Evaluation of evaporation on a small agricultural watershed: comparison of eddy correlation and scintillometry techniques.

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Since the actual evapotranspiration is a major component of the hydrological balance, there is a strong interest for estimating it at the watershed scale. Beside modelling approaches, spatially integrated land-air fluxes can now be measured continuously: fast sensors located on towers allow to measure the surface-air fluxes over large "foot-print" areas, using the eddy correlation method, whereas scintillometers allow to estimate the sensible heat flux over a given path length, and hence the evaporation through the surface energy balance.

This paper aims at comparing estimates of evapotranspiration over a small watershed, using eddy correlation and scintillometry techniques. This study was conducted in the framework of the *MOBHYDIC* project, devoted at observing and modelling all the components of the hydrological balance of a small agricultural watershed, during a period of several months. It was conducted on the Roujan experimental watershed, located near Montpellier, south of France. On the Roujan watershed, which extend is nearly 1 km^2, the main cultures are vineyard and cereals, forming a complex patch of small fields. During the summer of 2005, a large set of instruments were installed over the flat part of the Roujan basin (nearly 0.4 km^2): a 3D sonic anemometer and a fast hygrometer located on 6 meters high tower allowed to measure continuously the sensible and latent heat fluxes; a large aperture scintillometer was installed on both sides of the watershed, allowing to estimate continuously the sensible heat flux; several net radiometers were installed on various fields, chosen as representative of the main canopies of the basin (vineyard, wheat, fallow). Concurrently to this atmospheric measurements, an extensive characterisation of the soil hydric status evolution was performed, including neutron probe profiles and piezometric measurements.

We first present the comparison of the spatially integrated fluxes, momentum and sensible heat, as measured by the 3D sonic anemometer (eddy correlation) and by the scintillometer. In a second step, estimates of evaporation given by these two systems are compared. In both cases, the influence of the respective "foot-print" areas is investigated. These atmospheric estimates of the evaporation at the basin scale are finally compared with the water balance deduced from neutron probe measurements.