



Simultaneous measurements of carbon dioxide, water and energy exchange above four different ecosystems

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In the context of climate change it is of paramount importance to assess carbon and water exchanges between vegetated surfaces and the atmosphere.

Over the last decades many studies have been performed to determine mass and energy budgets of forests, croplands and grasslands. However, most measurements have been made in different geographical regions, at different periods of time. As the results depend on the meteorological conditions and vary in time it is difficult to intercompare them directly and evaluate the relative contribution of each ecosystem to global water and carbon exchanges. Therefore, there is a need to measure fluxes over different types of ecosystem during a given period of time, in a given region with similar meteorological conditions.

In this study we quantify carbon and energy budgets of typical ecosystems of Les Landes region in South West of France. For this, carbon dioxide, water and energy fluxes were measured by eddy covariance, along with micrometeorological conditions, during and after the 2005 CERES (CarboEurope Regional Experiment Strategy) experiment. Fluxes as well as biomass measurements were measured above a maize crop, a vineyard, a clear-cut forest and a 35-year old forest during 6 months extending over most of the vegetative season (May to October). All sites are located in the western part of the Regional Experiment area.

The energy balance closure is fairly good at all sites. CO₂ flux measurements show that the maize crop before irrigation and the clear-cut behave as sources of CO₂, whereas the vineyard and the mature forest act as sinks. However the maize crop becomes a substantial sink of CO₂ after the start of irrigation and canopy growth, with fluxes

three times as large as for the 35-year old forest. Evapotranspiration is largest over the irrigated maize and lowest over the clear-cut, while the vineyard and the mature forest exhibit similar water fluxes.

The data collected provides a good basis for a comparative study of the main ecosystems of the region, and for upscaling fluxes at the regional level, in conjunction with all other measurements performed during the 2005 CERES experiment.