



Mapping open burning of agricultural residues from Earth Observations

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Agricultural residue burning is a common practice in various regions of the world, which may have several environmental impacts, including on air quality, and the potential for triggering wildfires. In Portugal, this practice is particularly prevalent during the wet season, spanning from October to April. It involves open field burning of pruning residues and extensive burning to clear shrubbery, creating pastures for livestock. This research, conducted within the framework of the PRUNING project - Mapping open burning of agricultural residues from Earth Observations and modelling of air quality impacts- aims to explore the potential for detecting such events through satellite remote sensing.

The primary focus of this study is to assess the limitations of satellite remote sensing detection, with the overarching aim of integrating these findings into a systematic monitoring framework for open burning of agricultural residues. Additionally, the study aims to predict pollutant emissions and assess their impacts on air quality, providing valuable insights for environmental management and sustainable agricultural practices.

To achieve this goal, an in-depth analysis of known burning events was conducted using infrared thermal sensors. Multiple products, including Fire Radiative Power and fire masks from various sensors (e.g., MODIS, VIIRS, and Sentinel 3), were employed to characterize these known open field burning events. The results of this work allow verifying the tradeoffs effects associated with spatial, spectral, and temporal resolutions for each sensor, elucidating their impacts on the precision and accuracy of event detections. In parallel, this study evaluated the accuracy of the MINDED-FBA method in characterizing these known events. This automatic detection method, allows incorporating data from higher spatial resolution sensors (e.g., Sentinel-1, Sentinel-2, Landsat), for determining the extent of burned areas through multiple multispectral indices. In this context, the MINDED-FBA method may also be used to validate thermal anomalies detection products. Finally, the results of this work have also been compared to a national level register database of open burning, provided by the ICNF (Institute for Nature Conservation and Forests).