

Science plan

S2S sub-project on Africa

Draft of 1 April 2014

Goal

To develop skillful forecasts on the S2S time scale over Africa and to encourage their uptake by national meteorological services and other stakeholder groups

Objectives

1. Assess the performance of forecasts for 5-40 days ahead using the S2S forecast archive, with focus on daily weather characteristics including rain-day frequency, heavy rainfall events, dry spells and monsoon onset/cessation dates, with relevance to agriculture, water resources and public health
2. Develop metrics for measuring the success of forecasts in ways that are useful to farmers and other stakeholder communities
3. Improved understanding of the climate modes that drive subseasonal variability in Africa and their representation in models;
4. Work with the post-Africa Climate Conference 2013 framework to connect international with African climate science communities, as well as with operational and user communities in a participatory two-way process

Background

Rain-fed agriculture is by far the most common form of crop cultivation in sub-Saharan Africa, leading to high vulnerability of regional food security to the vagaries of weather and climate. In particular, the period 5 to 40 days ahead is a crucial planning window for farmers. Reliable predictions for this advance period would help plan for key, high impact, events such as the timing of rainy season onset (for planting decisions) and cessation (for harvesting decisions), and provide early warning for the risk and potential timing of dry spells or damaging heavy rain (crop management and protection decisions). Analogous needs can also be identified in the health community where disease outbreaks such as cholera are often associated with severe weather events such as heavy rain leading to flooding.

Despite the importance of the 40-day time horizon there is, to-date, effectively no forecast information for this time-range available to the African community. This is because the 5-40 day period is particularly scientifically challenging and development of forecast information lags behind that for the first 5 days (currently being developed in Africa through e.g. WMO's Severe Weather Forecast Demonstration Project (SWFDP)) and also that of seasonal forecasts (typically next 2-4 months ahead) that are being advanced through the Regional Climate Outlook Forums (RCOFs) and their associated processes.

Little is known about the success of predictions from these systems over sub-Saharan Africa and the S2S database will provide the first opportunity to comprehensively evaluate their performance and utility for supporting sectorial decisions. The proposed work will exploit this database to conduct specific analysis of the predictions for user-defined weather/climate events important for sub-Saharan Africa, identify the potential for applications, and plan a demonstration phase in which real-time 5-40 day forecasts can be trialled with users. This

staged research is similar to the approach used for 5-day forecasts that has led to the above mentioned, and highly acclaimed, SWFDP. The proposed work will therefore extend this well tested approach to develop 5-40 day forecasts for sub-Saharan Africa.

The Africa Climate Conference 2013 (ACC-2013) has proposed an ambitious coordinated research agenda to advance the current frontiers of climate knowledge to inform adaptation decision-making and climate risk management in Africa, and provide policy-makers as well as vulnerable communities with operational climate services. Research to improve sub-seasonal predictions for Africa emerged as one of the key research priorities, recognizing that improving understanding of sources of sub-seasonal predictability over Africa is necessary to improve intra-seasonal risk monitoring and management and intra-season operations. The ACC-2013 also demonstrated that there is huge demand for sub-seasonal forecasts within Africa, and this provides a pathway for the S2S project to link with user communities with some of the greatest needs for the type of improved forecasting that S2S aims to enable. This sub-project will therefore help the S2S project deliver subseasonal research and development endorsed by the ACC-2013 and to make a substantial contribution to the GFCS .

Proposed activities and tentative deliverables

1. Liaise with the post ACC-2013 agenda to identify entry points for coordinated S2S research involving African institutions (2014–2015)
2. Compile user demands for S2S climate forecasts by sector and institution in conjunction with ACC-2013 (2015–2016)
3. Organize S2S capacity-building workshop targeting African scientists at ICTP in 2015
4. Organize an assessment of the performance of forecasts for 5-40 days ahead using the S2S forecast archive, with focus on daily weather characteristics including rain-day frequency, heavy rainfall events, dry spells and monsoon onset/cessation dates, with relevance to agriculture, water resources and public health (2015–2016)
5. Conduct research to improved understanding of the climate modes that drive subseasonal variability in Africa (e.g. the MJO) and their representation in models

Linkages

There are strong potential linkages with the monsoons and verification sub-projects. A large part of sub-Saharan Africa's precipitation is monsoonal, and the objectives of the monsoons sub-project are highly relevant to Africa, namely to develop forecast products/metrics targeting monsoon variations at multiweek lead times, including evaluating the predictability and prediction of the timing of monsoon onset/cessation dates, and active and break phases. The Africa sub-project will also incorporate one of the primary interactions between S2S and the WWRP Societal and Economic Research and Applications (SERA) workinggroup.