Paper ID: 83193
oral

IAF EARTH OBSERVATION SYMPOSIUM (B1)
Interactive Presentations - IAF EARTH OBSERVATION SYMPOSIUM (IP)

Author: Dr. Fabio Nichele
Tyvak International, Italy

Mr. Giuseppe Crescenzio
Officina Stellare S.p.A., Italy
Dr. Claudio Di Paola
Italy
Mr. Giuseppe D'Amore
Agenzia Spaziale Italiana (ASI), Italy
Mr. Luca Deva
Tyvak International, Italy

EFESTO - FOREST-FIRE PREVENTION: REMOTE SENSING SWIR PAYLOAD FOR AN ITALIAN FLAMMABILITY MONITORING SYSTEM

Abstract

The problem of fires is the destruction of natural environments and man-made structures, and the loss of animal and human lives due to wildfires that rage out of control. The "problem" is a multi-stakeholder, multi-variable, multi-scale problem. Providing additional resources for fire suppression efforts is not a sustainable or viable long-term solution. The increasingly challenging situation of fire management and the increasing direct economic costs require proactive approaches to reduce the likelihood of catastrophic events.

The so-called "fuel load" conditions of a given environment are currently monitored by ground-based sampling, which is not adequate to provide detailed spatial and temporal information over large areas. The use of space-based systems capable of monitoring the conditions of the "fuel load" over sufficiently large areas is emerging, as it is directly linked to flammability indexes. Existing satellite data, however, is not fully fit for purpose in terms of readiness, spatial resolution and signal sensitivity to monitor such conditions.

There is an urgent need to have an adequate national system to monitor the conditions of the "fuel load" in various Italian regions, along the lines of what is developing in other risk areas in the world (e.g. Australia). We propose the design and development of a satellite "payload" consisting of a sensor for monitoring the flammability indices of a given environment, with the aim of providing useful data for the mapping of soils and environments at risk, with the aim of preventing the ignition event of potential fires. Several causes contribute to determining the susceptibility of forest vegetation to fires, among them, the moisture content in the fuel (vegetation) (FMC) and that of the main constituents of the dry matter of the same vegetation, especially lignin and cellulose. Moisture, lignin and cellulose influence the spectral response of vegetation in the optical-reflective domain of the electromagnetic spectrum, between the visible (vis, 250-780 nm), near-infrared (NIR, 780 – 1000 nm) and short-wave infrared (SWIR, 1000 – 2500 nm) wavelengths.

In this project, the team will focus on SWIR shortwave. The resulting product will be a miniaturized shortwave infrared (SWIR) payload designed 100