Call for Competitive Proposals:

Reconstructing and Evaluating Historic Daily Meteorological Data

BACKGROUND

CGIAR Program on Climate Change, Agriculture and Food Security (CCAFS)

Climate change is an immediate and unprecedented threat to the food security of hundreds of millions of people who depend on small-scale agriculture for their livelihoods. CCAFS' overall goal is to overcome the additional threats posed by a changing climate to achieving food security, enhancing livelihoods and improving environmental management. This entails promoting more adaptable and resilient agriculture and food systems; mainstreaming climate variability and climate change issues into development strategies and institutional agendas; enhancing peoples' understanding of climate change issues; and ensuring that decisions on policies and actions are based on the best information and data. In order to meet the overall goal, CCAFS has established four research themes: Adaptation to Progressive Climate Change; Adaptation through Managing Climate Risk; Pro-poor Climate Change Mitigation; and Integration for Decision Making.

CCAFS brings together the world's best researchers in agricultural science, development research, and climate science to identify and address the most important and complex interactions, synergies and tradeoffs between climate change, agriculture and food security through the CGIAR system and Earth System Science Partnership. CCAFS also involves farmers, policy makers, donors and other stakeholders, to integrate their knowledge and needs into the tools and approaches that are developed. More information is available at www.ccafs.cgiar.org.

Rationale

Under CCAFS Theme 2, *Adaptation through Managing Climate Risk*, the third objective is to "support risk management through enhanced prediction of climate impacts on agriculture, and enhanced climate information and services." Several promising opportunities to improve management of climate-related agricultural risk require long, spatially- and temporally-complete records of daily meteorological records a local scale, and are constrained in part by spatial and temporal gaps in available historic observations. Proxy data such as satellite remote sensing and climate reanalysis provides estimates with complete spatial and temporal coverage, but many available products are limited by some combination of short duration, and coarse spatial and temporal (monthly or 10-daily) resolution.

The objective of this call is to develop or adapt methods for reconstructing spatially- and temporally-complete, historic series of agriculturally-important meteorological variables on a daily time step, by combining available station observations with proxy data; and to evaluate daily historic meteorological data sets for the CCAFS focus regions of East and West Africa. Following the initial proof-of-concept study under this call, CCAFS hopes to secure additional resources to work with collaborating African national meteorological services to apply the methodology with their own station data, to develop and evaluate spatially- and temporally-

complete gridded meteorological data sets for agricultural risk management and climate adaptation applications. An initial CCAFS-sponsored project has developed and is testing methods to reconstruct a 28-year time series of gridded (≤ 10 km) historic rainfall on a daily time step, by combining historic station observations with satellite thermal images. This call seeks to extend that work to other meteorological variables that are important for agriculture and needed for agricultural simulation modeling.

TERMS OF REFERENCE

Scope of the Work

The project will develop or adapt methods for reconstructing spatially- and temporally-complete, historic series of agriculturally-important meteorological variables, other than precipitation, on a daily time step, by combining or calibrating proxy data (e.g., remote sensing, climate model reanalysis) with available station observations; and demonstrate and evaluate resulting data sets within the CCAFS focus regions of East and West Africa. The desired variables are daily maximum and minimum temperature (required), solar irradiance; and either potential evapotranspiration, or the additional variables (dewpoint or humidity, and wind) needed to calculate potential evapotranspiration by the Penman-Monteith formula. The project will produce sufficient derived data to demonstrate the feasibility, accuracy and utility of the methodology. The project should demonstrate the ability to produce derived data that are compatible with ongoing work on precipitation, including:

- Complete spatial coverage feasible over Eastern and West Africa;
- Temporal completeness and homogeneity for at-least 28 years;
- Spatial resolution no coarser than 10 km;
- Feasibility of combining or calibrating with the full set of station observations;
- Feasibility of updating with new station observations and proxy estimates.

The project will:

- Either develop and apply new methods, or apply existing methods, to combine proxy data with station observations on a daily time step.
- Identify and secure raw data sets used to estimate temperature and other relevant variables.
- Identify, secure and confirm quality of historic station data to evaluate derived data.
- Evaluate the accuracy of the derived data using sound statistical methodology.
- Evaluate the impact of the derived data on accuracy and bias of crop simulation results.

Required project outputs are a report, algorithms or software to apply the methodology, set(s) of gridded data calibrated/combined with station observations. The project report will include:

- Description of the proxy and validation data sets used.
- Full description of the methodology.
- Results of evaluation in terms of accuracy, and impact on crop simulation results.

Evaluation can be based on station observations anywhere in Eastern or West Africa, but evaluation in Ethiopia or the CILSS countries of West Africa is preferred for consistency with ongoing work on precipitation data.

Budget and Timeline

Up to US$45,000 are available for the project.

The report, any tools or algorithms, and derived data set(s) should be submitted by 15 December 2011.

PROPOSAL OUTLINE AND PROCEDURE

Proposals should not exceed 8 pages (12 point font, single space), excluding CVs), and contain the following components:

- *Objectives*. This section should indicate the general purpose, and describe objectives that are clear, specific and achievable within the time limits and amounts specified in this call.
- *Methodology*. This section should show how the problem will be addressed, describe the methodology in detail, outline its strengths and weaknesses, and identify any risks to implementation and means of overcoming them. It should also describe data that will be used, and provide evidence of their suitability and availability.
- *Team expertise, strengths and roles*. This section should identify the Principal Investigator and additional research staff involved in the project, and specify their roles and responsibilities. It should provide evidence of the research team's capacity to achieve the proposed objectives.
- *Work plan*. This section should describe outputs and their associated timing.
- *Budget*. The section should include a budget table summarizing how requested funds will be used, and a narrative describing and justifying expenses such as personnel, travel, supplies and services. Indirect cost recovery is limited to 15% of the award.
- *References cited*.
- *Curriculum vitae* of project investigators. Up to two pages each, including: current position; education; employment history; up to five relevant publications; and relevant projects, products or other synergistic accomplishments.

Proposals should be sent to CCAFS_Theme2@iri.columbia.edu no later than 5:00 pm EDT, 25 May 2011.

EVALUATION CRITERIA AND PROCESS

Proposals will be screened by the CCAFS Theme Leader. Those that meet minimum requirements will each be evaluated by at least two reviewers selected by the Management Team of CCAFS, based on the following criteria:

Scientific merit. Is the research conceived well, and presented clearly and adequately? Are the proposed methods sound and rigorous? Does the proposal provide sufficient evidence to support the approach?

Research team qualifications. Does the team demonstrate sufficient understanding of the problem, and sufficient expertise in the proposed methods? Do CVs demonstrate the necessary training, background, experience, and expertise? Proposals that show substantive contribution from partners in the target regions will be favored.

Realism of the work plan. Is sufficient personnel time allocated to the proposed activities? Does the proposal include a viable plan for administering the project and managing partnerships? Does the team have access and any necessary agreements for using proxy and station data? Does the team have access to adequate facilities and support?