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Estimation of catchment averaged sensible heat fluxes using a Large Aperture Scintillometer

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Evapotranspiration rates at the catchment scale are very difficult to quantify. One possible manner to continuously observe this variable could be the estimation of sensible heat fluxes (H) across large distances (in the order of kilometers) using a Large Aperture Scintillometer (LAS), and inverting these observations into evapotranspiration rates, under the assumption that the LAS observations are representative for the entire catchment. The objective of this presentation is to assess whether measured sensible heat fluxes from a LAS over a long distance (9.5 km) can be assumed to be valid for a 102.3 km^2 heterogeneous catchment. Therefore, a fully process-based water and energy balance model with a spatial resolution of 50 m has been thoroughly calibrated and validated for the Bellebeek catchment in Belgium. A footprint analysis has been performed. It has been found that good estimates of the temporally variable surface roughness parameters are needed in order for the LAS to provide adequate measurements. The modeled H within the footprint has been found to be very similar to the scintillometer observations, and the catchment averaged H. When the scintillometer path is reduced to 1 km, the validity of this statement depends on the location of the scintillometer path.