
Absolute Density Measures Estimation Functions with Very High Resolution Satellite Images

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Abstract

Assessment and monitoring of forest structure is frequently done with absolute density measures with field forest inventory data and expansion methods. The development of basal area and the number of trees estimation functions with data derived from very high spatial resolution satellite images enable their short-term and cost-effective evaluation, allowing also the estimation for the area not requiring extrapolation methods. The functions of basal area and the number of trees per hectare are based on crown cover obtained with very high spatial resolution satellite images for two evergreen oaks and umbrella pine. The three tree species are especially important in the agroforestry systems of the Mediterranean region. The linear functions fitted for pure stands of the three species and mixed stands of cork and holm oak and of cork oak and umbrella pine showed a better performance for basal area than for the number of trees per hectare. The inclusion of dummy variables for species composition improved the accuracy of the functions.

Keywords: quickBird image, multi-resolution segmentation, crown horizontal projection, absolute density measures, regression

1. Introduction

Holm oak (*Quercus rotundifolia*), cork oak (*Quercus suber*), and umbrella pine (*Pinus pinea*) are three of the most representative species in agroforestry systems in the Mediterranean basin [1, 2]. Their stands have usually low density, open heterogeneous canopies and as main production bark for cork oak and fruit for all [3–5]. They also have other productions, such as agricultural crops, pasture and extensive grazing. Due to the climate variability of the Mediterranean region, these multiple use systems enable risk dispersion and the sustainability in time [1, 2, 6].
