CORDEX Africa - Side event Report

WCRP Open Science Conference, Kigali, Rwanda, 24 October 2023

The session aimed at demonstrating the current and accomplished CORDEX efforts over the African continent, along with shedding light into the fact that CORDEX and WCRP are not only about models but also about producing and providing actionable information for society and different communities. CORDEX aims to provide a platform where climate experts and climate stakeholders/users can interact and exchange knowhow and experiences. The session included representatives from socio-economic sectors such as policy, agriculture, energy, health, and urban, along with the World Meteorological Organization (WMO) and CORDEX experts, The idea was to define pressing needs, challenges and possibilities for closing the gap between the research community/climate information producers and the climate information users, with special focus on Africa.

The session began with welcoming the speakers and the participants, and a demonstration of the run-of-show was presented to the participants.

<u>The session was devided into 4 main sections:</u>

1- Introduction and overview/history of CORDEX Africa.

2- Pitch presentations on what seems to be needed for several socio-economic sectors. 3- Speed dating, including table discussions on specific pressing issues, needs, and challenges for each of the represented sectors.

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4- Panel discussion and wrap up.

In the first section, Christopher Lennard gave a presentation with an Introduction and then overview and history of CORDEX Africa and how it has evolved into a platform for researchers and policy contributors.

At the pitch presentations, the invited speakers representing socio-economic sectors gave their view of what is needed for decision-making. The pitches were presented as follows:

- On policy: Nana Ama Browne Klutse and Nphamara K. Dampha (online)

- On urban: Christopher Jack and Rafiq Hamdi (online)

- On agriculture: Olivier Crespo

- On health: Adrian Thompkins and Tatiana Marufo (online)

- On energy: Belarmina Mirasse and Windmanagda Sawagado (online)

- On WMO: Jürg Luterbacher

In the speed dating part, discussions were aiming at identification of needs and challenges for each sector, which could help move towards answering the most burning questions. The idea was also to learn more about how much the audience knew about CORDEX. We discussed issues such as the following:

- Did you know about CORDEX before coming here?
- In what way is or can CORDEX information be used for assessing and minimizing climate impact/risk for your sector?

- What information do you need for adaptation and is it there now? How to use regional climate change science to guide adaptation policies?
- What are the future challenges and how can CORDEX/Climate information on regional and local scale help meet those challenges?
- How can we respond faster and quicker to societal issues?
- How do we go from climate models to socio-economic impacts?
- Decision Support Systems? (like climateinformation.org, climate adaptation games etc)

The outcomes of each table discussion can be summarized as follows:

Table 1: Health

At the health table the discussions revolved around these issues:

- Increased resolution does not necessarily offer much benefit due to the aggregation of health data which occurs in most countries, where the resolution of the health data often is much coarser than the CORDEX data. Some mentioned that co-developed projects between climate scientists and hospitals/health sector allowed access to greater level of health detail and that may then offer potential to use higher resolution information.
- In order to help get over the barrier of sensitive health data sharing, it is advised that the health data be prepared and presented as climate-related impacts on health.
- Relationship building is key and successful projects are often the result of a successful relationship rather than a structured top-down process. This relationship approach can, however, lead to an issue with sustainability when key people leave their positions/institutions.
- Studying the health impacts or indicators related to hydrology can be challenging, particularly in terms of studying the connection between atmospheric conditions, such as precipitation (rainfall) and hydrology. For example, in heavy precipitation cases, hydrological anomalies may result, e.g., floods or flash floods. In this case, the frequency of the occurrence of water-borne diseases may increase and finding the connection between precipitation anomaly and hydrology anomaly is usually hard to accurately understand, model, or forecast.
- Some models offer streamflow but not flood plains for example and bias correction is required before CORDEX+hydrology model coupling.
- It was suggested here that increased resolution may not always offer improved quality information – one study was cited where there was little difference between 44 and 22km resolution and the 22km was very dry, compared to the observation.

Table 2: Policy

The policy discussions included the topics below:

- A key point raised was the need for mutual understanding of the information required and the appropriate use of data information between the provider (for instance CORDEX-Africa) and the user/stakeholder.
- Co-creation and co-development are clearly vital and from the discussions it was quite obvious that the CORDEX-Africa community has a wealth of knowledge and experience they can share with the global North.
- It was interesting to hear that CORDEX data was being used directly in national assessments in a number of countries (Ghana, Liberia and Congo were mentioned).
- Further discussions included the following:

- Assessing what can be done and what policies can be designed with the information available. In many cases, higher resolution is welcome but not really needed. What is the added value of even higher resolution information?
- Understand how policy makers make decisions and design policies and how climate information can add value to their decisions. Do policymakers have the necessary access to use climate information? Or should this be a task for the regulatory agencies? Also, policymakers may lack the appropriate competency to use the climate information.
- Understanding what levels of policy makers need climate information, e.g., recommendations and laws will not explicitly include a climate risk map, for example, but rather prescribe to consultation agencies responsible for this kind of information (e.g. hydromet. offices) or use a certain standard.
- The need for translating climate information to the language used by policymakers, e.g., policy briefs and risk assessment information.

