Draft program for the WCRP/WGRC expert meeting

Climate Information "Distillation"

Santander, Spain, 29-30 October 2014

http://www.wcrp-climate.org/index.php/distillation-about

1. Objectives

The workshop seeks to develop a research agenda on innovation in the analysis and interpretation of multi-model multi-method multi-scale (M^5S) climate data, in the context of an uncertain observational history (and an uncertain range of future human climatic influences).

We seek to facilitate experts from the relevant communities to help identify strategic research priorities and formulate associated scientific questions in order to bring about a step advance in the relevance of the scientific output for uptake by broader community interests.

2. Background

Possibly the leading complication for users of climate information for policy and adaptation is the spread of messages arising from data of historical change and variability, GCM projections, downscaled projections from RCMs and statistical downscaling, and from other related spatial disaggregation methods. The confusing mix of contrasting data sets offer widely differing (and often times fundamentally contradictory) indications of the magnitude and direction of past and future regional climate change.

Sources of this problem are multiple and may be in part attributable to systematic biases, structural error in the methods and models, skill limitations of methods and models, scale constraints, unresolved / unresolvable processes, scientific gaps in knowledge, and inherent system stochasticism, etc.

As a generalization the IAV / Policy communities largely lump these issues under a collective term of "uncertainty" and weakly address the challenge of integration, while applying simplistic adjustments with subjective selection to obtain a "consensus message." This is then adopted in IAV and policy activities which are dominantly steered by the downstream concerns (impact studies, adaptation strategies, risk management, policies etc.).

Hence, in terms of scientific societal relevance, arguably the leading and most pressing research challenge is to finds new ways to understand the sources of conflicting messages from the M^5S data, to develop and implement new analysis methodologies to address this difficulty, and from this to substantively advance the interpretation and communication of robust climate information to decision makers.

3. Framing the approach

Users face three challenges in the adoption of climate data;

a) Access to very large and evolving data sets; this is an infrastructure issue.

b) Inadequate tailoring and communication of data for purposes of specific applications; this is largely the responsibility of the emerging climate services communities.

c) The confusion and contradictions inherent across the suite of M^5S data products; this is a research challenge for the scientific community.

This workshop addresses the last aspect (c), and while rooted in the user's interests, it is not focused on the specifics of meeting the user's tailored needs. Rather, this challenge is for scientists look across the diversity of M^5S data to address the sources of downstream confusion that the user is faced with. By this we mean that the user community is frustrated in their decisions to respond to climate stresses by the uncertainty and contradictions evident within and between climate data sets emerging from the collective of GCM, RCM, ESD, and observation communities' activities. While it is clear that some of the uncertainty and contradiction is irreducible (in that there is inherent system stochastic behavior as a function of scale in time and space), there are also additional sources of structural and scientific uncertainty that become conflated with the true system uncertainty in the communication to users. Likewise, the limits to skill as a function of method, spatial scale, time scale of prediction, and geographic location all contribute to a difficulty in understanding the mixed messages from the plethora of products. This further undermines confidence in the added value of the scientific outputs.

Thus we frame the workshop objectives by this use-case question: "*How do I know what credence your data product has for my decision context?*" The scientist's answer is likely "*I don't know*", and the resulting conflict of the multiplicity of messages either leaves the user inadequately prepared to incorporate the information into their decision making, or else opens the door to maladaptation if a message from only one subset of the data is adopted.

4. Agenda

Day 1 - 29 October 2014

Background activity to be completed by end of morning tea: have a large sheet on the wall of a two-axis graph; spatial scale versus temporal scale. Ask people to plot where they think are the generalized limits of actionable information for decision makers as derived from GCMs, RCMs and ESD (in different colours). For ~35 participants this should give us a 100+ point scatter plot of crowd-sourced wisdom.

Opening and Introductions

9:00 Welcome from local authorities
9:10 WCRP Overview and Priorities (*D. Carlson*)
9:20 Scope of the meeting and distillation concept (*B. Hewitson*)
9:40 Activities of the hosting group (*J.M. Gutierrez*)
10:00 The WCRP Grand Challenges (*C. Goodess*)
10:20 Examples of data versus information challenges and user experiences in dealing with the M^5S data diversity (*W. Gutowski*)

10:40 *TEA/COFFEE BREAK*

Keynote Talks from representatives of the OBS, ESD, RCM, GCM and "User" communities
The terms of reference for the talks:

- The nature of the community, structures and activities
- What advances have been made in the last 10 years on developing defensible and robust scale-relevant information to the decision-making community
- What are the leading foci of current research / activities / initiatives
- Perspectives on what science weaknesses limit the interpretation and societal relevance

11:10 Observations (*P. Loikith*)
11:40 Global Climate Modeling (*C. Jones*)
12:10 Regional Climate Modeling (*S. Solman*)

12:40 *LUNCH*

14:00 Experimental Statistical Downscaling (*C. Jack*)
14:30 User Perspective (*L. Mearns*)
15:00 Open discussion

15:45 *TEA/COFFEE BREAK*

First Breaking-out Groups
16:15 Briefing (*B. Hewitson*)
Three groups representing GCM, RCM and ESD communities. The task is to explore the question: If you forget about the other sources, and stay only within your science domain, then what approaches could be valuable research avenues that would address the following:

a) separate out sources of uncertainty (structural, error, natural variability, knowledge limits, etc)
b) develop user relevant metrics of skill that would help a user evaluate your data product - going beyond the traditional maps/plots; e.g. co-behaviour of user-relevant processes on different time scales
c) distill the M^5S products (e.g., scenarios, trends, plausible ranges of change, methods, resolutions) through the approaches of exclusion, amalgamation, or signal extraction.

16:30 Break into groups (*facilitators: B. Hewitson, C. Goodess, W. Gutowski*)

Evening homework for BOGs to prepare a plenary report back

Day 2 - 30 October 2014

9:00 Plenary report back
9:30 Discussion

Second Breaking-out Groups
10:00 Briefing (*B. Hewitson*)
Three groups that mix the communities. The focus is now on the confusion to the user from seeing multi-method multi-scale products communicating different messages. Task is to explore the question: If you wanted to address the multi-model multi-method multi-scale mix, how could the different communities collaborate on new research that is agnostic about the data source, in order to:
a) develop user relevant metrics of skill that would help a user evaluate the mix of data products
b) distill the multi-method data-set product through the approaches of exclusion, amalgamation, or signal extraction.
c) Handle the multi-scale / resolution incompatibility

10:30 *TEA/COFFEE BREAK*

11:00 Break into groups (*facilitators: TBD*)

12:30 *LUNCH*

14:00 BOG 2 Report back
14:30 Plenary discussion

Carousel Activity
15:00 Briefing on Carousel activity (*B. Hewitson*)
4 stations on GCM, RCM, ESD, and OBS. The task is to start formulating
a) research priorities within each community
b) research priorities across communities
c) articulating succinct, concise, single focus, and tractable science questions within each research priority
Anchors: W. Gutoswki, B. Hewitson, C. Goodess and J. Polcher. Carousal rotation: 60min, 15min, 15min, 15min for each stage plus time for people to actually move

Evening homework: prepare a report on each station's outcomes

Day 3 - 31 October 2014

9:00 Opening talk on "User's" perspective on the proceedings so far (*J. Arnold*)
9:30 Report back from each carousel station
10:00 Discussion

10:30 *TEA/COFFEE BREAK*

11:00 Presentation by the organizers of a distillation of the ideas into a set of proposals / statements on ways forward (including writing a short paper to a high profile journal)
11:30 Open discussion
12:00 Conclusion of decisions

12:30 *LUNCH*

End of meeting