



# **Implementation Framework For Frontiers of Climate Information (FoCI) Projects**

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**A WCRP working document prepared under the auspices of the Working Group on  
Regional Climate (WGRC)**

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## Implementation Framework for WGRC FOCI Projects

### Context

There is a rapidly expanding availability of different climate data sets from a multiplicity of global and regional models and other downscaling techniques. This is matched by an increasing pressure from a wide range of stakeholders and organizations for scale-relevant information to support regional decision-scale needs. These data, along with new observational datasets that are themselves not fully congruent, convey mixed and contrary messages about climate change and variability. This presents a clear challenge to the scientific community and there exists a fundamental and critical research frontier on how to move from the expanding production of data to the construction of defensible and scale-relevant information.

Addressing this challenge is the concept of a Frontiers of Climate Information (FoCI) Project; an initiative of the World Climate Research Programme (WCRP). The 36th session of the WCRP Joint Steering Committee (JSC-36; 2015) concluded that climate information for regions is a key issue across all deliverables of WCRP projects and activities and therefore called for a more inclusive and harmonized effort in support of the WCRP's Key Deliverable on Regional Climate.

As a way to develop mechanisms to advance the research on developing information for regions, the JSC requested the WCRP Working Group on Regional Climate (WGRC) to take responsibility as an implementing agent of FoCI<sup>1</sup> Projects with a city/regional focus. In this role the WGRC would facilitate and support relevant scientific efforts across the WCRP as well as initiate activities within the WGRC terms of reference. This may include developing guidance and catalyzing linkages with external partners for climate services.

### Concept

A FoCI Project adopts an important and specific phrasing of “information for regions” – as distinct from “regional information”. While the latter implies a focus on 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 local to global in-so-far as these inform our understanding of the regional climate dynamics and the local response to climate forcings. FoCI Projects would approach this through a lens wherein the needs for robust, scale-relevant information for regional decision making expressly help steer and prioritize foundational research on the relevant climate processes that operate and interact across all scales.

Explicitly, a FoCI Project seeks to engage with the research challenge of *data distillation*. The term “distillation” refers here to the challenge presented by the conflicting information from across the range of observational, Global Climate Models (GCMs), Regional Climate Models (RCMs), and empirical-statistical downscaled (ESD) data. These data represent a conflated mix of natural variability, deterministic responses to anthropogenic forcing, and multiple sources of bias and error. The response to the distillation challenge is to develop new approaches and analysis techniques to contribute to building physical understanding of robust scale-relevant information for decision needs.

Priority objectives for FoCI projects:

- added value of WCRP activities related to regional information
- appropriate spatial and temporal scales for decision-relevant issues
- distillation of climate system information from varied sources

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<sup>1</sup> At the time of JSC-36, these projects were referred to as ‘frontier projects’ – the WGRC-3 meeting subsequently established the FoCI title.

- integrating and linking climate information into the context of risk management of the natural and human systems
- developing and sustaining research capacity, especially in developing nations
- cross-cutting, trans-disciplinary, and translational science

A key intent of FoCI projects is to provide opportunities for engagement by all relevant activities of the WCRP. In particular, the CORDEX Flagship Pilot Studies are considered core components of relevance to FoCI Projects, and the GEWEX RHPs afford additional potential for establishing FoCI Projects.

### FoCI Project Management

FoCI Projects would 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. FoCI Projects will also be a primary vehicle for the WGRC's mandate to engage with boundary organizations<sup>2</sup> (including Future Earth and the GFCS), to bridge climate science to climate services, and thereby support all WCRP activities.

The process of identifying and designating an initial portfolio of FoCI projects would be led by the WGRC (following guidance from the JSC). In the longer-term, it is envisioned that selected exemplar projects would establish and refine the modalities of implementation and that in due course open calls may be issued.

The management process for FoCI projects is modelled on that of GEWEX RHPs. Thus the WGRC is the body which will approve FoCI projects and to which projects will report. Projects will be expected to submit an annual report to the panel, and to make an annual presentation to WGRC members (e.g., 1 or 2 project representatives to make a presentation to an annual meeting).

### Framework of FoCI projects

The heart of a FoCI Project is climate information for regions, framed by relevance to regional stakeholders, and approached through innovation in analysis and methods, and in this context:

- Relate to regional aspects of one or more **WCRP activities and Grand Challenges**<sup>3</sup>, with objectives to:
  - Understand the separation of local and remote contributions to natural and forced variability and change
  - Leverage existing climate research targeting different time-scales
  - Integrate research across multiple foci; e.g. integrating understanding of extremes with local feedbacks and inter-annual variability of global drivers.
- **Develop new approaches to distill decision-scale-relevant information** from different sources within the WCRP and related external programs to reconcile the differences across data sources, data types, and relevant scales of time and space.

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<sup>2</sup> The term "boundary organizations" is used broadly to include climate services and activities that engage across the science-society gap, including formal frameworks as in GFCS, groups such as in the Climate Services Partnership or Climate Knowledge Brokers, the proliferation of regional, national, and sub-national activities and related portals, as well as the burgeoning commercialization of climate services

<sup>3</sup> See <http://www.wcrp-climate.org/grand-challenges> - the grand challenges as of December 2015 are: Clouds, Circulation & Climate Sensitivity; Melting Ice & Global Consequences; Climate Extremes; Regional Sea-level Change & Coastal Impacts; Water Availability.

- **Advance the quality of regional information** through innovation of methodology and analysis with **special emphasis on using a lens of multi-scale climate processes.**
  - Focuses on scales of user relevance, by which is implied a domain of notable societal vulnerability to climate where there is limited understanding of the co-behavior of the multi-scale driving climate processes, and for pragmatic purposes also likely to attract a high level of funding interest from a range of agencies.
- **Adopts data criteria of “free sharing for researcher use”** and full and free public access wherever possible.
- **Targets stakeholder relevant information about the regional climate;** recognizing that data is not necessarily information, but that regional information is about informing messages of relevance to regional stakeholders which is 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.
- **Is informed by the information needs of regional stakeholders;** this implies a mechanism is required to undertake an engagement with stakeholders, or an opportunity exists for collaboration to access user information to inform the research. 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 in the coupled socio-ecological regional system.
- **Focuses on relevant time scales** that could range from seasonal to multi-decadal.
- **Includes linkages with relevant research communities** in impact modeling, vulnerability assessment, and adaptation and policy.

#### Criteria for selecting FoCI Projects

- Identifies varied sources of climate information and steps to be followed for distillation
- Identifies relevant WCRP projects that will be synthesized into the FoCI project and what will be the added value from that
- Gives the details of user engagement and capacity building/sustaining, and identifies the relevant participants
- Defines the relevant temporal and spatial scales (e.g., decision scales, climate scales, etc.)
- Contributes to well-defined policy questions
- Assesses the effectiveness of distillation messages
- Defines what “value” means to the project

#### Monitoring and success metrics for FOCI Projects

- Capacity building/sustaining elements
- Measure of different types of information incorporated
- Success in synthesis of different sources of information
- Distillation: Can we present scientifically, physically robust, credible and scale appropriate messages on changing climate?
- Measures of uptake of the distillation messages
- Self-reflection on how well the group has engaged the varied participants (including stakeholders)
- What has been learned from the interaction with the users?
- What policy relevant outcomes have been produced? What policy has been affected? Is there a demonstrable link to policy?
- To what degree is the project drawing on WCRP diversity
- How have the scientific goals been affected by the interaction? (e.g., refocusing of the science)