



## **Analysis of the Representation of the West-African Climate in a set of CMCC Climate Model Simulations**

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State of the art of global climate models poorly simulate the West-African climate, as reported in the last IPCC report. For instance, there is still an excessive spatial spread across the existing different climate models in the cumulative rainfall over the Sahel although all of them tend to capture the mean seasonal migration of rainfall over this area and its intraseasonal variability associated with the mean zonal wind. Reported biases in the representation of West African climate have implications for seasonal predictions and long-term climate projections in this area. The most important error sources in terms of relevant processes and model parametrizations have not yet clearly been attributed. However, many factors have been identified to be crucial for explaining model biases: the choice of the model convection scheme, sea surface temperatures (SSTs), the representation of the land-atmosphere feedbacks and coupling, the spatial resolution.

In this work, we examine the capability of the Centro Euro-Mediterraneo per i Cambiamenti Climatici (CMCC) climate models to simulate the mean West African climate and its intraseasonal and interannual variability. We make use of a set of model simulations, representing the past historical climate performed within the CMIP5 (Coupled Model Intercomparison Project, Phase 5) project, in order to evaluate the role of SSTs, the horizontal and vertical resolution and the representation of land-atmosphere interaction, (namely, the simulated soil moisture and the surface energy and water budgets) on: (1) the variations, latitudinal extent and penetration of the West African monsoon system and (2) the associated dynamical structures such as the mean meridional circulation and the strength of the Saharan low.