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Influence of a topography on quality of flux measurements above a rainforest in Central Sulawesi, Indonesia

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To explore quantitatively the processes of energy, H2O- and CO2-exchange between the atmosphere and rainforest ecosystem the tower equipped with standard micrometeorological instruments and eddy-covariance set was installed at Bariri site on Central Sulawesi, Indonesia within the frames of STORMA-project. However, to interpret the measurement results correctly the knowledge on footprint function is required, which characterizes a sensor “field of view” and depends strongly on airflow structure. That is a challenging task especially when the investigated ecosystem is characterised by complex vegetation structure and by irregular topography. The main aim of present study was, therefore, to analyze the influence of the irregular relief of Bariri site on footprint function using observed wind profiles data only. To filter out the vegetation influence the horizontal homogeneity of plant cover was assumed. The vertical distribution of LAD was taken from measurements. The 1-D version of atmospheric boundary layer model SCADIS (Sogachev et al., 2002, 2005) employing two equation closure’ approach (E-w closure) was used to describe the airflow for 12 wind directions separately. The measured above vegetation vertical wind profiles allowed implementation of a nudging technique to reconstruct these profiles both above and inside canopy and to derive other turbulence characteristics like TKE, eddy diffusivity. Obtained air flow characteristics were used then to estimate a footprint function for chosen 12 wind directions. To attain it we used the Lagrangian simulation (Kurbanmuradov, Sabelfeld, 2000) with assumption sigmaU/uL and SigmaW/uL equal to 2.3 and 1.25 respectively (Rannik, 2002), where uL is local velocity scale just above canopy top equal friction velocity u*. For all directions the source was assumed as cor-

respondent to ideal uniform case - at the height of z0+d. The presented results show significant influence - and, thus, a topography effect - of wind directions on footprint functions which is illustrated by the difference between measured and target (true) signal. Underestimation of measured signal comparatively to the "true" one for the wind from northern sectors (lee-side) agrees well with the data of Sogachev et al, 2005 for the wind behind the idealized hill. This study was supported by the Grants SFB 552 of DFG and of Nordic Centre of Excellence NECC.