



Waves and Convection in Wet and Dry sequences
of the West African Monsoon

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Using NCEP/NCAR reanalyses, NOAA OLR and observed IRD rainfall over West Africa from 1968 to 1999, an investigation was made of the variability of 3-5-day waves, convection and their relationship with rainfall. Wet and dry sequences of the West African Monsoon depicted by a Sahelian rainfall index defined by Janicot et al (2001) and Sultan et al (2003).

The mean daily rainfall during wet sequences is twice as great as during dry sequences but the number of wet or wet sequences per year is not correlated with the annual rainfall. Wet sequences account for 40% of the total rainfall while dry sequences account for 20%.

The number of 3-5-day African Easterly waves increases during wet years and in wet sequences. The number of wave-days tends to be larger during wet years in both wet and dry sequences. These wave-days explain 40% of the total simulated rainfall during wet sequences whereas they contribute to 26% of the total rainfall observed during dry sequences. Generally, they tend to contribute to the increase of rainfall during these sequences.

Mean convection is stronger and there are twice as many low OLR days ($< 225 \text{ W.M}^{-2}$) during wet sequences. The mean rainfall per convective event is also twice as great during wet sequences but it changes at inter-annual timescale. Rainfall that occurs during large OLR contributes to 64% of the total rainfall during dry sequences and 46% during wet sequences.

A composite study is performed from day D_0-10 to day D_0+10 in each sequence. Wet (dry) sequences start with an African monsoon starts with a decrease (slight increase) on day D_0-6 of the negative meridional PV gradient at 700 hPa, associated with an increase (decrease) of the spectral density of wave-days. 925-700 hPa and 700-500 hPa wind shear decrease respectively at D_0-4 and D_0-1 during wet sequences. OLR decreases at D_0-6 and remains low during 4 days in wet sequences. The daily rainfall increases (decreases) between D_0-4 and D_0+4 and returns to the mean value at D_0+4 for wet (dry) sequences.