Geophysical Research Abstracts
Vol. 21, EGU2019-16551, 2019
EGU General Assembly 2019

The genesis of convective clouds

Leif Denby (1), Steven Boeing (1), Douglas Parker (1), and Mike Whitall (2)

(1) University of Leeds, Institute for Climate and Atmospheric Science, School of Earth and Environment, Leeds, United Kingdom (l.c.denby@leeds.ac.uk), (2) Met Office, Exeter, United Kingdom

Convective clouds interact with their immediate environment, both at cloud level and below-cloud in the boundary layer, and through this may affect their own development and organisation. One of the aims of the GENESIS project is to quantify this by making a systematic study of coherent boundary layer structures and their interaction with moist convection, based on analysis of Large-Eddy Simulations. Tools have been developed to produce measures of the scales of interaction relevant to triggering and maintaining convection, which are traditionally unresolved in global circulation models. We focus on observed physical phenomena related to convection (surface heterogeneity, ambient shear, coldpools and aggregated convection) and how these interact with and influence structures in the boundary layer. The aim is to provide new insight into the two-way interaction between clouds and their environment, and through this aid the development of convection schemes with better representation of sub-grid variability, specifically by producing a statistical description of the forcing from below cloud base. Results from analysis of coherent structures in LES in environments of varying shear and surface Bowen ratio are presented, showing how each of these affect the boundary layer structures and convection formed. These have been produced with novel analysis tools including methods borrowed from Direct Statistical Simulation (DSS) and topological analysis. Statistical representations of the connection between cloud properties and the sub-cloud boundary layer feeding those clouds will be presented.