

## NEW FRONTIER FOR EMERGENCY RESPONSE: SATELLITE DATA

*The space-based approach gives an innovative instrument to improve rescue operations in terms of rapid mapping for identifying targets and priorities.*

### The challenge

The Italian National Fire and Rescue Service guarantees a 24/7 response for any type of emergency. For this purpose, the first requirement is the rapid identification of the affected area in order to define the amount of resources and minimise the time of deployment.

Consequently, a point of view not involved in the operational scenario is fundamental. A significant contribution to this approach is an optical analysis of the affected area through the Earth Observation programme.

### The space based solution

Two real emergencies affecting the Italian territory are described below. Data from Sentinel-1 and Sentinel-2 were used to support the management function, and, using multispectral bands (SWIR and false colour NDVI) it was possible to represent the impact of floods and forest fires, two very different types of scenario.

During December 2017, the Emilia Romagna region was affected by flooding. The delimitation of the flooded area compared to a land use map allowed the identification of the civil and commercial buildings, streets and highways involved. In this way, it was possible to define the amount of affected people to be rescued and to be displaced in safe accommodations.

In August 2017, in the Campania region, a big forest fire occurred on the slopes of Vesuvius. The delimitation of burned areas provided data for monitoring the emergency evolution taking into account threatened infrastructures, available roads for rescues, targets for aerial forest fire fighting vehicles, etc. It was also possible to collect data for statistical purposes such as the type of affected

vegetation, the extent of the event and, the number of deployed Fire and Rescue Service teams, in order to improve the planning process for future forest fire fighting operations.

These two cases aim to show how the use of satellite data, a few hours after the event, allow optimising the deployment of rescuers, reducing response times.

### Benefits to Citizens

The Italian National Fire Corp operates in every regional area, coordinated by a Central Emergency Directorate, a few minutes after events. In the Central Emergency Directorate, we activate a technical team that immediately made a plan based on a cartographic survey of the affected area. The "Space-Based" approach for emergency management, using small-scale geography, allows a stronger awareness of the scenario evolution and therefore a faster and more targeted operational response which provides a more effective and efficient support to the population. Delimitation of an affected area overlapped to, for example, population density allows an estimate to be made of the number of people affected and threatened and to optimise the planning phase of the assistance in terms of the number of rescuers and resources needed.



Italy - Reggio Emilia 2017, multispectral image (Sentinel) showing flooded areas, in light blue, near Lentigione town due to Enza river flooding.  
Credit: Contains modified Copernicus Sentinel data [2017]

Thematic Area



CIVIL PROTECTION

Region of Application



ITALY

Sentinel mission used



S1  
S2

Copernicus Service used



-

Usage Maturity Level



3

As mentioned above, we need emergency mapping a few hours after the event, hence EO Data are necessary as soon as possible, just after the acquisition by satellite in order to create self-produced maps. The Copernicus EMSservice is used to compare and to verify the results of our map processing.

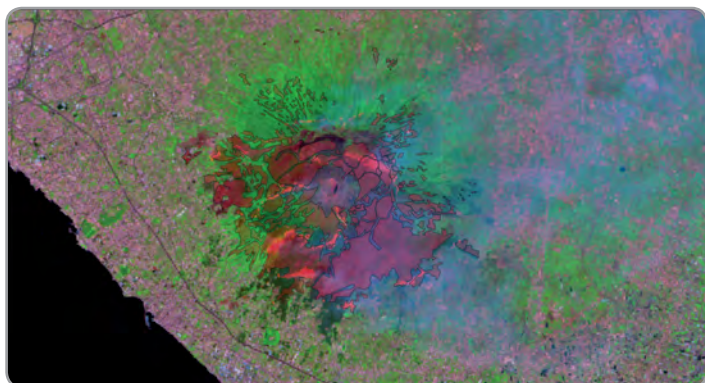
## Outlook to the future

The objective for the future: higher spatial resolution and higher temporal incidence.

Improving the temporal incidence will give more images, resulting in a more accurate analysis of the evolution of the event and a higher possibility of analysis to be integrated with our daily data entry.

A higher spatial resolution also provides a more realistic scenario.

The Italian National Fire and Rescue Service is improving their knowledge and skills in using satellite data, optical and SAR products, in emergency and planning activities.



Italy - Vesuvio 2017, diachronic analysis with change detection method (Sentinel) showing burned areas, in red, due to forest fires occurring on the slopes of the volcano during last summer.

*Credit: Contains modified Copernicus Sentinel data [2017]*

“The satellite data planning changes the way to prepare, plan and respond to an emergency, optimizing risk analysis and rescue operation efficiency.”

*Italian National Fire Corps*

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## ABOUT COPERNICUS4REGIONS

This Copernicus User Story is extracted from the publication “**The Ever Growing use of Copernicus across Europe's Regions: a selection of 99 user stories by local and regional authorities**”, 2018, Edited by NEREUS, the European Space Agency and the European Commission.

The model cases focus on local and regional authorities who successfully applied Copernicus data in 8 major public policy domains. The views expressed in the Copernicus User Stories are those of the Authors and can in no way be taken to reflect the official opinion of the European Space Agency or of the European Commission.

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