

Discussion for WCRP Grand Challenge on (Regional) Climate Information

Paris, France, 9-10 March 2015

Background and Goals of the Discussion:

The WCRP Grand Science Challenge (GC) on Regional Climate Information has been deliberated for the last 2-3 years. The original white paper was drafted by a writing team which then passed on leadership responsibility to CLIVAR (Frontiers 1 and 2) and WGRC (Frontiers 3 and 4). During the latter part of 2014 the current group (Clare Goodess, Francisco Doblas-Reyes, Lisa Goddard, Bruce Hewitson and Jan Polcher) conducted a series of consultation with the WCRP and wider (e.g., IPCC, AGU and other) communities for further input. Subsequent requests from the WCRP Joint Steering Committee (JSC) for improvement have been directed toward; 1) further clarification and focus on achievable goals for scientific improvement in defined timeline of the GCs; 2) re-visiting and considering implementation strategies for the GC, to propose a renewed direction to the 36th WCRP JSC (JSC-36; April 2015, Geneva).

Given the time constraint, the discussion aimed for consensus on the outline and main points to propose to the JSC regarding the concerned Grand Challenge. Further development of the white paper and implementation plan should follow, according to the approval and guidance at the JSC-36.

Summary of Discussion:

The meeting started at 0900 CET, 9 March 2015, in the meeting room of the UNESCO Headquarters. The participants started with a brief review of the progress and initiatives for the GC on Regional Climate Information, including its initial targets, scope and questions/comments raised within the WCRP community. The discussion then led to the deliberation on the following points:

- What should be the focus/targets/expected deliverable(s) of the GC in the defined timeline?
- How the outline of the GC implementation plan should be described/revise to address the above-defined targets?
- What can be a strategic mechanism / pathway for implementation of the GC?
- How can we improve coordination among all WCRP activities, and furthermore, interactions with the community outside WCRP for the GC implementation?

G.Brasseur proposed that this GC may be transformed into a long-lasting activity for interfacing regional climate activities of WCRP (e.g. distillation). He noted that the GC (or possibly a transformed activity) should maintain its focus on the advancement of climate research, and be developed in close interaction with partners including IPCC (climate assessment), Future Earth (addressing societal and economic aspects) and initiatives for climate services.

As a way to set a milestone for scientific advancement/achievement through the GC implementation, it was proposed to explore publishing a high-visibility paper on "Approaches to producing robust regional climate information", by 2020.

The participants discussed identified scientific challenges in producing robust climate information for regional users; for example, data availability and scale issues. General agreements of the discussion included the need for enhanced partnership with the weather community (e.g. World Weather Research Programme; WWRP) and observation community (e.g. GCOS). Future Earth, the Africa Climate Research for

Development (CR4D) and the Global Framework for Climate Services (GFCS) were also considered for closer partnership and potential sources for funding. On the final morning, the meeting considered additional potential partnerships that include other GCs and WCRP working groups, MIPS, TGICA, PROVIA, ISIMIP, AGMIP, VIAMIP, and other WMO programmes/projects as well as various funders.

In implementing the GC, it was considered important to clearly differentiate between data versus information, and to identify appropriate channels to understand what climate data and knowledge are required for formulating relevant climate information. Other potential mechanisms were also suggested for consideration, including; 1) review/synthesis papers; 2) targeted projects (see description on frontier projects in the following section); 3) fundraising – general oversight & specific activities; 4) documentation on implementation; 5) building on relevant achievements (e.g. distillation workshop in 2014) and engaging ongoing efforts (e.g. WMO expert meeting on downscaling in 2015, planned CORDEX flagship projects); 6) potentially holding an expert meeting on added value of downscaling, in association with the CORDEX 2016, etc.; 7) identifying information needs by leveraging related activities (e.g. Our Common Future Conference (July 2015), TGICA expert meeting on using climate information (June 2015), IPCC WG1 Regional Climate Information expert meeting (Sept 2015)).

