

Sehouevi Mawuton David Agoungbome<sup>1</sup>, Nick van de Giesen<sup>1</sup>, Frank Ohene Annor<sup>1</sup>, Marie-Claire ten Veldhuis<sup>1</sup>,

<sup>1</sup>Water Management Departement, Delft University of Technology, PO Box 5048, 2600 GA Delft, Netherlands.

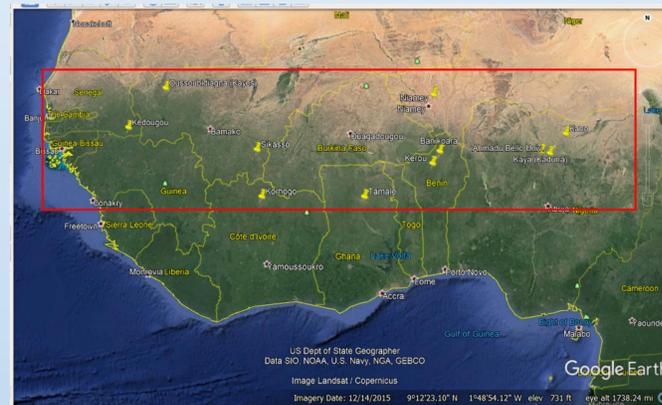
## Background

70% of West Africa farmers rely on rainfall to sustain their crops production, yet the region is one of the most vulnerable and least monitored in terms of climate change and rainfall variability. Therefore, an urgent call for efficient crop water use is inevitable to meet the fast-growing population of the continent (UN-DESA/PD, 2019 World Bank, 2009; Benin S., 2016). This study targets a participatory approach with farmers to find **an agronomical onset of the rainy season** that **maximizes crop water use** and **improves crop yield** using AquaCrop, the FAO crop model.



## Location

## Study Area



The study is conducted for the **semi-arid and arid regions of West Africa**, which comprises of savanna areas between latitudes 9 N to 14 N. The annual average precipitation varies along the south-north gradient from 1000 in Tamale to 500 in Niamey.

## Crops

**Maize, Millet and Sorghum** are the major crops grown in arid and semi-arid regions of West Africa and constitute staple foods for millions of African households and are the main source of incomes for smallholder farmers.

## Analysis Procedure: Can we find the onset of the rainy season ?

### 1: Assess climate variability

- 1.a Extraction of weather and climate data
- 1.b. Analysis of the rainy season
- 1.c Validation of the climate and weather information

### 2: Simulate yield response

- 2.a Processing of input data
- 2.b. Simulations for each location
- 2.c Formatting the output for statistical analysis

### 3: Analyze the dynamics of the onset

- 3.a Visual analysis
- 3.b Statistical analysis
- 3.c Validation and Recommendations

## Outlook and Feedback

### The next steps are to:

- Produce results on selected locations
- Run field experiments to validate results
- Analyse spatial variability
- Use GIS tools to scale up to the regional level
- Make recommendations

### Share your thoughts on:

- **The method of using agronomical onset yield response to water availability to improve crop water productivity instead of climate observations solely**
- **The scalability of this method to the regional level as an effective climate adaptive measures to reduce food insecurity**

## AquaCrop

AquaCrop is a multi-crop model that simulates crop yield response to water, climate, soil, and management practices while using relatively few parameters (Raes et al., 2009; Steduto et al., 2009, 2012). The main focus of AquaCrop is crop response to available water.



### References:

United Nations, Department of Economic and Social Affairs, Population Division; 2019. World Population Prospects 2019: Ten Key Findings.  
World Bank; 2009. Awakening Africa's Sleeping Giant: Prospects for Commercial Agriculture in the Guinea Savannah Zone and Beyond. . Directions in Development ; agriculture and rural development. World Bank. <https://openknowledge.worldbank.org/handle/10986/2640> License: CC BY 3.0 IGO.  
Benin, Samuel, ed. 2016. Agricultural productivity in Africa: Trends, patterns, and determinants. Washington, D.C.: International Food Policy Research Institute (IFPRI).  
Steduto, P., Hsiao, T. C., Raes, D., & Fereres, E. (2009). AquaCrop - The FAO crop model to simulate yield response to water: I. concepts and underlying principles. Agr. J., 101 (3), 426(437).

