



Comparison of two drainage flow situations on a gentle forested slope.

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Drainage flows generated on a gentle slope in stable conditions were analysed at the forested site of Vielsalm (Belgium). Two distinct situations were encountered, one corresponding to *vertical convergence*, characterised by a negative vertical velocity at the canopy top, the other corresponding to an *equilibrium* situation without any vertical movement. The causes of these two distinct flow patterns were analysed.

Moreover, combined measurements of vertical velocity above the canopy and horizontal velocity divergence below the canopy were found to comply with the continuity equation: an acceleration of the horizontal flow was indeed observed in the trunk-space in convergence situations while not in equilibrium conditions.

These measurements combined with those of the horizontal $[CO_2]$ gradient below the canopy were found to met the dilution hypothesis suggested by Aubinet et al.(2003): the horizontal $[CO_2]$ gradient was negative in convergence situations while slightly positive in equilibrium conditions.

The existence of such patterns allows us to confirm the coherence of advection observations made at the site and help to better understand the mechanisms responsible of night flux exchanges at work in stable conditions in complex terrains.

Nevertheless, difficulties were met when trying to obtain reliable estimates of the advection transport terms. The estimation of the vertical velocity in the trunk-space obtained by using the divergence measurements refuted the hypothesis of linearity of the vertical profile of vertical velocity, assumption usually used when computing vertical advection. This problem resulted in a great uncertainty on vertical advection which

did not allowed to improve the night-flux estimation by adding advection terms to the turbulent flux and the storage.