



## **Fluxes of energy, carbon dioxide and water measured over a vineyard in Barrax, Spain, during the SPARKS and SEN2FLEX campaigns**

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Two intensive field campaigns were carried out at the Barrax site in Spain in the framework of the Earth Observation Envelope Programme of the European Space Agency (ESA): the first between 12 and 21 June 2004 (SPARKS) and the second between 8 and 14 July 2005 (SEN2FLEX). The aim of the campaigns is to support the development of algorithms for satellite based estimates of land-atmosphere exchange of energy, water and carbon dioxide. The measurements included field-, airborne and satellite measurements.

We present here the energy balance and the exchange of carbon and water measured with a Large Aperture Scintillometer (LAS) and two eddy covariance systems (EC) at two heights over a vineyard. First, the effect of footprint, measurement height and land cover of adjacent fields is investigated. Second, the responses of the fluxes of heat, carbon dioxide and water to environmental variables are analysed.

The energy balance closure was 90%, and the fluxes measured with the EC systems were similar for the two years. The LAS and EC systems gave similar values for sensible heat in 2004, but different values in 2005, due to a different land cover in adjacent fields. The ratio of the carbon dioxide flux over the water flux was higher in 2005 than in 2004, which indicates that water use efficiency in 2005 was higher than in 2004.