

**AFFILIATIONS:** LAKE—Swedish Meteorological and Hydrological Institute, Norrköping, Sweden; GUTOWSKI—Iowa State University, Ames, Iowa; GIORGI—International Centre for Theoretical Physics, Trieste, Italy; LEE—World Climate Research Programme, Geneva, Switzerland

**CORRESPONDING AUTHOR:** Iréne Lake, [irene.lake@smhi.se](mailto:irene.lake@smhi.se)

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and extremes seem to need finer-scale models to be resolved. A key factor is thus what the relevant temporal and spatial scales for the problems in question are. This is closely related to the dilemma of the relationship between spatial and temporal resolution and cost, where cost–benefits analysis is needed to help prioritize resource allocation. A challenge when moving toward higher resolution involves the scarcity of observations for evaluation. Studies here also raised issues like how economic assumptions and expectations concerning climate impacts influence determining the risks and adaptation level, how to tackle the fact that end users want to see one single “number” and not a spread, and the mismatch between time scales in climate science and policy-planning processes. This highlights the responsibility of both scientists and end users to coordinate downscaling and distillation efforts and the communication of results. Some examples of web processing services and other ways of presenting/communicating data/results, including uncertainties, to the VIA community and how downscaling can be used for adaptation studies showed that the community embraces this challenge.

During the conference a number of side events were offered and one of the largest, drawing the attention of the participants toward the end of the second day, was the the European Climate Research Alliance’s (ECRA) event. Researchers, policymakers, and data users were brought together to discuss the gap between global-scale climate system modeling and high-resolution hydrological modeling, in response to the requirements for impact assessments. The participants actively discussed the challenges of bringing the model data to the user community.

Thursday morning and lunch featured an exciting variety of presentations and posters on a range of contemporary issues, all more or less connected to impacts and applications. When working with defining, understanding, and predicting extremes, one comes back to the issue of scales and how to agree on standards, which for instance comes into play in model intercomparison and assessment. Standardizing and speaking with one common voice is essential when conveying the information as well as in discussions on the scarcity, and scale mismatch with models, of observational data. The recurring question of balancing resolution and cost is even more relevant when discussing the benefits of high resolution particularly in mountainous regions and when considering climate change implications for hydro/thermo/wind/solar power generation and RCMs’ potential in facilitating planning.

The more workshop-oriented sessions covered some cross-domain issues, including the special features and difficulties in dealing with monsoons and polar areas. In light of the notion that CORDEX may serve as a foundation for climate services one of these workshop sessions included a survey of how the participants have used CORDEX data and what they found missing in complying with users’ needs. In summary the demand for climate services is increasing and the climate scientist community needs to step up to meet those expectations. Another of these workshops offered hands-on training using a Regional Climate Model Evaluation System (RCMES) which left satisfied participants eager to bring this knowledge home with them and partake in further development opportunities. Knowing the pros and cons of the models is, of course, also key in using the results and in discussions/interactions with users on what is needed to answer the questions of interest with an adequate degree of precision.

Thursday ended with four side events including the well-attended early career scientists (ECSs) event focusing on how ECSs can best communicate their research.

**MAIN OUTCOME.** Friday, the last day of the meeting, began with a conference summary and an overview of the overall goals of, the planning for, and the basic framework of CORDEX presented by the CORDEX cochairs Bill Gutowski and Filippo Giorgi. In planning the next steps of CORDEX, it is essential to discuss and revise scientific targets. The difference between regional information and information for regions was raised and how an integrated holistic approach may be necessary to deliver what the user needs while also imparting the understanding necessary to benefit from CORDEX products. From the World Climate Research Programme (WCRP) there is new emphasis on food-basket regions as well

## EARLY CAREER SCIENTISTS (ECS)

On Thursday evening, at the side event focused on how early careers scientists can best communicate their research, invited speaker Asher Minns delivered a key message underscoring the idea that effective communication is about understanding how you are heard instead of focusing on what you are saying. Four early career scientists presented communication examples and shared their thoughts on how to improve science communication ([www.icrc-cordex2016.org/index.php/programme/ecs-event](http://www.icrc-cordex2016.org/index.php/programme/ecs-event); [www.icrc-cordex2016.org/](http://www.icrc-cordex2016.org/)).

as the demands for information associated with the corresponding water issues. CORDEX contributions to these new challenges and to the coming IPCC assessment report and special reports were discussed.

The overall CORDEX goals are better understanding of smaller-scale phenomena and their variability, evaluation of and improvements to RCMs, production of coordinated sets of projections, and the fostering of communication and knowledge sharing with users. These goals are partly synthesized in the suggested CORDEX-specific scientific challenges. The aim of these challenges is to target specific regional finescale features: added value, the human element, coordination of regional coupled modeling, precipitation, and local wind systems. In the discussion of the challenges other cross-cutting themes were brought up and a grid-type scheme for the challenges was suggested.

Key outcomes from the conference included the following:

- The CORDEX community worldwide continues to advance the scientific understanding of regional climate and regional downscaling.
- Growing IPCC interest in information for regions is providing new opportunities for CORDEX contributions.
- The interface between regional climate science and climate services needs further exploration in order to make optimal use of climate research and experience when providing services.
- The CORDEX community has demonstrated the added value of regional downscaling and recognizes the need to further communicate this with policymakers.

Some recurring dilemmas stood out during the wrap-up discussion:

- lack of observations;
- coordination of modeling/modelers;
- distillation of information from data;
- links to other initiatives;
- interface/communication with users and stakeholders, including how to make sure results are understood and implemented in an intelligent way;
- organization with respect to societal issues; and answering the question of what are the limits to CORDEX? How far into services does CORDEX go and where are the boundaries with the VIA community?

## ICRC-CORDEX 2016 WEBSITE

[www.icrc-cordex2016.org/](http://www.icrc-cordex2016.org/)

It was agreed that there is a need and a demand for definitions of the role, the priorities, and the boundaries of CORDEX.

Participants deliberated on a framework of a Coordinated Output for Regional Evaluations (CORE) program. This program would involve a succinctly structured set of simulations for each region in support of IPCC needs, including choosing scenarios, GCMs, RCMs, archiving, and required coordination with Phase 6 of the Coupled Model Intercomparison Project (CMIP6).

The CORDEX Scientific Advisory Team (SAT) announced the first set of endorsed Flagship Pilot Studies (FPSs), selected from the responses to the first FPS call. The purpose of the FPSs is to focus on subcontinental-scale targeted regions, so as to address a number of capabilities working to resolve key scientific questions.

Terminating the final conference day and the closing ceremony were the presentations of the three young scientists who won the best poster competition. The winners were awarded a diploma and a handmade glass bowl.

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A final word of gratitude goes to the CORDEX community at large and to all of the participants, who made this conference an enjoyable and memorable event.