Based on the statistical analyses of observational datasets, this study demonstrates that the ocean-atmosphere phenomenon termed South Atlantic Ocean (SAO) dipole (SAOD) is the dominant mechanism associated with the inter-annual variability of precipitation over the Guinea Coast, West Africa during the boreal summer monsoon rainy season. Our results illustrate that the well-known connection between the Atlantic Niño and Guinea Coast precipitation in the literature represents only an aspect of the air-sea interactions in the SAO linked to the precipitation anomalies. During the positive phase of the SAOD, characterized by warm sea surface temperature (SST) anomalies in the northeastern part of the SAO or the northeast pole (NEP) — that is, the Atlantic Niño sector — and cool SST anomalies in the southwestern part [southwest pole (SWP)] off the Argentina-Uruguay-Brazil coast, the imprints of SST gradients give rise to divergence over the SWP linked to convergence and rising motions over the NEP. The implication is that precipitation is greatly enhanced with positive anomalies of over 40mm month$^{-1}$ at most locations in the NEP/Guinea Coast sector, following the Lindzen-Nigam mechanism.