

Regime shifts in the West African monsoon system and seasonal rainfall predictionsWassila Thiaw[†];[†] National Oceanic and Atmospheric Administration, USALeading author: wassila.thiaw@noaa.gov

Regime shifts in Sahel rainfall over the past 60 years are investigated. This study was prompted by the recent rainfall extremes that occurred in West Africa, especially in the western part of the Sahel during the first decade of the 21st century. We show that the Sahel rainfall has been characterized by different climate regimes over the past several decades. The prolonged dryness of the 70s through the 90s was associated with more frequent warm ENSO episodes and SST trends in the southern Pacific, Atlantic, and Indian Ocean. The wet periods of the 50s and 60s were characterized by climate regimes different than the most recent wet period (2001-10). While tropical North Atlantic warming has proven to be more relevant in the later period, cold Pacific SST seemed to have played a role in enhancing the West African monsoon system in the earlier wet period (1951-70). Further analysis of the recent wet period shows that the warming in the tropical north Atlantic acts to strengthen moisture convergence across West Africa through the low level westerly jet, and increased meridional surface temperature and moisture gradients. It is further shown that the changing trends in the Sahel rainfall makes seasonal predictions quite challenging. The NCEP Tier-1/ Climate Forecasts System (CFS) T382 model is discussed. Experimental predictions are compared with those from other dynamical and statistical models. The results show that the NCEP CFS-T382 has the ability to depict Atlantic and West African monsoon features reasonably well, and has potential to improve seasonal rainfall predictions in the Sahel.