Tropentag, September 10-12, 2025, hybrid conference

"Reconcile land system changes
with planetary health"

Development of a rainfall nowcasting model : the case of Burkina Faso

Belko Diallo[1], Souleymane Zio[2], Xavier Bado[3]

[1] *West African Science Service Center on Climate Change and Adapted Land Use (WASCAL), Burkina Faso*

[2] *Polytechnic School of Ouagadougou,*

[3] *West African Science Service Center on Climate Change and Adapted Land Use (WASCAL), Data Management, Burkina Faso*

Abstract

Burkina Faso faces significant challenges related to unpredictable rainfall, which not only contributes to natural disasters and complicated water resource management but severely impacts agriculture, a critical sector for the country's economy and food security. Accurate rainfall forecasting is therefore crucial to anticipate these disasters, optimise resource allocation, and ensure long-term resilience to climate variations. With this in mind, our research project aims to develop a nowcasting model for precipitation using advanced Artificial Intelligence techniques tailored to the specific conditions of Burkina Faso.

To achieve this, a pipeline was designed and developed to collect and process data over a period from July 10, 2017, to December 31, 2021, for training, and from January 01, 2022, to June 21, 2024, for testing and validating the models. Three approaches were explored: a model based on CatBoost, a Convolutional Neural Network (CNN) model, and a CNN-LSTM hybrid model. The model's input data includes calibrated precipitation, elevation, and cloud and moisture indices (CMI), while its output consists solely of predicted precipitation.

Models based on CatBoost and CNN show more reliable performances compared to CNN-LSTM. For instance, the CatBoost model achieves an RMSE of 1.23, an MAE of 0.42, and a POD of 84

Keywords: CatBoost, CNN, CNN-LSTM, nowcasting, satellite imagery

Contact Address: Xavier Bado, West African Science Service Center on Climate Change and Adapted Land Use (WASCAL), Data Management, Arrondissement 12 secteur 52 12 bp 577 ouaga 12. ouagadougou, Ouagadougou, Burkina Faso, e-mail: badoxavierzwamassoe@gmail.com