

# Seasonal Weather Extremes Forecasting to Improve Food Security in the Horn of Africa



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## Introduction

- Horn of Africa is under the burden of chronic food insecurity as a result of seasonal weather extremes among other factors
- Weather situation of the region is unstable because of ITCZ, SST anomaly of Pacific Ocean, ENSO and monsoon systems
- Resulting in loss of lives and livelihoods
- Ability to forecast upcoming weather situation over the region will reduce production loss by weather-induced disasters
- The demand for numerical weather forecasting is steadily increasing
- Correspondence of forecasts and observations has improved by computational and verification skills advancement

## Objectives

The general objective of the study is to forecast seasonal weather extremes to improve food security over the Horn of Africa

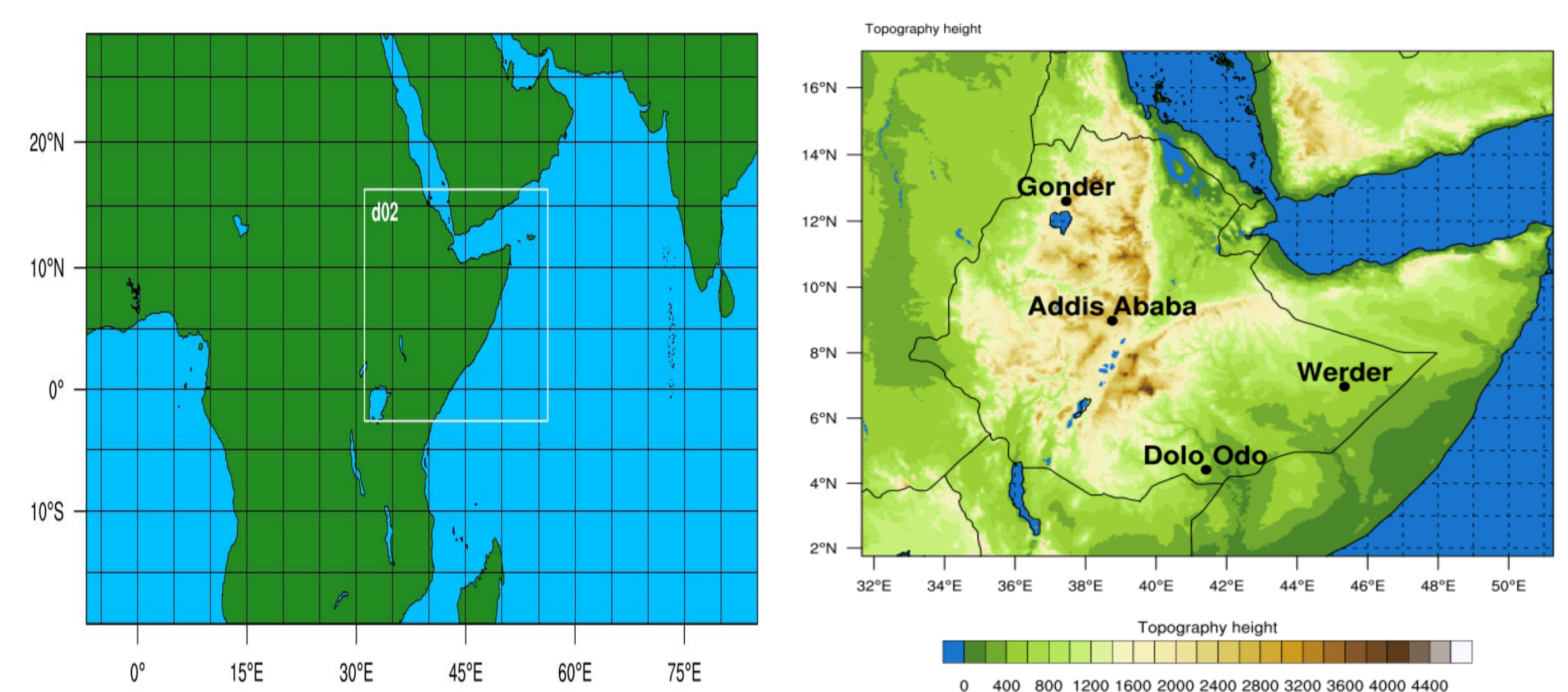
- To evaluate an ensemble of seasonal convection permitting forecasts for the Horn of Africa with the WRF model
- To evaluate simulation added value to optimize farmers agricultural practice, risk assessment and early warning systems

## Methodology

- Convection permitting numerical downscaling using WRF Version 3.8.1 with 20 members and 1 control will run
- Nested domain with 15km and 3km grid spacing resolution will be used
- Data forcing will be done using global datasets – ECMWF seasonal forecast
- Ensembles with the slightly different initial condition and microphysics parametrization will be used
- The forecast will be generated for six months with the main focus on summer season (June-September)

## Forecast Verification

- To improve forecast quality, different type of verifications skill scores will be used:
- Brier skill score (BSS), what is the relative skill of the probabilistic forecast over that of climatology, in terms of predicting whether or not an event occurred?
- Extremal Dependency Index (EDI) and symmetric extremal dependence index (SEDI) (Ferro and Stephenson, 2011) will be used
- In addition Scores:-
- Bias, RMSE and Correlation will be used



Nested domain and orographic map of the area limed model forecast simulation

## Expected Results

Probabilistic seasonal forecast using 21 ensemble members will be produced by using WRF model

Show the atmospheric system responsible for the incidence of seasonal weather extremes

Forecast added value for the local systems optimization will be investigated in comparison with global forecast

Publications for the fulfilment of PhD

## References

- Ferro, C.A.T., Stephenson, D.B., 2011. Extremal Dependence Indices: Improved Verification Measures for Deterministic Forecasts of Rare Binary Events. *Weather Forecast.* 26, 699–713. doi:10.1175/WAF-D-10-05030.1
- Schwitalla, T., Bauer, H.-S., Wulfmeyer, V., Warrach-Sagi, K., 2017. Continuous high-resolution midlatitude-belt simulations for July–August 2013 with WRF. *Geosci. Model Dev.* 10, 2031–2055. doi:10.5194/gmd-10-2031-2017

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