Fire severity analysis using LANDSAT data in an heterogeneus landscape of semiarid NW Patagonia

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Fires at landscape level are result from complex interactions among ignitions, weather and vegetation. Factors related to fire, such as fuel moisture, vegetation structure and topography, can exhibit substantial spatial and temporal variability. Arrangements of patches with different degree of burn severity are found after to fire and this heterogeneity could have major implications for ecosystem processes. For instance, severely burned patches may be more affected by fire returning to pre-fire conditions in a large time period while areas with low burn severity may be seed sources accelerating the plant recovery process.

Interactions between fire severity, type vegetation and others environmental factors are poorly known, in particular in large fires. For overcome this lack, the first step is rely on accurate data regarding fire severity at landscape scale.

Remote sensing tools are particularly suitable assessment fire effects at landscape scale, where monitoring the entire surface affected by large fires is laborious. In addition, the integration into a GIS of data obtained by remote sensing facilitates to explore causal relationships involved in fire severity and the influence of them in the recovery process. In this context, spectral indices can be used to relate burn severity observed in the surface to values measured by the satellite sensor. One of the most widely used indices is the "Normalized Burn Ratio" (NBR) which enables to infer the degree of post-fire ecological change.

Nevertheless, in heterogeneous landscapes, to map fire effects may be required pre-disturbance data in addition to post-disturbance image, because precisely to non-homogeneity conditions. Thus, two NBR derivatives, delta-NBR (dNBR) and Relative delta-NBR (RdNBR), have been developed to remove biasing of the pre-fire vegetation present in the uni-temporal approach. To difference of dNBR, in which it is obtained an absolute change value, RdNBR is a relative measure that allows independence from the pre-fire condition of vegetation.

Considering that: 1) the dNBRand RdNBR indexes are proposed to evaluate fire severity by remote sensing in different environments and 2) exist few information about its behavior in communities with low biomass load as the semiarid grasslands. Then, the general objective of work was to analyze and compare the behavior of dNBR and RdNBR in their ability to discriminate the degrees of fire severity in semiarid environments dominated by herbaceous vegetation.