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# Large-Eddy Simulation Study for Fetch Effect over Forest Canopy

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The flux measured above the forest canopy often deviates from the source strength underlying the measurements due to the consequence of limited fetch. Fetch studying needs to be taken into account especially when considering heterogeneous surface. Usually, the field surface doesn't meet the requirement of horizontal homogeneity for most micrometeorological measurement methods. For understanding how the horizontal scale of the heterogeneity influence scalar transformation as well as to the footprint of the measurement, we study the spatial scale of the surface patches to the measurement height by applying large-eddy simulation model. Numerical simulations of detailed flow over forest canopy with variety of fetches are performed. This presents the significant influences of surface heterogeneity to flux measurement. The results show that the blending height of scalar is sensitive to the size of fetch. In particular, when the size of fetch is getting smaller, the local turbulences affect scalar transportation strongly. This has implications for the transport of scalars in the forest canopy. In the end goal, depending on the location of measurement tower and field heterology, the influence of blending height of scalar to measurement data qualities can be studied. Furthermore, these results show great potentials for a wide range of applications for micrometeorological field including the placing and interpretation of measurement instruments in complex forest terrain.