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Flux Footprint over Idealized Urban Surface Using Large Eddy Simulation model

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Footprint modeling is a critical method for estimating the representativeness of surface flux measurements. For complex surfaces, understanding on the impacts of terrain heterogeneity for the exchange processes between atmosphere and surface is crucial. Since buildings have significant influences on atmospheric flows, which will lead to the effects on atmospheric chemistry and physics processes, the study focuses on the critical issue of footprints inside urban areas. For the purpose of characterizing urban interaction with regional flow, particle distribution, and atmospheric processes over horizontally heterogeneous surface, the study applies the Large Eddy Simulation (LES) model coupled with a Lagrangian Stochastic footprint model. In the idealized urban simulations neutral conditions were used. Several sensor heights have been analyzed with different horizontal sensor locations. So far, there are not many studies applying footprint model inside the urban canopy by using LES. This study reveals the important information on effects of horizontal and vertical sensor positions, related to a sensor location between the buildings with regard to the mean flow direction and to the height above the buildings. The results can be utilized in the better interpretation of the existing data on urban fluxes and concentrations as well as in the planning of new measurement sites.