

The Madden Julian Oscillation influence on upstream African easterly wave precursor disturbances during boreal summerGhassan Alaka, Jr.[†];[†] Colorado State University, USALeading author: gusalaka@atmos.colostate.edu

The Madden-Julian oscillation (MJO) produces alternating periods of enhanced and suppressed precipitation and African easterly wave (AEW) activity in the west Africa. This study documents the MJO influence on the west African monsoon system during boreal summer using reanalysis and brightness temperature fields. MJO-related west African and Atlantic convective anomalies are likely induced by equatorial Kelvin and Rossby waves generated in the Indian Ocean and west Pacific by the MJO, consistent with previous studies. The initial modulation of tropical African convection occurs upstream of west Africa, near the entrance of the African easterly jet (AEJ). Previous studies have hypothesized that an area to the east of Lake Chad is an initiation region for AEWs. Called the "trigger" region in this study, this area exhibits significant intraseasonal convection and wave activity anomalies prior to the wet and dry phases of the MJO in the African monsoon region. In the trigger region, cold tropospheric temperature anomalies and high precipitable water, as well as eastward extension of the African easterly jet, appear to precede and contribute to the wet phase in west Africa. An anomalous stratiform heating profile is observed in advance of the wet phase with anomalous PV generation maximized at the jet level. Opposite behavior occurs in advance of the MJO dry phase. The moisture budget is examined to provide further insight as to how the MJO modulates and initiates precipitation and AEW variability in this region. In particular, meridional moisture advection anomalies foster moistening in the trigger region in advance of the MJO wet phase across west Africa.