

INGV contribution to wildfires

Mapping fire activity

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Mapping Fire activities

INGV specialists use a number of algorithms adapted to a range of data deployed by a variety of space sensors such as **Multispectral, Hyperspectral, Thermal and SAR** to characterize active fires and their impact on vegetation and soil erosion.

Space sensor type (no commercial)	Spatial resolution
Multispectral	10-30m
Hyperspectral	30m
Thermal	60-100m

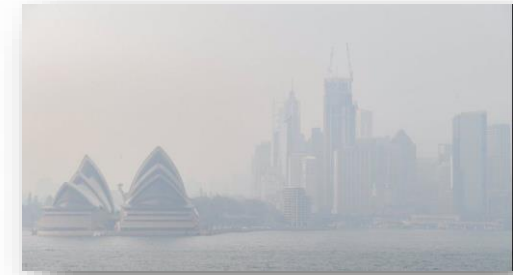
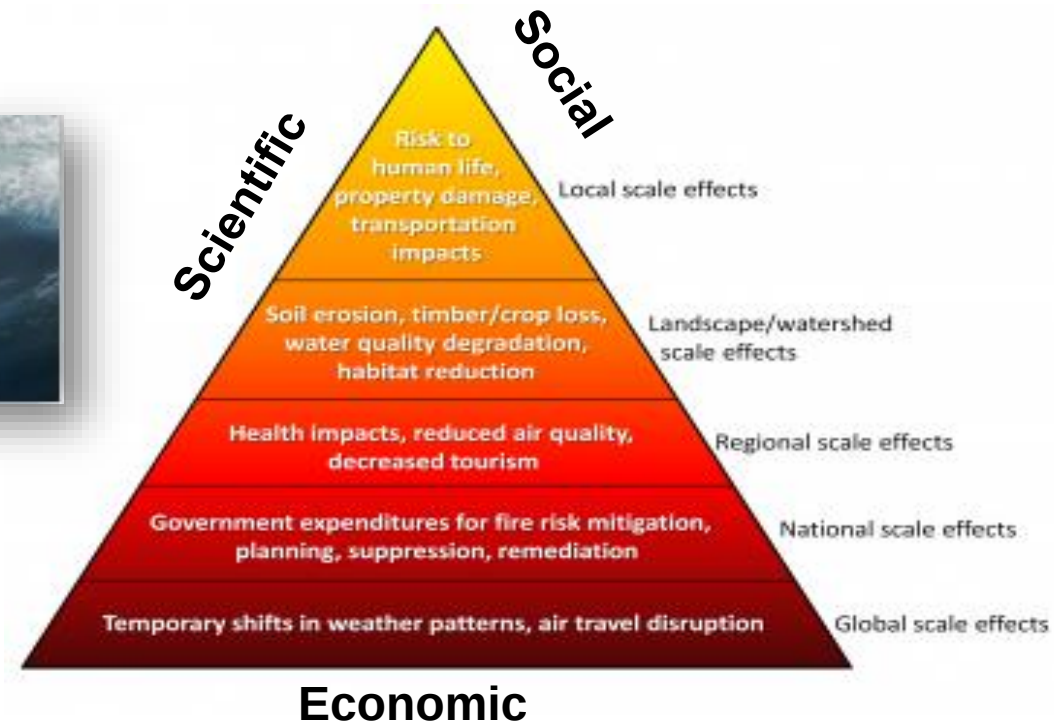
Science and Technology for wildfire characterization



SimGA for Hyperspectral fire detection 2006
- AIRFIRE –ESA funded project -

• SCIENTIFIC RATIONALE

Forest Fire: mapping fire activity near real time monitoring and applicaton



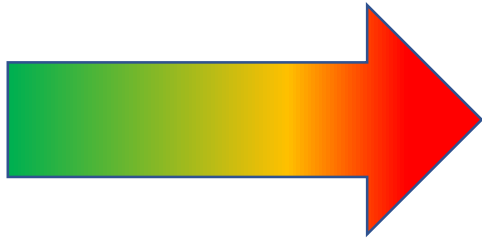
<https://www.fbcnews.com.fj/world/sydney-residents-choking-on-intense-bushfire-pollution/>



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- SCIENTIFIC RATIONALE

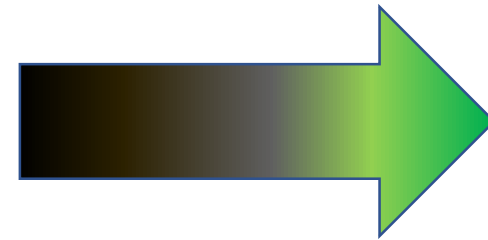
Pre-Fire



Active-Fire



Post -Fire



- OBSERVATIONAL INFRASTRUCTURE

- Producer portal access
- It can include INGV Antenna

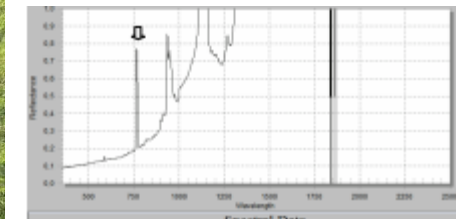


• TECHNOLOGICAL LABORATORIES

- Instrument requirements definition for new sensor development
- Laboratory (Laboratorio di Ottica – ONT) and open laboratory: instruments for spectra collection



