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Abstract

Live Fuel Moisture Estimation Using Sentinel 2 Data in Non-Monospecific Mediterranean Shrublands †

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Abstract: Live fuel moisture (LFM) is essential for monitoring fire risk, since it influences vegetation flammability and the rate of spread of fires. Indeed, national and regional fire agencies typically use weather-based methods to predict and map LFM in an operational way. However, contrasting water strategies across species (i.e., isohydric versus anisohydric) and variability in environmental conditions (e.g., soil water conditions) limit the use of these methods. Remote sensing potentially overcomes these limitations, since it directly "observes" vegetation water status. Previous studies using coarse-resolution satellite sensors, ranging from 1 km–300 m (AVHRR, MODIS, ASTER) showed successful results, but were limited to large homogenous and monospecific areas. Here, we take advantage of the new generation of Sentinel-2 sensors, which provide data at high spatial and temporal resolution (10 meters and 5 days, respectively) to build and spatially project an empirical LMF model for heterogeneous Mediterranean areas. The study, located in eastern Spain, includes 15 non-monospecific sample locations and tests different vegetation indices. The Normalized Difference Moisture Index (NDMI), together with the mean temperature of previous days, explained up to 70% of the variability, with a mean absolute error of 6%. Our results highlight the potential usefulness of remote sensing products to build near-real time tailored tools for wildfire risk management.

Keywords: live fuel moisture; wildfires; NDMI

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