



Fourth Edition

**“NATURAL HAZARDS AND CULTURAL
HERITAGE”**

PRESERVATION STRATEGIES

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Modern Approaches and Technologies in Search and Rescue Operations

Geol. Saverio ROMEO, PhD

Coordinator of the National Technical-Scientific Committee of LARES Italia
saverioromeo@uniprotezionecivile.it



Foligno (PG)

22 July 2026

Saverio ROMEO

Coordinator of the National
Technical-Scientific Committee of LARES Italia

Modern Approaches and Technologies in Search and Rescue Operations

Saverio Romeo is an **Engineering Geologist** at the Italian Institute for Environmental Protection and Research (ISPRA), specializing in **geological remote sensing** and the design of advanced **monitoring systems** for geotechnical and structural assets. With extensive technical expertise in Terrestrial SAR Interferometry, Laser Scanning, and advanced imaging techniques, he contributes to cutting-edge solutions aimed at enhancing safety, infrastructure resilience, and risk management. A Licensed Engineering Geologist and former President of LARES (Italian Union of Civil Protection Experts), he has a proven track record as an international technical consultant for major infrastructure and research projects. A proud member of the European Geosciences Union (EGU), he remains actively engaged with the latest scientific advancements. Beyond his technical work, he is deeply passionate about geoscience outreach, collaborative teamwork, and field exploration.



The Culture of Prevention in Civil Protection

The Role of Citizens, Volunteers,
and Professionals

LA RES ITALIA

NATIONAL UNION OF CIVIL PROTECTION EXPERTS

LA RES@UNIPROTEZIONECIVILE.IT | WWW.UNIPROTEZIONECIVILE.IT





Who we are

LARES – don't call it an acronym...

Ancient figures for a modern concept of civil protection

APS – Association for Social Promotion

Part of the Third Sector Entities: civic, solidarity-based, and socially useful purposes

Registered in the central list of volunteer organizations of the Department of Civil Protection



The context

SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION 2015-2030



Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, **social**, health, **cultural**, **educational**, environmental, technological, political and institutional **measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery**, and thus strengthen resilience.



LARES adopts a multidisciplinary and participatory approach, focusing on the co-production of knowledge and on educational pathways tailored to different audiences: students, educators, volunteers, professionals, and the general public.



Our values

...since 2006!

The Lares are guardian deities in ancient Roman mythology, protectors of the domestic hearth and the family, the first fundamental cell of every society: ancient figures for a modern civil protection concept.



Foto Dipartimento Protezione Civile



<https://www.uniprotezionecivile.it/>



Where we are



In red the regions with which Lares Italia has an active agreement with at least one university.



Civil Protection Activities



Development and promotion of projects for the dissemination of Civil Protection culture



The LARES experience provides transferable practices aligned with the Sendai Framework priorities, contributing to informed, aware, and resilient communities.



Civil Protection Activities



Operational support in emergencies: training





Civil Protection Activities



Emergency Management and recovery

Operational support:

- 2009 - L'Aquila Earthquake
- 2012 - Emilia Romagna Earthquake
- 2016 - Central Italy Earthquake
- 2023 - Emilia-Romagna Flood
- 2024 - Campi Flegrei Bradyseism





Are disasters on the rise?

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Has the unpredictability of geological disasters been increased by global warming?

[Huiran Gao](#), [Chong Xu](#) , [Saier Wu](#), [Tao Li](#) & [Yuandong Huang](#)

npj Natural Hazards **2**, Article number: 55 (2025) | [Cite this article](#)

Is the number of natural disasters increasing?

A deep dive into missing data and the limitations of disaster databases.

Research Article

Is the number of global natural disasters increasing?

[Gianluca Alimonti](#) & [Luigi Mariani](#) 

Received 28 Nov 2022, Accepted 18 Jul 2023, Published online: 07 Aug 2023



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Number of reported natural disaster events, 1900 to 2025

The number of global reported natural disaster events in any given year. Note that this largely reflects increases in data reporting, and should not be used to assess the total number of events.



Data source: EM-DAT, CRED / UCLouvain (2026)

Note: Data includes disasters reported up to April 2026.

OurWorldinData.org/natural-disasters | CC BY



Many organizations have reported a dramatic rise in actual disaster events. e.g.:

- Food and Agriculture Organization of the United Nations (2023): “According to the International Disaster Database (EM-DAT) of the Centre for Research on the Epidemiology of Disasters (CRED), disaster events have increased from 100 per year in the 1970s to around 400 events per year worldwide in the past 20 years.”
- UN chief says natural disasters have quadrupled since 1970. This statement was then reported by the UNFCCC.
- World Meteorological Organization (2019), on page 16: “The number of disasters has increased by a factor of five over the 50-year period: whereas 711 disasters were recorded for 1970-1979, 3536 were recorded in 2000-2009.”
- UN Framework Convention on Climate Change (UNFCCC): “The number of disasters has increased by a factor of five over the 50-year period, driven by climate change, more extreme weather, and improved reporting.”