In addition, the participants briefly reviewed the current Terms of Reference (ToR) for the WGRC (Note: The ToR were reviewed at the JSC-35, and continue to be open for further development). While it was agreed that the breadth of the current ToR presents challenges to make tangible achievements/deliverables on shorter and longer terms, and that there is a need to sharpen the focus to ensure the Group's energy is effectively put on addressing WCRP-wide scientific questions toward improved regional climate information. The participants did not take any further decision in this matter.

The participants agreed on a renewed outline of the GC, as described in the following section. The current leaders of the GC would present a summary and recommendations at the JSC-36, for the sessional presentation on the progress of GCs, then during a breakout session on “climate information”, for consideration and guidance by the JSC members.

The meeting adjourned at 1100 CET, 10 March 2015.

Proposed target, outline and approaches for the GC, as agreed during the discussion:

It was agreed that **this Grand Challenge should focus on closing gaps in the science for climate information**, based on gaining further understanding of the users' information needs from/through relevant communities. The participants generally agreed that the concept of “distillation”, which was discussed at length during and after the Workshop on the Assessment, Analysis and Integration of Climate Information Conflicts (October 2014, Santander), addresses relevant and major science questions and tools for research and applications that are relevant to all working groups in the WCRP; e.g., producing defensible climate information from multiple sources, and understanding contradictions and uncertainty in developing climate information for regional users from multi-method, multi-scale applications.

In this context, the participants **proposed to re-name the GC as “WCRP Grand Challenge on Climate Information”**. [Note: An alternative suggestion, came up after the meeting, was “WCRP Grand Challenge on Climate Information for Regional Applications”.]

The current leaders of the GC would propose to the JSC-36 **an outline of the GC-Climate Information** as the following, with an intention to narrow the scope to the scientific issues in extracting climate information from data:

Overarching objectives:

- To close the gaps in our scientific understanding and information that would maximise the value content of climate information, at all time scales, of interest to a wide range of regional stakeholders.

Targets:

- To explore and contribute to frameworks for defining climate information needs;
[Note by L.Goddard: "I would probably leave this off for WCRP. This is more of a GFCS/CSP thing."]
- To better understand variability and change and their interaction in models and observations;
- To distinguish the local and remote contributions to regional variability and change signals
- To evaluate of the contribution (added value) from downscaling;
- To distil of multi-model multi-method predictions and projections into defensible regional messages;
- To advance knowledge by taking advantage of climate research targeting different time-scales.

Expected outcomes

- Innovative partnerships in & beyond WCRP;
- Appropriate metrics and guidance relating to these targets
- Propagation of values standards on 'climate information' throughout WCRP programmes.

As part of the GC implementation plan, a matrix on achievements (of the GC) should be developed; it may include measures for the accessibility/availability of data and requirements, usage/applicability of climate data / model output to produce climate information (preceded by clearer definition on climate information), etc., while maintaining the focus on the science.

As a major GC implementing mechanism/pathway, it was proposed to develop a series of "frontier projects" to close gaps in producing climate information for specific regions/cities. B. Hewitson proposed a **set of principles to develop frontier projects**, as reproduced in the **Annex 1** to this summary.

The participants entertained ideas for potential development of such projects, based on existing projects and plans of relevance. Linking the high level of interest and commitment for adaptation to climate change/variability in Africa, and for weather and climate disaster risk reduction and adaptation in major cities (particularly in coastal zones), the participants explored the ideas of developing domain-specific climate information for African cities (such as Maputo), and for coastal megacities (such as New York). It was generally agreed that the first frontier project should be targeting a developing country/region demonstrating a collective effort by all WCRP community.

To identify resources for implementation: **it was agreed that a plan, particularly for the initial frontier project, should be based on / linked to existing proposals - C.Goodess and B.Hewitson would take the lead for the planning and preparation of the proposal on frontier projects.** Once the outline and direction of the GC is endorsed by the JSC, a frontier project will initially be overseen by the WGRC for an establishment phase (3-5 years), after which the project will be re-evaluated to assess future modalities.

In parallel, efforts should continue exploring other places for potential projects. It was proposed that the leaders of the GC would work on relevant calls by funding agencies; such as the US/NSF Research Coordination Networks (RCN) and the EU Work Programme for Societal Challenge 5.

