

## Comment by the WGRC on the JSC proposals for addressing regions

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This document is submitted to the JSC-37 for possible consideration in conjunction with the JSC's discussion document "A framework for WCRP regional activities". We note that although resourcing for WGRC has been suspended, and that the WGRC and CORDEX have not been invited to provide comment on this discussion document (nor is the WGRC requested to provide a report to JSC-37), we consider it an obligation to present some input on this critical topic.

Below we present (1) a brief breakdown of what the WGRC in its current form has engaged with, followed by (2) a section of lessons learned, and finally (3) some comment in light of these items and recognizing the proposed IPCC approach to AR6 as established at the recent IPCC-43 plenary.

### 1. Reviewing the activities of WGRC

The WCRP's Working Group on Regional Climate (WGRC) was set up in 2013 with the broad mission to 'co-ordinate regional climate research and science-based knowledge development for decision makers'. The initial membership comprised: Clare Goodess and Bruce Hewitson as co-chairs, 11 members including representatives of the WCRP core projects, and the two CORDEX co-chairs (currently Filippo Giorgi and Bill Gutowski) as ex-officio members – see <http://www.wcrp-climate.org/regional-climate-members>.

Three face-to-face WGRC meetings have been held: WGRC-1, Vienna, April 2013; WGRC-2, Montevideo, March 2014; and WGRC-3, Norwich, December 2015. Some modifications were made to the draft Terms of Reference (ToR) received from JSC at WGRC-1 – and the current ToR are available here: <http://www.wcrp-climate.org/regional-climate-terms>.

The activities undertaken by the WGRC reflect the breadth of these ToR, as these examples show:

- Playing a leading role in the Regional Climate Information Grand Challenge until the Joint Steering Committee (JSC) decided to discontinue it at JSC 36 (April 2015) (see, for example, [http://www.wcrp-climate.org/images/documents/jsc/JSC36/Summary\\_GC-CI\\_20150309.pdf](http://www.wcrp-climate.org/images/documents/jsc/JSC36/Summary_GC-CI_20150309.pdf)).
- Organization of meetings and side events relating to the Regional Climate Information Grand Challenge (e.g., at Pan-CLIVAR/Pan-GEWEX meeting, July 2014, The Hague; WCRP-IPCC Workshop, September 2014, Bern; AGU, December 2014, San Francisco).
- Scoping of on-going regional activities within WCRP and identifying their strength and weaknesses.
- Organization of WGRC "Distillery" expert meeting (October 2014, Santander).
- Catalyzing two papers currently in preparation: "The distillation dilemma", and "Online climate services: an assessment" for submission in 2<sup>nd</sup> quarter 2016
- Participation in CORDEX Scientific Advisory Team (SAT) meetings and activities, and development of Flagship Pilot Studies.
- Participation in and assistance in organizing ICRC – CORDEX 2013 and 2016.
- Participation in major regional conferences in Latin America (LACC) and Africa (CR4D).
- Organization of a CORDEX side event at International Conference on Climate Services - ICCS3 (December 2013, Jamaica).
- Developing linkages with the GFCS (e.g., Filipo Lucio has participated in a number of WGRC meetings and events, Clare Goodess is a member of the GFCS Commission for Climatology Implementation Coordination Team for the Climate Services Information System).
- Involvement in the founding, creation and continued membership of the CMIP6 Vulnerability, Impacts, Adaptation and Climate Services (VIACS) Advisory Board.
- Organisation and reporting of a Users survey to assess the accomplishments and gaps of CMIP5 and to inform CMIP6 – focused on the Impacts, Adaptation and Vulnerability (IAV) community (with Richard Moss and Linda Mearns).
- Organising a survey of WCRP regional activities (undertaken for WGRC-3 – see <http://www.wcrp-climate.org/wgrc3-documents>).
- Development of linkages with the IPCC Task Group on Data and Scenario Support for Impact and Climate Analysis (TGICA) regarding, *inter alia*, a possible role in handling CORDEX output.

These activities have guided WGRC towards an improved understanding of the role of climate science in our society and hence to propose a new approach to the interactions between decision makers and climate scientists. They have also demonstrated that the disciplinary divisions within WCRP are of limited relevance and can even be a strong hindrance to approaching regional climate problems.

Two priority foci emerged out of these WGRC deliberations during 2015:

- The Frontier of Climate Information (FOCI) project concept (encompassing distillation<sup>1</sup> issues and their relationship to CORDEX, particularly CORDEX Flagship Pilot Studies)
- The fostering of communication within and outside the WCRP on issues relating to “information for regions”<sup>2</sup>.

These priorities highlight the need for climate research which is both “excellent” and “relevant”.

On the advice of the WCRP Joint Planning Staff (JPS) Director to not undertake membership renewal, coupled with a lack of any allocated budget for operations, in early February 2016 the WGRC put on hold all activities including the development of a review/assessment paper to provide the background to and motivation for FOCI.

## 2. Information for regions – what we have learnt

The priority understanding is that *the topic of information for regions is complex, nuanced, and poorly addressed by the conventional approach of generating and delivery of data from and by the physical climate sciences to the exceptionally diverse decision making community.*

The relevance and value of derived information requires a far more careful approach that goes beyond the normal ambit of WCRP activities, and where the users provide critical input on the framing of how information is co-produced. For WCRP interests, this requires a departure from exclusively “needs driven” research towards the dual challenges of “needs informed” research (that is, research that recognizes how user needs are undermined by the knowledge gaps in the underlying science) and “co-production of actionable information” in partnership with communities from outside the traditional WCRP domain of science.

