The parametrization of momentum turbulent transport in the convective boundary layer

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In the case of scalar fluxes, such as potential temperature and water vapour, it has been shown that “non-local” transport plays an important role in the turbulent transport in the convective boundary layer, implying that a purely diffusive representation is inappropriate. Counter-gradient, mass-flux theories and the combined eddy-diffusivity/mass-flux (EDMF) schemes were built to overcome that problem. However, the role of non-local effects in momentum is still largely an opened question. Model results for the mean wind are frequently poor in test cases. In general the subgrid scale momentum transport is treated as a diffusive process in atmospheric models and it is not clear how important are those fluxes in the performance of the models. In the present study we use results from LES simulations to diagnose vertical profiles of momentum fluxes in different convective boundary layers: a well known dry case, a cumulus BOMEX case and a shallow cumulus diurnal cycle from the ARM experiment. In many situations these results show that the momentum transport made by organized updraughts contribute significantly to the total turbulent flux, suggesting that they may be included in convective parametrizations.