Geophysical Research Abstracts
Vol. 12, EGU2010-4411-1, 2010
EGU General Assembly 2010

Vegetation Cover and Habitat Heterogeneity derived from QuickBird data as proxies of Local Plant Species Richness in recently burned areas

Olga Viedma, Ivan Torres, and Jose Manuel Moreno

(olga.viedma@uclm.es) Departamento de Ciencias Ambientales. Facultad de Ciencias del Medio Ambiente, Universidad de Castilla-La Mancha, Avda. Carlos III s/n, 45071 Toledo, Spain. phone: +34 925268800 (Ext. 5469)/fax: +34 925268840

In fire-prone ecosystems, it is very common that, following fire, plant species richness increases very markedly, mainly due to an explosion of annuals, following a rapid change during the first few years after the blaze. Herbs play a major role in the system, among other, by fixing nutrients that might be lost, or by changing competitive interactions with shrubs or tree seedlings. But assessing species richness, particularly, herbaceous one, in space and at large scale is very costly. Furthermore, the scale of measurement is also important. In this work we attempted to asses plant species richness during the first year after fire in an abandoned dehesa (open parkland) at three scales (1 m2, 25 m2 and 100 m2) using QuickBird images. The study area was located in Central Spain (Anchuras, Ciudad Real), and was affected by a large summer fire (ca. 2000 ha). Before the fire the system was composed of a shrubland intermixed with trees and open spaces. Two 90x180 m plots were selected and field species richness measures were made at the three scales, using a nested design. Field-based data were related to remotely sensed data using Regression Trees (RT) and Boosted Regression Trees (BRT) modelling. Explanatory spectral and textural remotely sensed data were ecologically interpreted based on vegetation cover ground-based data. We found that areas with low spectral contrast and high reflectivity were dominated by herbaceous species, and had greater species richness than those characterized by low contrast and medium-low reflectivity, which were dominated by shrubs and trees. The highest species richness was found in the areas characterized by high contrast and medium-high reflectivity, which had a mix of herbs and woody layers. Variance explained varied depending on the modelling approach and the scale, from 21% and 50% for 1 m2 using RT and BRT, respectively; to 65% and 79% for 100 m2. The contribution of different life forms in model fitting was scale-dependent. At smaller scales, herbaceous layer explained the greatest variability of species richness; whereas at higher scales, shrubs and trees increased their contribution in fitting plant species richness. Model's predictions and Moran's Index on residuals indicated that the best sampling scale to predict species richness from QuickBird data was at 100 m2. The high variance explained in most cases indicates that species richness in space can be well predicted by QuickBird derived data.

Keywords: plant species richness, local nested scales, vegetation cover, spatial heterogeneity, texture, reflectivity, QuickBird.