



Spatio-temporal Variability of the Relation between African Easterly Waves and West African Squall Lines in 1998 and 1999

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ABSTRACT: This study investigates the spatio-temporal variability of the relationship between African Easterly Waves (AEWs) and the lifecycle and characteristics of Squall Lines (SLs) over West Africa for the two six-month periods May-October 1998 and 1999. In all, 81 AEWs have been tracked using analyses from the European Centre for Medium-Range Weather Forecasts (ECMWF) and 344 SLs have been identified by localizing their leading edges mainly from passive microwave rain rate retrievals. It is found that the area west of the AEW trough is a favorable location for SL generation over the entire tropical West Africa. In the Sahel, a secondary peak around the region of maximum AEW-related southerlies is observed. In these wave phases, 42% of all 344 SLs were identified and defined as „AEWforced“.

According to this definition, the contribution of AEWs to SL generation increases from 20% around 15°E to 68% at the West African coast (15°W), and is larger for the Sahel than for the Guinea Coast/Soudanian region. Furthermore, the impact of AEWs on SL genesis is greater at the height of the Sahelian rainy season (July-September) than in the remaining early and late monsoon months. Few SLs form after midnight and in the morning hours, but if so, they mostly belong to the sample of AEW-forced SLs. Since AEW-forced SLs exhibit no extraordinary characteristics (lifetime, propagation speed, size, and rain rate) compared to the remaining SLs, it is suggested that the impact of AEWs is largely restricted to SL initiation and organization processes. Finally, some potential physical mechanisms responsible for the AEW/SL genesis relationship are discussed.