

**VII Simposio de Doctorandos de la UAH en Investigación con Tecnologías de la Información
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Plantilla para el envío de resúmenes

Título (máximo 30 palabras): Integrated observing systems for multi-spatial scale plant diversity analyses and its relationship with ecosystem functioning in Mediterranean <i>dehesas</i>
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Resumen (máximo 400 palabras): The spatial mismatch between pixel size and plant size hampers the study of plant biodiversity and its properties through remote sensing (RS). Integrating <i>in situ</i> data, computer simulations, satellite products and citizen science could help to solve this problem. This Ph.D. project foresees the implementation of this methodology to study different facets of plant diversity through RS data in a mediterranean <i>dehesa</i> , a complex ecosystem of high socio-environmental value. The project is organized in three phases: 1) Optimization of automated species recognition with Flora Incognita; 2) the study of functional diversity through multi-scale spectral information; 3) the study of biodiversity and ecosystemic function (BEF) relationships at large scale. So far, progress has been made in the first and second phases. In the first phase, the Flora Incognita app is being optimized for recognizing mediterranean species. Flora Incognita is a citizen science plant identification mobile app which relies on a robust machine learning algorithm in order to identify single plant species. The completion of the photographic database with the missing mediterranean species will enable the use of Flora Scan tool (under development) to simultaneously identify multiple species and estimate their relative abundance from photos at plot level. A specific protocol has been developed to test recognition accuracy by using field photos acquired at multiple spatial resolutions (1m, 25cm and 12,5cm) in combination with plant inventories conducted in permanent plots that will be sampled through various phenological cycles. In the second phase, plant functional diversity is being studied through <i>in situ</i> hyperspectral imaging. The effect of spatial resolution in the estimation of functional and diversity metrics is being explored using images from three consecutive campaigns acquired on the grassland layer in a <i>dehesa</i> ecosystem. These campaigns include plant inventories and functional traits information, as well as drone multispectral images and field spectroscopy data that will be used to estimate different diversity metrics based on species' spectral dissimilarity, such as Rao quadratic index (Q) entropy. These metrics will be used to explore the correlation with species richness and plant functional traits at species and canopy levels. The results obtained will be analyzed in order to evaluate the performance of this methodology through different spatial and spectral resolutions to carry out and validate BEF studies at coarser scales.