Mediterranean Wildland Fuel Complexes at the stand scale: comparison between field surveys and remote sensing data.

L. Borgniet, T. Curt, S. Alleaume and S. Brewer [1]

Abstract

Characterizing wildland fuel structure is crucial for a good understanding of fire behaviour and for the realistic implementation of fire models/simulators. We hypothesize that the pattern of fuels at stand- and landscape-scale is non-random, and as such may be characterized using a number of indices of spatial patterns derived from field data. Suitable indices can also be used for (semi-) automatic mapping of fuels using data from remote sensing (THRS, Very High Spatial Resolution). Robust and efficient indices of spatial patterns are therefore required that may be applied at a variety of spatial scales. The identification of these patterns is notably difficult for Mediterranean fuel complexes with various combinations of garrigue and tree species. We present here some results of a comparison between field description of fuel structure and the analysis of remote sensing images using two techniques.

The study site is located in area that is typical of southern French limestone vegetation and fuel, composed of different facies of Pinus halepensis and garrigue vegetation dominated by Quercus coccifera and Ulex. Fieldwork has yielded extensive fuel description for a series of plots at different scales (ten 20x20 m plots and ten 5x5 m plots). For each plot the location and size of each individual is described with differential GPS. From these parameters, the plots are characterized by density, cover proportion and aggregation indices.

The comparison has been made using a multi-spectral Quickbird image (June 2006, resolution 60 cm) and a 10 cm spatial resolution image (helicopter photogrammetrical flight from October 2006). In order to obtain equivalent indices from this image, it is necessary to identify individuals by image segmentation. Two methods have been applied: the e-Cognition software algorithm and a combined wavelet analysis and neural mapping method.

These results will be used to assess the ability of segmentation techniques to identify and map the typical fuel structures of this region, and will be subsequently applied to larger scale mapping and the production of realistic scenarios of fuel structure for fire modeling.

[1] CEMAGREF, Aix-en-Provence Regional Centre, 3275, route de Cézanne – CS40061, F-13182, Aix-en-Provence cedex 5, France. Contact : Laurent.Borgniet@aix.cemagref.fr