Geophysical Research Abstracts
Vol. 19, EGU2017-8847-1, 2017
EGU General Assembly 2017

The nocturnal low-level jet in theWest African Sahel from observations, analyses, and conceptual models

Geoffrey Bessardon (1), Barbara Brooks (1,2), John Marsham (1,2), and Andrew Ross (1)

(1) Institute for climate and atmospheric science, University of Leeds, Leeds, United Kingdom, (2) National Centre for Atmospheric Science, University of Leeds, Leeds, United Kingdom

There is a strong diurnal cycle in the West African monsoon (WAM) and the nocturnal low-level jet (NLLJ) is a key component of the nocturnal monsoon flow, transporting heat, moisture, and aerosols. Shear beneath the NLLJ has been linked to cloud formation and daytime mixing of NLLJ momentum to the surface is a key process for dust uplift. This study presents a comparison between observations from the WestnAfrican Sahel, reanalyses and two conceptual models of the NLLJ inertial oscillation. Past studies have identified inertial oscillations as the main cause of NLLJs at midlatitudes, but this study provides a novel quantitative test of conceptual models for the NLLJ at a monsoonal latitude. A comparison of 18 cases observed during the African Monsoon Multidisciplinary Analysis (AMMA) shows that an inertial oscillation is the main mechanism behind the NLLJ in the summertime Sahel. The inclusion of friction is essential for a realistic jet evolution. A simple conceptual model with friction captures the NLLJ strength, but gives too rapid rotation, likely due to the assumption of a constant equilibrium wind, when there are significant changes in geostrophic wind overnight. Reanalyses give a realistic rotation rate, but too weak NLLJ, with too strong winds at low-levels, due to too much mixing. This leads to substantial biases in reanalysed moisture transport.