This poses a challenge for WCRP strategic development, namely the question of to what degree WCRP seeks to engage in the production of application-framed information for regions, versus remaining constrained to producing products largely defined by the research community, delivered primarily as data products, and that may or may not be appropriately adopted by others outside the WCRP. Furthermore, researchers and practitioners involved in climate change risk assessments to inform adaptation responses are increasingly looking for guidance on how to integrate climate information with socioeconomic and technological developments that help define exposure and vulnerability at regional scale, often using a global scenario framework such as that of linking Representative Concentration Pathways (RCPs) to Shared Socioeconomic Pathways (SSPs).

Specific points of relevance:

- There is a growing demand for “regional information” – from climate services and the wider user and decision-making communities, and most recently from the IPCC (e.g., <http://www.wcrp-climate.org/images/documents/WGRC3/IPCC%20Reg%20Proj%20EM.pdf>).
- Expectations of what the scientific community can provide to these communities are high (particularly with respect to CORDEX), perhaps unrealistically so.
- If the climate research community does not engage in the development and communication of relevant “regional information” for decision makers, there are others in the market place (already) offering products such as very high-resolution projections with weak consideration of their reliability and relevant information content.

<sup>1</sup> Distillation goes beyond simple data synthesis across models and methods, and seeks to build the rigor and robustness of the resultant message by: a) considering the integration of multiple signals predicated on understanding the relevant skill, strength and weakness of the different sources at multiple scales in space and time; b) explain the influence of error, bias, and other sources of uncertainty on the resultant integrated message; and c) approaches the task through the lens of an application need.

<sup>2</sup> Note that this should be distinguished from “regional information”, as elaborated elsewhere in this status review.

- Ensuring the relevance of activities to regionally-focused decision makers and society is vital to ensure on-going support of and buy-in to the WCRP.
- Building understanding of, and engaging with, diverse and traditionally separate communities takes time, effort and trust – and also benefits from the involvement of social science and communication experts.
- Climate data is not climate information. For example, one conclusion from the various 2014 cross-WCRP discussions facilitated by the WGRC was that the latter must include consideration as to how best to apply information from ensembles of simulations to provide trustworthy uncertainty estimates.
- Cross-WCRP discussions also identified the following key research questions: What new approaches are needed to understand the sources of uncertainty at the regional level as a function of methods, scales and processes? Is it possible to disaggregate the contribution from local, regional and remote processes, including the co-behaviour of processes?
- It is also important to take a cross-timescale approach. The separation of the original Regional Climate Information Grand Challenge into separate frontiers on the basis of timescale (i.e., intraseasonal and seasonal prediction; decadal prediction; and longer-term regional climate change projection) is not meaningful to the users of climate information who approach these different timescales in a much more fluid way.
- A FOCI Project, as developed by WGRC, deliberately adopts an important and specific phrasing of “information for regions” – as distinct from “regional information”. While the latter implies a focus on fine resolution and location-specific data, especially via downscaling, the concept of “information for regions” infers a broader scope, to consider scales of processes ranging from global to local in-so-far as these inform our understanding of the regional climate dynamics and the local response to climate forcings.
- GEWEX RHP activities show that the vitality of the regional climate science communities is essential to link climate information with the needs of decision makers. They offer an example of how these scientific communities can be motivated and organised to produce “needs informed” research of international quality.

### 3. Considerations of IPCC AR6

At the IPCC-43 plenary it was decided that the AR6 would be preceded by three special reports. It was also repeatedly emphasized by governments that there was a strong desire for enhanced information in AR6 on regions that is relevant to the adaptation and mitigation decision scales. Realistically, the adoption of three special reports means that there is limited appetite and capacity from the three working groups to mount any extensive treatment of regional information, and earlier intentions for a “regional volume” or similar equivalent are seemingly no longer an option. At the same time there is recognition of a capacity gap within IPCC on how to address regional assessments as there is limited guidance and consistent methodology on how to approach this. The implications of this will continue to play out through forthcoming plenary meetings and the AR6 scoping, yet it is clear that external activities to address these issues will be increasingly looked to for developing information for regions that is rooted in and co-produced with a cross-disciplinary and cross-working group perspective.

*For the WCRP this raises a choice: to focus on the underlying science and produce relevant data products for integration by other agencies into decision-relevant regional information, or to invest in moving beyond the traditional basic science paradigm of WCRP and engage in co-production as equal partners with others from outside the core physical climate science disciplines. The latter option should be recognized as non-trivial in terms of resources and investment in building partnership relationships.*

The development of decision-relevant information necessitates a trans-disciplinary approach: it is not viable for the physical climate science community to undertake this task in isolation and on behalf of the user community. In part this need is what motivated the initial composition of the WGRC. If WCRP moves ahead on this avenue, the only possible scale is the regional one. Thus careful consideration is needed about what revisions and/or new structures are adopted for the coordination of trans-disciplinary integration, and to ensure that the requisite capacity is allocated for these structures to obtain effective and defensible results on what is truly a grand challenge for the WCRP.