



The seasonal variability of tropical shallow convective mass flux through cloud base

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To get a better understanding of the interaction between shallow cumulus clouds and the environment, we studied the seasonal variability of the mass flux through the cloud base by using remote sensing instruments at the Barbados Cloud Observatory (BCO). The BCO is located on the east coast of Barbados ($13^{\circ} 09' N$, $59^{\circ} 25' W$), where it is exposed to the relatively undisturbed easterly trade winds. By combining the measurements of a Ka-Band cloud radar and a Doppler lidar, we are able to directly measure the mass flux through cloud bases. Comparisons with large eddy simulations show a good agreement between the modelled and measured mass flux. In this study, we will focus on the seasonal variability of the mass flux through the base of tropical shallow cumulus clouds and will explain the physical reasons for the shape of its distribution among the clouds. Since the clouds consist of up- and downdraught pairs, we will also present a statistical analysis showing the vertical velocities to get a detailed view of the transition between the up- and downdraughts inside the clouds, in the surrounding subsiding shells, and in the vicinity of a typical shallow cumulus cloud.