



Negative water vapour skewness and dry tongues in the convective boundary layer: LES budget analysis

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This study focuses on the intrusion of dry air into the convective boundary layer (CBL) originating from the top of the CBL. Aircraft in-situ measurements from the IHOP_2002 field campaign indicate a prevalence of negative skewness of the water vapour distribution within the growing daytime CBL over land. This negative skewness is interpreted according to large-eddy simulations (LES) as the result of descending dry downdrafts originating from above the mixed layer. Using two LES, one corresponding to a drying boundary layer and the other one to a moistening boundary layer, a comprehensive analysis of the moisture variance, third-order moment and skewness budgets is conducted. This analysis helps to identify the processes responsible for the negative skewness. It underlines the main role of turbulent transport, which distributes the skewness produced at the top or the bottom of the CBL into the interior of the CBL. The dry tongues contribute significantly to this turbulent transport.