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# Joint Use of Sentinel-1 and Landsat-8 data for Burned Areas Mapping: the Case of the Sardinia Island, Italy

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Fires widely affect Mediterranean regions, causing severe threats to human lives and damages to natural environments. The socio-economic impacts of fires on the affected local communities are significant, indeed, the activation of prevention measures and the extinguishment of fires and reclamation of the pre-fire conditions are very expensive. Moreover, fires have also global impacts: they affect global warming and climate changes due to gas and aerosol emissions to atmosphere. In such a context, fire scars mapping and monitoring are fundamental tasks for a sustainable management of natural resources and for the prevention/mitigation of fire risk. With this respect, remotely sensed data offer the opportunity for a regional-up-to-global scale monitoring of areas prone to fires, on a cost-effective and regular basis.
In this work, the potential of a joint use of Sentinel-1A (C-band) Synthetic Aperture Radar (SAR) and Landsat-8 Operational Land Imager (OLI) data for detecting burned areas is investigated. The experimental analyses are conducted by focusing on Sardinia Island, which is one of the Italian regions most affected by fire events during summer. Our analysis shows that the capability of monitoring burned areas in the Mediterranean environment can be improved by exploiting information embedded in OLI multispectral bands in conjunction with multi-temporal dual-polarized SAR data. Indeed, limitations experienced in analyses based on the use of only optical data (e.g., cloud cover, spectral overlap/confusion of burned areas with dark soils, water surfaces and shaded regions) may be overcome by using SAR data, owing to the insensitiveness to sunlight-illumination conditions and the cloud-penetrating capability of microwave radiation.
Results prove the effectiveness of an integrated approach based on the combination of optical and microwave imagery for the monitoring and mapping of burned areas in vegetated regions.