Utilizzo delle immagini satellitari a supporto delle attività di gestione degli incendi boschivi

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## Prevention

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## Detection/Monitoring

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Fuel reduction map and forecast of suitable conditions for prescribed fire practices.

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### FUELMAP

- **Need for a novel European classification approach** (1 km/250 m)

### ARCFUEL

- **Nested level using RS potential at medium-high resolution** (30 m)

### PREFER

- **Nested level using RS potential at**
- **Refined approach**
- **Considers service repetition (seasonality)**
Yearly Fuel Map

Forest fuel classification according to the assessed capacity to support fire occurrence and contribute to fire potential.

Product Specification:
- Spatial Resolution or Scale: 5m/30m
- Product standard refresh rate: Twice a year
- Area covered by a single Product: 500 km²
- Satellite sensor data Input: RapidEye/ Landsat
- Standard Format: GEOTIFF
Seasonal Fire Hazard Map

Seasonal Fire Hazard Map is a new danger index computed by considering: **natural factors**, distinguishable in static (fuel map, slope, aspect, climatic zone) and dynamic (vegetation index, e.g. NDVI), meteo data, updated fuel map with burnt areas, daily fire hazard index); **human factors**, distinguishable in static (urban areas, roads, fire statistics, cultural factor) and dynamic (actual fire season statistics).

The natural factors take into account the morphological characteristics (slope, aspect) and the vegetation stress (based on a daily hazard index averaged on 15 days).

The human factors consider the accessibility factor, the cultural factor and the seasonal factor. The **cultural factor** is based on the fire occurrences for the last 5-10 years. The **seasonal factor** is based on the actual season fires trend respect to the average of the 5-10 previous years. The actual fires occurrence trend could be evaluated, at present, by using satellite based fire detection systems (FIRMS or SFIDE).

**Product Specification:**

- Spatial Resolution or Scale: 250 m
- Product standard refresh rate: 4 – 8 times a year
- Area covered by a single Product: 500 km²
- Satellite sensor data Input: RapidEye/ Sentinel 2
- Standard Format: GEOTIFF
Daily Fire Hazard Index (DFHI)

Daily Fire Hazard Map provides a medium spatial resolution fire danger index for the present day and the following two. The index is based on MODIS images, and meteorological data acquired daily and on fuel map.

**Product Specification:**
- Spatial Resolution or Scale: 250 m
- Product standard refresh rate: Daily
- Area covered single Product: Regional scale
- Satellite sensor data Input: MODIS
- Standard Format: GEOTIFF

Example of daily hazard index map computed for the Sardinia region. The maps, refer to the whole month of August 2017.
The fire risk map represents the likelihood that a fire may occur and cause losses. It results from the combination of fire hazard (probability of fire occurrence) with vulnerability (potential losses).

\[
\text{Risk} = \text{fire hazard} \times \text{vulnerability}
\]

Vulnerability map represents a relative measure of the potential loss of an area, including:
- Type, number and density of exposed elements
- Level of coping capacity
- Economic value
Prescribed fire map, based on the intersection between the fuel reduction map and weather conditions, provides spatial-temporal indications of the areas where it would be useful to apply the prescribed burning. This practice can be performed under specific conditions.

Prescribed fire conditions are a daily forecast product providing three spatial and temporal maps of the areas "Where" and "When" the fuel load can be reduced by using the prescribed burning. The final products are a set of forecasting daily masks containing only the areas where the climate conditions for the prescribed fire practice are satisfied.

### Product Specification:

- **Spatial Resolution or Scale**: 1:10,000 to 1:25,000
- **Product standard refresh rate**: Daily winter season (November/March)
- **Area covered by a single Product**: Portuguese, Spanish, Italian AOI
- **Satellite sensor data Input**: VHR satellite images
- **Standard Format**: GEOTIFF

### Prescribed Fire Conditions

**Prescription elements** | **Range**
--- | ---
burn season | Nov - Feb
wind speed (km hr⁻¹) | 2 - 8
air temperature (°C) | 6 - 15
relative humidity (%) | 35-65
N. days since rain | 2
Burn Scar perimeters at cadastral scale (1/1.000-1/4.000) obtained through contextual analysis of Very High Spatial Resolution Optical EO data. An example of Burn Scar Map VHR Optical extracted through contextual analysis of very high spatial resolution Kompsat-2 image, is represented in white.

Soil erosion susceptibility is described through indicator(s) based on soil erosion model of the Universal Soil Loss Equation (USLE) family (RUSLE, G2).

The Damage Severity Map provides the degree of damage in a burned areas. The algorithm for the determination of post-fire damage severity is based on a multi-temporal analysis of vegetation spectral index. The damage severity is represented by a scale of damage from 0 to 5 indicating the degree of damage. The index is based on pre and post-event L8 images and makes use of the PREFER product ‘HR Burn scars’.
Thank you for your attention!

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S2IGI: Sistema satellitare integrato gestione incendi
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