



## **West-African rainfall variability and its link with the Atlantic Ocean variability at different time scales**

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The West African area is a wide region with a complex topography, a variety of vegetation types and different climates. The northern part of this region (around  $10^{\circ}$  -  $20^{\circ}$  N), known as the Sahel, is characterized by a more arid climate than the southern part, the Guinean Coast (around  $0^{\circ}$  -  $10^{\circ}$  N), which benefits from wetter conditions. During recent decades, the Sahel has experienced a strong multi-decadal variability in rainfall, with a succession of wet and dry periods. Recent studies have shown that the variability of rainfall in the Sahel on different time scales is related to the variability of the Atlantic Ocean's sea surface temperature. The Guinean coast region's climate and its rainfall variability is, however, much less documented.

This work aims to study the rainfall variability in the whole West African region, with focus on the differences between Sahel and Guinean coast rainfalls and their connections with the Atlantic Ocean. Among the various modes of climate variability of this oceanic basin that influence the rainfall regimes in West Africa, the Atlantic Multidecadal Oscillation co-varies with the Sahel rainfall, while the Atlantic equatorial mode influences the Gulf of Guinea. The stability of these links is evaluated on different time scales, from inter-annual to decadal and multi-decadal time scales. Various atmospheric and oceanic data fields based on reanalyses (20CRV3, ERA40, ERAINTERIM) and observational data (CRU, GPCC, ERSST, HAdISST) are used to test the robustness of our conclusions. After describing the most important modes of climate variability in the Atlantic Ocean region, the physical mechanisms by which they interact with the West African climate are studied.