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Change Detection Analysis Using Sentinel 2 Multi-Temporal Satellite Imagery and its Integration for Fuel Mapping at a Municipal Scale

[1]Álavares-Taboada, Flor, [2]Sánchez-García, Sandra and [1]Pereira-Obaya,Dimas

[1]*Departamento de Tecnología Minera, Topografía y de Estructuras, Escuela Superior y Técnica de Ingenieros de Minas y Escuela de Ingeniería Agraria y Forestal, Universidad de León, Av. de Astorga s/n, Campus de Ponferrada, 24401 Ponferrada, Spain*
[2]*CETEMAS, Centro Tecnológico y Forestal de la Madera, Área de Desarrollo Forestal Sostenible. Pumarabule, Carbayín Bajo s/n 33936 Siero, Spain*

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Abstract

Soil covers are in constant change, due to their dynamic behavior having updated and reliable fuel model maps is an important step in forest fire prevention and defense planning procedures. The aim of this work was mapping four large types of fuel and burned areas using a multi-temporal set of multispectral satellite images in different software and web platforms for geospatial processing. And finally assess the proposed methodology as a semi-automatic tool for updating current fuel maps. Based on the type of analysis followed, the process was divided in two blocks that share some steps. An Object Based Analysis (OBIA) was performed on a multitemporal collection of Sentinel 2 MSI images in order to map four vegetation types. The images were acquired and processed before being segmented to generate the necessary data to carry out the supervised automatic classification. In the case of mapping burned areas a temporary set of Sentinel 2 MSI images was acquired and processed and then the classification was executed directly. It was not necessary to segment the images due to having followed a pixel-level analysis. Both classifications achieved high overall accuracy levels, it was 87.01 % in the fuel groups one, while it was 98.28 % in the case of burned areas. These results demonstrate that using multispectral Sentinel 2 MSI images is possible to identify different coverages reliably. This methodology proposed, based on the use of passive remote sensors and its combination with different free and commercial software, allows the existing cartography to be updated. Thus, it could be a really useful tool in planning the management and defense of forest fires.

Keywords: Fuel, Mapping, Sentinel, OBIA, update