



Assessing Model Relevance: Agroclimatic Indices Across Different CORDEX Domains for Enhanced Climate Projections in the Houceima-Tanger-Tétouan Region

Meryem Qacami¹, Marc-André Bourgault¹, Mohamed Chikhaoui², Thierry Badard¹, Mélanie Trudel³, and Bhiry Najat¹

¹Laval University, Quebec, Canada (meqac@ulaval.ca, marc-andre.bourgault@ggr.ulaval.ca, thierry.badard@scg.ulaval.ca)

²Hassan II Agronomic and Veterinary Institute, Rabat, Morocco (mchikhaoui@gmail.com)

³Sherbrooke University, Sherbrooke, Canada (melanie.trudel@usherbrooke.ca)

Understanding the intricacies of climate behavior is paramount for regions like Houceima-Tanger-Tétouan, where agroclimatic phenomena directly influence socio-economic stability. This study rigorously evaluates the performance of climate models against the ERA5-Land reanalysis data, focusing on two pivotal agroclimatic indices: dry spell and heat wave frequencies. Such indices are integral for regional drought risk management, agricultural planning, and environmental policy formulation.

Our approach integrates a dual comparison framework—comparing model outputs against each other (inter-model) and against multiple runs of the same model (intra-model). We also validate the ERA5-Land data against 16 years of in-situ measurements to confirm its aptitude as a benchmark dataset, particularly examining its representation of temperature and precipitation.

Findings indicate a strong temperature data correlation with in-situ measurements, affirming the ERA5-Land's reliability for temperature-related indices. However, precipitation data showed considerable variability, necessitating cautious application and potential model adjustments. Among the models, the MOHC-HadGEM2-ES demonstrated notable accuracy in dry spell predictions for selected domains, while the MPI-M-MPI-ESM-MR model stood out for its heat wave frequency projections, especially in the EUR-44 domain.

Our results pave the way for selecting the most appropriate models for regional climate projections. They also highlight the necessity of model calibration, especially for precipitation indices, to ensure the precision of climate-related predictions. The study contributes to the field by providing a clear pathway for the utilization of tailored climate models in developing robust adaptive strategies to climate variability in the Houceima-Tanger-Tétouan region.