EGU22-1898
https://doi.org/10.5194/egusphere-egu22-1898
EGU General Assembly 2022

Observed Effects of Vertical wind shear on the intensities of Mesoscale Convective Systems in West Africa.

Michael Baidu[1], Juliane Schwendike[1], John Marsham[1], and Caroline Bain[2]
[1]University of Leeds, Institute of Climate and Atmospheric Science, Atmospheric Dynamics and Cloud Group, United Kingdom of Great Britain – England, Scotland, Wales (michaelbaidu489@gmail.com)
[2]Met Office, Exeter, United Kingdom

Vertical wind shear plays a key role in the organisation and intensification of Mesoscale Convective Systems (MCSs). In West Africa, the meridional temperature gradient between the hot Sahel and the humid Gulf of Guinea results in a strong easterly wind at mid-levels and south-westerlies at low-levels leading to a strong vertical wind shear. A decadal increase in vertical wind shear has recently been linked to a decadal increase in intense MCSs over the Sahel. Here, the effects of vertical wind shear on MCSs over West Africa have been investigated using a 10-year (1998 - 2007) MCS dataset. The results show that, a strong vertical wind shear is associated with long-lived, fast moving, large and cold (deep) storms with high rain-rates. The observed cloud-top heights of storms over the oceans are closer to their level of neutral buoyancies (LNBs) compared to their land counterparts. We hypothesise that this is due to greater entrainment dilution over land compared to storms over the ocean. The difference between the observed cloud-top heights and the LNBs of land MCSs is minimised over regions of high vertical wind shear. Strong vertical wind shear results in colder brightness temperatures relative to the temperature at their LNBs. This is consistent with recent modelling work showing that shear reduces entrainment dilution of squall-line updrafts. We conclude that, modelling the impacts of vertical shear, which are normally missed in convection parameterisations, are not only important for predictions of high impact weather, but also important for modelling the climatology of anvil heights.