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Oceanic influence on seasonal malaria outbreaks over Senegal and Sahel. Predictability using S4CAST model

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Senegal and, in general, West African regions are affected by important outbreaks of diseases with destructive consequences for human population, livestock and country's economy. The vector-borne diseases such as mainly malaria, Rift Valley Fever and dengue are affected by the interanual to decadal variability of climate. Analysis of the spatial and temporal variability of climate parameters and associated oceanic patterns is important in order to assess the climate impact on malaria transmission. In this study, the approach developed to study the malaria-climate link is predefined by the QWeCI project (Quantifying Weather and Climate Impacts on Health in Developing Countries). Preliminary observations and simulations results over Senegal Ferlo region, confirm that the risk of malaria transmission is mainly linked to climate parameters such as rainfall, temperature and relative humidity; and a lag of one to two months between the maximum of malaria and the maximum of climate parameters as rainfall is observed. As climate variables are able to be predicted from oceanic SST variability in remote regions, this study explores seasonal predictability of malaria incidence outbreaks from previous sea surface temperatures conditions in different ocean basins. We have found causal or coincident relationship between El Niño and malaria parameters by coupling LMM UNILIV malaria model and S4CAST statistiscal model with the aim of predicting the malaria parameters with more than 6 months in advance. In particular, El Niño is linked to an important decrease of the number of mosquitoes and the malaria incidence.
Results from this research, after assessing the seasonal malaria parameters, are expected to be useful for decision makers to better access to climate forecasts and application on health in the framework of rolling back malaria transmission.