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Water and carbon fluxes over vineyard in southern Spain

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The work presents the data collected in an experiment carried out over vineyard in the area of La Mancha (Spain) during the year 2007. This crop has been monitored during the whole crop growth cycle in terms of the carbon and energy fluxes. For this purpose an eddy covariance tower (coupling a sonic anemometer and IRGA) has been used to estimate the 3D wind velocity vector, air temperature, water vapour (to characterize sensible and latent heat flux) and carbon dioxide concentration at high frequency. Additionally the energy budget was evaluated incorporating the measurement of the net radiation (Rn) (by the four components, upward and downward shortwave and long wave radiation) and the soil heat flux (G) (by a set of thermocouples and heat flux plates). The experiment was focused in two ways, by one side to calibrate the eddy covariance tower (EC) with a Bowen system (with independent Rn, Bowen-ratio and soil-surface heat flux) during the initial period of the crop and by other side to monitor de energy and carbon flux exchange between a heterogeneous cover at different stages during the crop growth cycle.

The preliminary results show a lack of closure of the surface energy balance e.g. the sum of LE and H is less than Rn minus G. Can be appreciated an under-estimation of the evapotranspiration (LE) and the sensible heat (H) by the eddy covariance compared to the Bowen system. Days with more atmospheric demand (low Bowen relationship) showed bigger closing problem and underestimation of LE. For this reason the magnitude of this problem varied with time during the day and seasons. Possible corrections can be carried out using the bowen relationship (H/LE), this implies that EC systems underestimated H and LE in the same proportion.

According to other investigations in this topic the values of CO2 flux will be underestimated in similar proportion that the evapotranspiration flux.

Not many variations in the climate and stability of measurement made with EC system allow establishing the pattern of the fluxes in a semiarid environment over a characteristic cover in La Mancha such as vineyard.

More investigation will be necessary to explain the closing lack and it would be of great utility to duplicate sensors to determine the sources of error, for example to evaluate H flux with scintilometer method.