Table 3: Energy

The energy discussion was prompted after the pitches by the representatives/stakeholders from the energy sector and included:

- The energy representative noted a keen interest in future climate information to support planning within the energy company. All of the other participants in the discussion were researchers, most of whom were already doing research focusing on energy, including sub-seasonal to seasonal forecasting for energy companies in Kenya, and analysis of suitability for renewable energy (wind, solar, hydropower), in Ghana and Cameroon. There were also a few researchers who had not worked on energy before, but were interested to do so in the future. All of the participants had either heard of CORDEX or worked with CORDEX data.
- Most of the discussion focused on understanding the context for climate information in energy companies.
- The researchers asked questions about what climate information was already used, what decisions were on the horizon, and what other factors need to be taken into account (for example climate change mitigation).
- The researchers also asked questions about the current energy mix in Mozambique, which is dominated by gas, hydropower and coal.
- The energy company in Mozambique is in the process of developing a 25-year master plan, which provides an opportunity for input, particularly analysis of suitability for solar and wind energy, analysis of hydropower, and analysis of the influence of climate variability and shocks on the power system. There is also an opportunity to explore the use of seasonal to sub-seasonal forecasts. CORDEX data present a valuable source for input into such analysis, and it was noted that this would be most valuable if used alongside a suite of other climate data (e.g., projections from various climate models, observations, and other timescales of information).
- The participants exchanged contact details and plan to be in touch to explore potential for collaboration.

Table 4: Agriculture

The discussion was mainly on the challenging questions in the agriculture sector, which still need further study and focus, such as:

- Bias correction processes, are quite useful when studying the impacts on agriculture, but they are also quite time consuming.
- Issues of studying and analyzing the climate thresholds of the impacts on agriculture.
- Understanding of the climate processes and how they are affecting the agriculture sector. It was mentioned that some CORDEX Flag Ship Pilot Studies include specific case studies that may be of interest to the agriculture sector.
- The need for high-spatial-resolution data for the agriculture sector studies.
- The need for more agriculture-specific parameters in the CORDEX data.
- The need for improvements in the availability of seasonal and sub-seasonal forecasts as they are often used in crop yields studies.

Table 5: Urban

The urban discussion revolved around issues such as:

- There is a large need for high-resolution climate forecasts for urban areas.
- There is a challenge in bias-correcting CORDEX data - as there are large gaps in observational data.
- The high-resolution simulations for Africa are very expensive (requires enormous computer resources) and there is also a big challenge in terms of the knowledge capacity needed.
- Statistical downscaling was also discussed and if there is a need for CORDEX to plan for it. Note: ESD is part of CORDEX and discussions on how to integrate various downscaling methods are ongoing.
- The idea of running nests for cities and how to do this on a high-resolution scale came up, do we need to run it on each large city?
- On urban scales, one may be interested in high-resolution climate parameters, Sometimes, however, in high-resolution land-surface, especially when studying run-off and hydrology one may not necessarily need the high-resolution climate model data, but can run an offline hydrology model with high-resolution.
- The lack of observational data almost everywhere in Africa is very challenging, especially when the observations are needed to validate models or to perform downscaling. Most of the time, the approach is to use satellite imagery or data for land-surface temperature mapping and translating them into air temperature data.
- Rare and extreme events presentation in CORDEX data was discussed, and how to combine the results of large ensemble modelling, which often consists of low-resolution and simplified models, with the results from models with the spatial resolution that is needed in urban sector. There were some interesting ideas on events downscaling, through running large ensembles that identify extreme events and then downscaling those particular events to understand how they are manifested at the local scale.
- The use of the current data for cities, such as population census data, and the current land-use data and combine it with future climate projections data. There is a big challenge in dealing with African cities which are going to double in size in the next 50

years and how to try to include possible future land-use and demographic changes in the climate projections for 2070 and ahead!

Table 6: WMO

Discussions at the WMO table focused on:

- The collaborative efforts between WMO and CORDEX were discussed.
- Most of the discussions were about the data sustainability and high-quality needs of African countries.
- The Global Observing System (GOS) has specific data that needs to be shared globally for free use.
- Some countries have some difficulties in installing and operating their instruments and stations according to the GOS's standards and recommendations because of challenges in terms of infrastructure maintenance and financial availability.
- There is a financial mechanism, the so-called "The Systematic Observations Financing Facility (SOFF)", which supports primarily Least Developed Countries and Small Island Developing States. Currently the SOFF supports countries in installing instruments as well as sustainability and maintenance of the data in the long-term to improve local forecasts, reanalysis and prediction.
- The way forward is to support infrastructure and data provision so everybody will benefit from these data.

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