SPECIAL PROJECT PROGRESS REPORT

Progress Reports should be 2 to 10 pages in length, depending on importance of the project. All the following mandatory information needs to be provided.

Reporting year	2016
Project Title:	Tailor-made seasonal forecasts for sub-Saharan Africa
Computer Project Account:	
Principal Investigator(s):	SPDELAUX (user: de4l) Dr. Patrick Laux
Affiliation:	Karlsruhe Institute of Technology Institute of Meteorology and Climate Research (KIT/IMK-IFU)
Name of ECMWF scientist(s) collaborating to the project (if applicable)	
Start date of the project:	01/01/2014
Expected end date:	31/12/2016

Computer resources allocated/used for the current year and the previous one
(if applicable)
Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)	1 Mio	0	1 Mio	0
Data storage capacity	(Gbytes)	1,500	0,5	1,500	0,5

Summary of project objectives

(10 lines max)

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The objectives of this special project are:

i) Statistical Analysis of the raw (uncorrected) global seasonal forecasting system of ECMWF (S4) and NCEP (CFSv2) data in terms of the intra-(seasonal) rainfall distribution, such as onset, cessation of the rainy season.

ii) Bias correction of the global seasonal forecasting system of ECMWF using different bias correction methods such as quantile mapping.

iii) Spatiotemporal refinement applying dynamical downscaling of selected ensemble members based on ECMWF and NCEP data. The results will be validated using gridded precipitation observations such as GPCC.

Summary of problems encountered (if any)

(20 lines max)

Summary of results of the current year (from July of previous year to June of current year)

This section should comprise 1 to 8 pages and can be replaced by a short summary plus an existing scientific report on the project

The following tasks have been performed during the reporting period:

- Documentation of the forecasting techniques used by the PRESAO community
- Determination the forecast quality and value of past PRESAO forecasts, focus was on drought situations
- Analysis of potential ways to improve seasonal precipitation forecasts for the West African region

The quality of PRESAO forecast of seasonal precipitation amounts has been assessed using the Brier skill score (BSS) for Burkina Faso, Ghana, and Benin. For this reason, data from long-term synoptic stations have been used and analyzed separately. The period from 1998-2013 has been used for evaluation. PRESAO forecasts are conducted end of May for the coming 3-month period of July, August, September, i.e. with a lead time of 1 month.
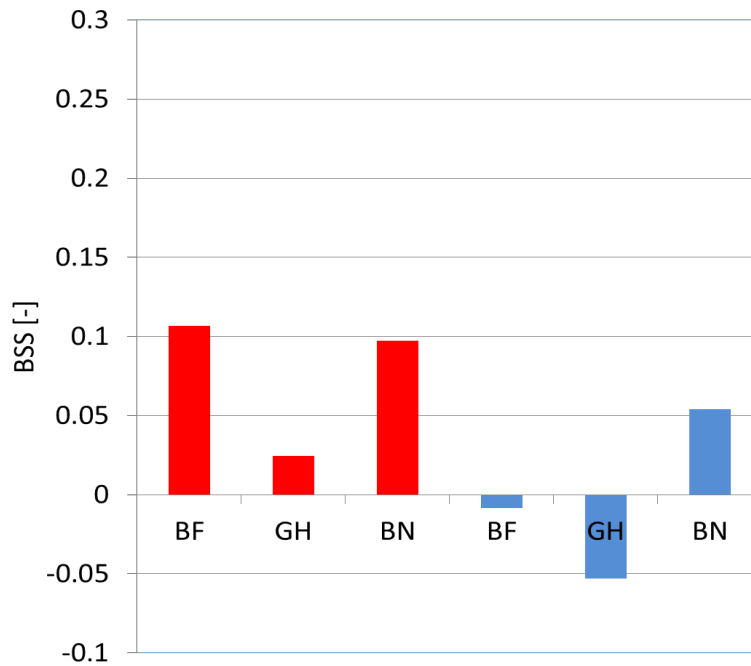
Figure 1: Brier skill score (BSS) of PRESAO precipitation forecasts for Burkina Faso (BF), Ghana (GH), and Benin (BN), for dry (red) and wet year (blue), respectively (left) (BSS > 0 means better prediction compared to climatology).

It is found that the PRESAO forecast show only very limited skill (Fig. 1). The precipitation forecast is more skillful for the dry years, however, it should be noted that the magnitude of the BSS is low. For the wet years, the forecast shows only limited skill for Benin, but no skill for Ghana and Burkina Faso (worse than prediction based on long-term climatology).

In addition to that, the economic value has been analyzed (Fig. 2). The PRESAO forecast is beneficial in terms of its economic value (compared to a simple reference system), however, the magnitude of the skill score is low.
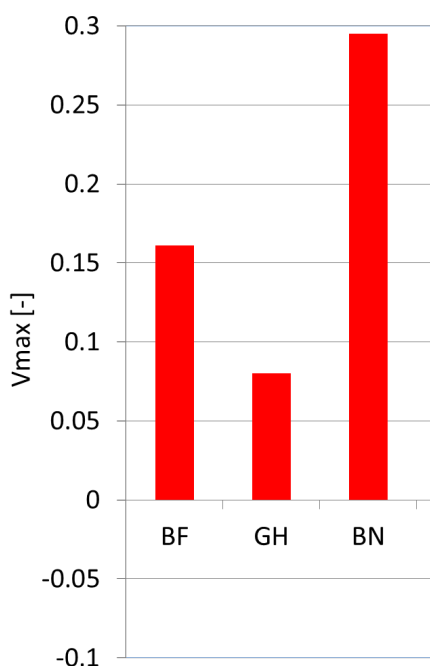

Figure 2: Maximum economic value (Vmax) of PRESAO precipitation forecasts for Burkina Faso

(BF), Ghana (GH), and Benin (BN), for dry (red) and wet year (blue), respectively (left) (Vmax > 0 means better prediction compared to climatology).

List of publications/reports from the project with complete references
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Siegmund, J., J. Bliefernicht, P. Laux, and H. Kunstmann (2015), Towards a Seasonal Precipitation Prediction System for West Africa: Performance of CFSv2 and High Resolution Dynamical Downscaling, J. Geophys. Res. Atmos., 120, doi:10.1002/2014JD022692.

Bliefernicht, J., J. Siegmund. J. Seidel, H. Arnold, M. Waongo, P. Laux, and H. Kunstmann (2016), Forecasting droughts in West Africa: Operational practice and refined seasonal precipitation forecasts, Oral presentation, 19th April, EGU, Vienna.

Summary of plans for the continuation of the project
(10 lines max)

The following tasks will be performed in the coming months:
- Evaluation of the raw and downscaled (WRF) global seasonal forecasting system of ECMWF (S4)
- Development of user-oriented approaches for providing forecast variables needed in agriculture (more accurate prediction of the onset of the rainy season)