



Open call for Proposals:
Development of an analogue method for examining both spatial and temporal analogues based on multiple climate projections

BACKGROUND

The Climate Change, Agriculture and Food Security Challenge Programme (CCAFS- CP)

CCAFS-CP addresses the most pressing and complex challenge to food security in the 21st century and brings together the world's best researchers in agricultural science and Earth system science through the union of the complementary strengths of the CGIAR system and the Earth System Science Partnership. It aims to overcome the threats posed by a changing climate to achieving food security, enhancing livelihoods and improving environmental management.

To reach this goal CCAFS will: (1) close critical gaps in knowledge of how to enhance – and manage the tradeoffs between – food security, livelihood and environmental goals in the face of a changing climate; (2) develop and evaluate options for adapting to a changing climate to inform agricultural development, food security policy and donor investment strategies; and (3) assist farmers, policymakers, researchers and donors to continually monitor, assess and adjust their actions in response to a changing climate.

CCAFS research is structured around six Themes, two of which address Adaptation. Theme 4 addresses *Adaptation pathways based on managing current climate risk* whereas Theme 5 focuses on *Adaptation pathways under progressive climate change*. Both teams will identify, develop and evaluate instruments, technologies, practices and partnerships needed to decrease the vulnerability of food systems and enable them to prosper under a variable and changing climate.

RATIONALE

The first objective of the 'Adaptation pathways under progressive climate change' Theme is to achieve adapted farming systems for changing climate conditions in space and time, through the development of improved crops, livestock, farmed fish, and natural resources management. This will require the development of new technologies and testing across a range of pilot sites as well as modeling activities to out-scale the potential of individual adaptation options across a wide-range of geographies.

OBJECTIVE OF THE CALL

An essential activity in the identification of candidate site-based studies for CCAFS is **to develop a methodology for mapping location specific analogues – both spatial and temporal – based on multiple climate projections**. Analogues refer to sites or years that experience conditions with statistical, mathematical similarity, in terms primarily of climate, but also additional factors such as soils, crops, socio-economic characteristics etc.

CCAFS aims to support the **development of an analogue method in a first phase** during 2010 and, in a **second phase, implement this method** into the CCAFS Adaptation and Mitigation Knowledge Network which will be concurrently developed during 2010 and into 2011. The final objective of the analogues **development is a web-based platform** to provide insights into the vulnerability of crops to climate change and support field evaluation, using today's climate, of agricultural adaptation options for 2030 and beyond.



TERMS OF REFERENCE

- I. Scope of the Work:** to develop an initial analogue methodology and proof of concept for identifying and mapping spatial and temporal analogue sites across the globe based on multiple climate projections.

Temporal analogues will make use of past climates as representative time series of future climate, allowing us to identify historic events that might provide an insight into the possible future consequences of climate change. Spatial analogues will allow us to identify areas whose climate today appears as a likely analogue to future projected climate for another location, and thus represent promising areas for comparative research on adaptation plans.

- II. Key points to be considered:** the spatial and temporal analogue tool should:

- **Use measured historical weather and climate model output to identify** a) spatial analogue sites or current crop areas around the globe whose current climate is a likely analogue to future climate simulated for other locations within the study regions and b) past years for a given site with historic climate data that is similar to expected future conditions for the same site.
- The spatial resolution of the analogues should **be sufficiently fine** for application to site-level analyses, and not so fine that the analogues developed are highly dependant on the downscaling methods used.
- **Include** an option to calculate analogues independently of spatial resolution (i.e. the tool will operate on the grid of the input climate data),
- **Permit** multiple and flexible definitions of similarity in climate, including metrics relevant to agriculture (e.g. number of dry days, temperatures exceeding a given threshold).
- **Include** one or more metrics for the extent of the match between the two analyzed regions/time slices.
- **Include** a temporal window of climatic data ranging from the past century through to 2100.
- **Be flexible in input data** to allow the use of different climate time slices and scenarios.
- **Be designed to enable future inclusion of** additional filters based on layers such as demographic data, hydrological information, soils data, crop-specific layers, etc.
- Be designed in a way that will allow it in the future to be **implementable online** into the CCAFS Adaptation and Mitigation Knowledge Network.

In addition, proposals that indicate methods for the analysis of climate model ensembles in terms of uncertainty and/or predictability are particularly welcome. These methods, which would not be implemented until phase 2, could be used to provide an indication of the probability that a given analogue will prove to be correct.

- III. Expected outputs and time plan:** the work will involve two phases:

- **Initial phase** (ending in December 10th 2010): development of the **methodology and proof of concept** for a number of analogues cases, which allow searching and identifying location-specific temporal and spatial analog areas.
- **Implementation phase** (going until November 2011) with additional budget, where the analogue tool will be finalized, used for collaborative publications and then enabled on the web.



IV. Geographic target: Global

V. Input data

CCAFS will contribute by providing provisional climatic data for the execution of the project for gridded past climate (monthly minimum, maximum and mean temperature and precipitation for the period 1900-2010) and gridded future climate from downscaled GCMs (monthly minimum, maximum and mean temperature and precipitation for 3 time slices consisting of average 2015-2040, 2040-2070, and 2070-2100). For the second phase more climate data will become available, hence the tool should be developed in a way that it is flexible in terms of input data.

VI. Methodology

We are open to proposals covering a whole range of methodologies that address the objectives. We will favor **innovation and frontier science** in the proposals received. The method should be developed in a way that it is **easily automatable** through a web-platform (i.e. development of scripts rather than static analyses). However, the automation within a web-platform is not needed in this first phase – rather we are looking for methodological development and proof of concept in this first phase. The winning team may be requested to attend a meeting in September/October in Europe for 1-2 days to coordinate development with other CCAFS-funded projects that are related.

VII. Budget: US\$ 50,000

VIII. Duration of the study

The project will begin in August and should not last longer than **10th December 2010** during proof of concept. In October a review of progress will be made and feed into a negotiation process for a Phase 2 with additional budget.

IX. Competencies: The consultant/research team will have a strong modeling and computational background, and proven track record in development of similar tools/methodologies. Those with already advanced analogue methods will be given preference.

X. Deadlines and Timeline

- Deadline for submission of the application: **10th August 2010**
- Final report no later than **10th December 2010**

XI. Suggested outline for proposals: Proposals should not exceed 10 pages and should include the following components:

- a) **Title** (should summarize the content or core subject of the proposal).
- b) **Objectives and justification of the project.** This section should indicate the general purpose and specific objectives of the project. Goals should be precise, clear and achievable within the time limits and amounts specified in this call.
- c) **Methodology:** this section should show how the problem will be addressed, describe the modeling approach in detail, outlining strengths, weaknesses, barriers to implementation and means of overcoming them.



d) **Team expertise and strengths.** This section should indicate the Project coordinator as well as the research staff involved in the project specifying roles and responsibilities in operational and technical aspects.

e) **Curriculum vitae** of lead researchers.

f) **Timetable and budget.** A schedule of the activities should outline timing, results, personnel involved and a general budget.

g) **Bibliography**

Proposal should be sent to Osana Bonilla-Findji: o.bonilla@cgiar.org

They will be assessed by the CCAFS-CP Theme 5 leaders, Andy Jarvis (CIAT) and Andy Challinor (University of Leeds)