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Evaluation of sensible heat flux from remote sensing and eddy correlation data for two Portuguese cork-oak forests

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Energy balance is a major determinant of Earth surface temperature and climate. However, the physics of energy balance computations are complex and vary in space and in time. Most of the data available on the energy balance of non-agricultural systems is from local measurements, only representative of the area around the measuring point. To overcome this, remote sensing techniques have been widely used, particularly in studies on the temporal land-cover changes and on their influences on the energy and water balances. Several remote sensors with different spatial, temporal and spectral resolutions have been used to understand these processes. In many applications, the main objective is to understand how landscape's changes over time can influence regional climate. Orbital information enables the analysis of the spatial and temporal features of the Earth's surface, and to understand the interactions between different land-cover types with topography, atmospheric and anthropogenic action. However, to test for accuracy and precision, data from satellite sensors and their derivatives need to be compared with ground-level field data. This study evaluates and tests sensible heat flux data obtained from the SEBAL algorithm using images by Thematic Mapper (TM) sensor aboard Landsat 5 satellite. These sensible heat flux data were compared with those of two ground level experiments, with the Eddy Covariance technique, in Évora and Coruche, Portugal. The footprints of the sensible heat flux measurements were calculated for six scenes of sensor TM, allowing the comparison between satellite data and surface flux data. Results showed a high correlation between sensible heat flux data derived from remote sense and ground-level measurements (R^2=0.94). We conclude that the remote sensing technique is useful in estimating this energy balance component and may contribute to the understanding of vegetation dynamics.