Fire
reflectance



Amici, G. D. Clay , J. McMorrow, F. Mark Danson, Badi Abdulbaset ,2016

• INFRASTRUCTURE FOR DATA MANAGEMENT

- Data Storage
- Cloud computing
- Dedicated computer

- INFRASTRUCTURE FOR DATA PROCESSING

- From Pre-operational Modules to Operational Module
- Dedicated resources: trained remote sensing specialist vs automatic processing

Module: active fire characteristics

Pre-operational stage

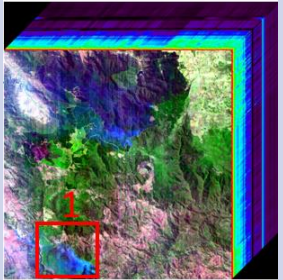
Input



Procedures



Distribution

Access	Sensor	Algorithm	Application	Users	Example
Product portal (ASI)	PRISMA	HFDI* SVM* AKBD**	Propagation Active front delineation	Emergency response National command and control service Media Humanitarian Aid Agencies	Web site: public view product Web service: on demand Raster Map
Product portal: NASA	ECOSTRESS	Developing phase*	Intensity Communicatio n product		 Amici S. and Piscini A., MDPI 2021
Product portal Copernicus	Sentinel 2	developing phase*			

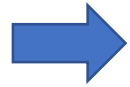
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Limits: * Cloudiness **Limited to a prioritized acquisition schedule, not optimal spectral resolution, SNR, striping

Module: Burnt area characteristics

Pre-operational stage

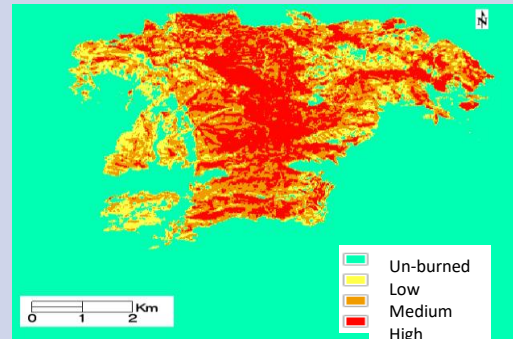
Input



Procedures



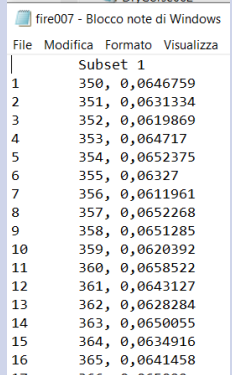
Distribution

	Sensor	Algorithm	Application	Users	Example
Product portal (Copernicus, NASA catalogue)	Sentinel 2 Landsat 8	NBR dNBR	- Vegetation Mortality, Ecosystem Recovery, Land use change - Burnt area is considered as the primary variable that requires climate-standard continuity. - Combined with information on available fuel load and fuel consumption is used to estimate emissions of trace gases and aerosols - Burnt area can also include the combustion of surface and below-ground organic material (peat) - Burnt area can be used as input to climate and carbon-cycle models. - At national level	National institutions Humanitarian Aid Agencies Media	Web site: public view product Web service: on demand Raster Map  Contains modified Copernicus Sentinel 2 [2018]
Product portal (NASA catalogue)	ECOSTRESS	Band/ratio			

Module: spectra collection

Close to operational stage



Access	Sensor	Algorithm	Application	Users	Example
Labratory	Fieldspec	Reflectance retrieval	Validation Endmenber for ground thruth	Product developer	Web site: public view product Web service txt 

• CURRENT DISTRIBUTION OF PRODUCTS

➤ Scientific community peer review papers

➤ Zotero

➤ Project website



• PROGRAMS/PROJECTS OF REFERENCE

- **Algorithms and procedures** have been developed within scientific institutional and international collaborative work
- **Demonstration phase: (Fire localization)**
current activity aiming to create a processor which uses specific hyperspectral bands for fire location

• PROGRAMS/PROJECTS OF REFERENCE

- SHALOM - (ASI) 2021
- Studio di missione MIR –TIR (ASI)
- Progetto Libera ricerca
- ASI-AGI (ASI)
- AIRFIRESC/N 2009 (ESA)
- OECD COoperative Research Program Fellowship
- Honorary visiting Researcher at The University of Manchester
- Visiting researcher at Kings College London

• TEAM AND AFFILIATIONS



Stefania Amici -ONT

National/International colleagues



Agenzia Spaziale Italiana