! The increase in the number of disasters is partly a result of reporting bias.



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**PREVENTION
SAVES
LIVES!**



COVID-19
RESPONSE



UNDRR
UN Office for Disaster Risk Reduction

'Natural' disasters do not exist

#PreventionSavesLives



“ Hazards turn into disasters because our human decisions don't take us to reduce vulnerability exposure. Disasters are, in a way or another, all human made.

Mami Mizutori
Special Representative
of the Secretary-General
for Disaster Risk Reduction





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Miami Beach, Then and Now



1925



2017

Source: Roger Pielke, Jr., The Climate Fix: What Scientists and Politicians Won't Tell You About Global Warming, 171.





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Naples (Vesuvius Volcano)





Type of disaster

A few examples from Italy in recent years...

Earthquake



24 August 2016
30 October 2016
18 January 2017

Central Italy

299 victims, 65000 displaced.



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Landslide



26 November 2022
Casamicciola Terme (NA)

12 victims, 5 injured, 462
displaced,
40 affected homes.



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15-16 settembre 2022
Prov. Ancona e Pesaro-Urbino

12 victims, 1 displaced, 50
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Avalanche



3 luglio 2022
Ghiacciaio della Marmolada

11 victims, 8 injured



Search and Rescue is a race against time

In SAR operations, technology must reduce time, uncertainty and risk for rescuers.



- Define search areas and priorities.
- Support safe access for ground teams.
- Share information with the command room.
- Use data to guide decisions, not to replace them.

SAR = Search And Rescue

~~SAR = Synthetic Aperture Radar~~



Technology stack for SAR

No single technology is enough.

Satellite /
Copernicus

GIS maps

UAS RGB /
thermal

Radio
communication

Command
room

Data sharing

Ground teams





From sensor to decision

The operational value chain.

Data that does not reach the decision maker in time has little operational value.





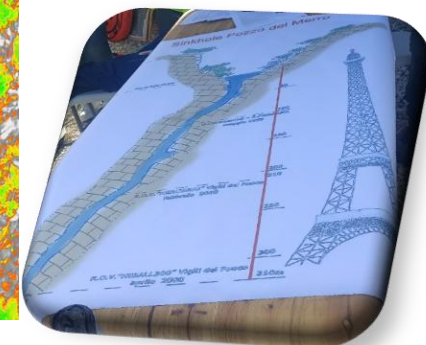
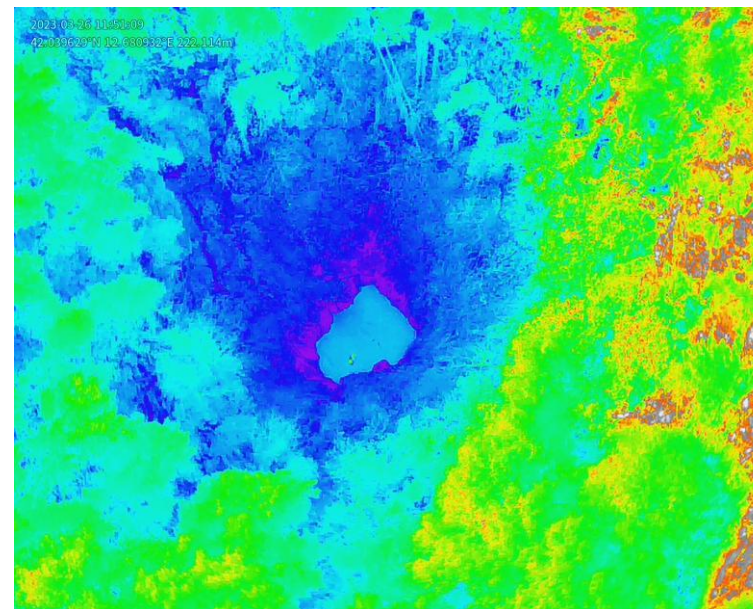
Case study: missing person search

Operational goal: support ground teams in locating possible human presence

Sensors: RGB and thermal imaging

Main challenge: distinguish relevant thermal targets from environmental noise

Lesson learned: combine thermal detection with context and verification





What the drone added to the operation

The drone supports the mission, not the opposite!

- Rapid overview of the area
- Access to difficult or unsafe zones
- Thermal scanning of priority sectors
- Georeferenced observations
- Support to ground team coordination
- Mission documentation for debriefing