It was agreed that the current group for GC-CI would present during the break-out session on 'climate information'; 1) what is climate information?; 2) Frontier project principles; and, 3) the Maputo example.

Participants:

A list of participants is in *Annex 2*.

ANNEX 1

“Frontiers Project” for the implementation of WCRP Grand Challenge on Climate Information

Three strategies

- Outline a targeted research action and seek funding
- Co-brand and engage in an identified activity that meets the GC objectives
- Invite proposals along the lines of RHP procedures

Principles of a Frontiers project

The heart of the project is climate information, framed by relevance to regional stakeholders, and approached through innovation in analysis and methods.

- Targets regional climate information¹.
- Substantively addresses the six GC targets shown below: this does not mean it needs to adhere to breadth at the expense of depth; rather address a few but in depth:
 - To explore and contribute to frameworks for defining climate information needs;
 - To understand variability and change and their interaction in models and observations;
 - Separation of the local and remote contributions to regional variability and change signals
 - Evaluation of the contribution (added value) from downscaling;
 - Distillation of multi-model multi-method predictions and projections into defensible regional messages;
 - To advance knowledge by taking advantage of climate research targeting different time-scales.
- Focuses on a specific domain, implying a specific set of user requirements, notable climate vulnerability, limited understanding of the co-behaviour of the multi-scale driving climate processes, and likely to attract a high level of funding interest from a range of agencies.
- Advances the knowledge of regional information through innovation of methodology and analysis with special emphasis on using a lens of multi-scale climate processes.
- Explicitly innovates new approaches to distil regionally-relevant information from different sources within the WCRP programs to reconcile the differences across data sources, data types, and relevant scales of time and space.
- Integrates the research depth within multiple foci; e.g. integrating understanding of extremes with local feedbacks and inter-annual variability of global drivers.
- Informed by the information needs of stakeholders in the domain of interest; this implies a mechanism is required to undertake an engagement with stakeholders, or an existing source of this information is available to be drawn upon. This is not a simple needs-driven approach, but a process to inform the research through a user-directed identification of key attributes of the climate system that have identifiable relevance to thresholds and vulnerabilities of consequence.
- Observational data criteria; “free sharing for researcher use” – full and free public access not essential (although desirable).

¹ Information is not data, but is an understanding that builds messages of relevance to regional stakeholders that are backed by clear physical understanding. That is, robust messages of scale-relevant climate attributes, tailored to the decision and risk management needs of stakeholders, defensible through understanding of multi-scale climate processes.

Example of a Frontier project: Regional information on variability and change for the city of Maputo and its co-dependent region.

Maputo is a city with significant vulnerabilities in relation to:

- sea level rise
- storm surge
- flooding from tropical cyclones and/or upstream extreme rainfall in the Limpopo catchment
- regional drought
- extreme rainfall events
- fragile transport infrastructure
- energy supply (hydro power and transmission system vulnerable to lightning)
- etc.

Understanding is needed in relation to key atmospheric processes; tropical cyclones, regional marine influences, teleconnections and ENSO, tropical processes / ITCZ / MJO, land surface feedbacks, etc.

Existing project activities are available for leverage, and which include ongoing stakeholder engagement to identify and evolve the understanding of thresholds, key vulnerabilities, and the related climate information needs to inform decision making, policy, and risk management on multiple time scales.

ANNEX 2

List of Participants

Guy BRASSEUR (via WebEx)	MPI-MET (Germany), UCSR (USA)	gpbrasseur@gmail.com
David CARLSON	WCRP (Switzerland)	dcarlson@wmo.int
Francisco DOBLAS-REYES	BSC-CNS (Spain)	francisco.doblas-reyes@bsc.es
Lisa GODDARD (via WebEx)	IRI (USA)	goddard@iri.columbia.edu
Clare GOODESS	UEA (UK)	C.Goodess@uea.ac.uk
Bruce HEWITSON	UCT (South Africa)	hewitson@csag.uct.ac.za
Boram LEE	WCRP (Switzerland)	blee@wmo.int
Jan POLCHER	IMD (France)	Jan.Polcher@lmd.jussieu.fr
Michel RIXEN	WCRP (Switzerland)	mrixen@wmo.int
