

# Monitoraggio del rischio geo-idrologico

*Danilo Godone, PhD – CNR IRPI*

**3 ottobre 2023**

Research Scientist at the Research Institute for Hydrogeological Prevention and Protection / Geohazard Monitoring Group



## Istituto di Ricerca per la Protezione Idrogeologica (IRPI)

### Ricerca, Risk analysis e Monitoraggio



#### Attività

- ordinarie:  
Identificazione, analisi e monitoraggio dei rischi geoidrologici.
- straordinarie:  
Supporto tecnico-scientifico durante e dopo le emergenze (alluvioni, terremoti, frane, etc.)

# Forestali nell'Istituto

Torino

1. Ricercatore, Responsabile di Secondaria;

Padova

1. Ricercatore;
2. Primo Ricercatore;
3. Dirigente di Ricerca, Responsabile di Secondaria.



## Rapporti Ordine/Istituto

	ACCORDO DI COLLABORAZIONE	
	PER	
	LO SVOLGIMENTO DI ATTIVITA' FORMATIVA E SPERIMENTALE	
	TRA	
	la Federazione Interregionale degli Ordini dei Dottori Agronomi e dei Dottori Forestali del Piemonte e Valle d'Aosta (di seguito FODAF) codice fiscale nr. 97549470017 con sede Via Amedeo Peyron 13, Torino, rappresentato dal dott. agronomo Gian Mauro Mottini, nella sua qualità di Presidente pro tempore, avente i poteri per il presente atto,	
	E	
	il Consiglio Nazionale delle Ricerche, Istituto di Ricerca per la Protezione Idrogeologica, del Dipartimento Scienze del sistema Terra e tecnologie per l'ambiente, con sede in Perugia, via Madonna Alta 126, (C.F. 80054330586) – di seguito "CNR IRPI" – nella persona del Direttore f.f., Dott. Alessandro PASUTO;	

Decorrenza 18/12/2020  
Durata 2+2 anni

- Ricerca avanzata nell'ambito del rischio geo-idrologico e sviluppo di metodi di monitoraggio innovativi;
- Ideazione e realizzazione dei nuovi strumenti e software di monitoraggio (**3 brevetti**);
- Supporto tecnico e scientifico a istituzioni pubbliche e private per il monitoraggio e l'analisi del rischio geo idrologico;
- Gestione “grande strumentazione” – LiDAR aereo.



# Casi studio

**5 Terre (UNESCO) Flood**



**Costa Concordia**



Vettori spostamento  
1.55 metri

**Metro C – Fori Imperiali**



**Mt de La Saxe rockslide (10 M m<sup>3</sup>)**



**Montaguto earthflow (6 M m<sup>3</sup>)**



**Ponzano earthflow/slide**

<http://gmg.irpi.cnr.it/index.php/en/dove-operiamo>



## LEGENDA

### Processi Analizzati

-  Frana / DGPV
-  Debris Flow
-  Evento Sismico
-  Evento Alluvionale
-  Ghiacciaio / Rock Glacier
-  Dinamica Fluviale
-  Ambiente Ipogeo

### Altre Attività

-  Valutazione Stabilità Infrastruttura
-  Grandi Emergenze
-  Smart Farming

Ulteriori dettagli [qui](#)

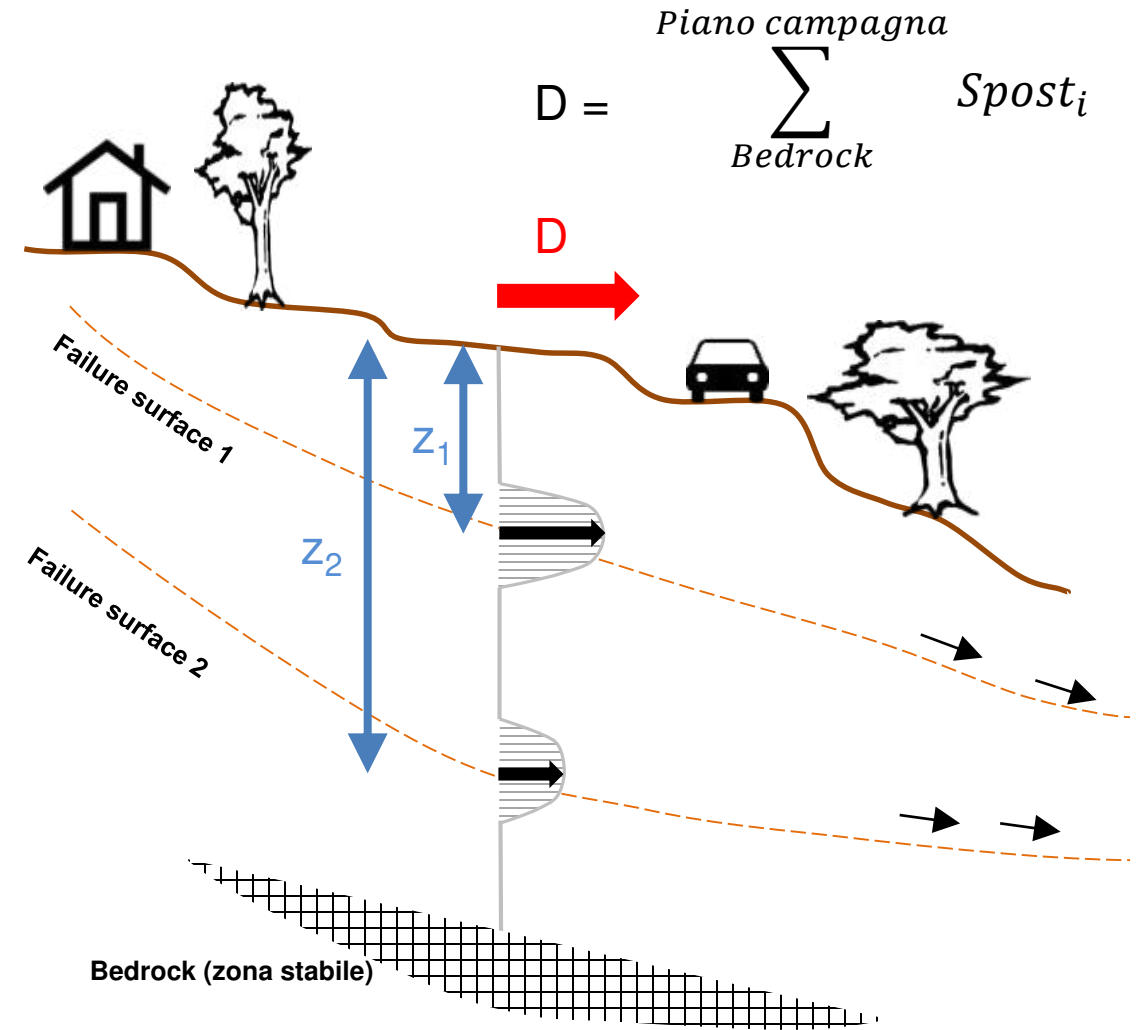
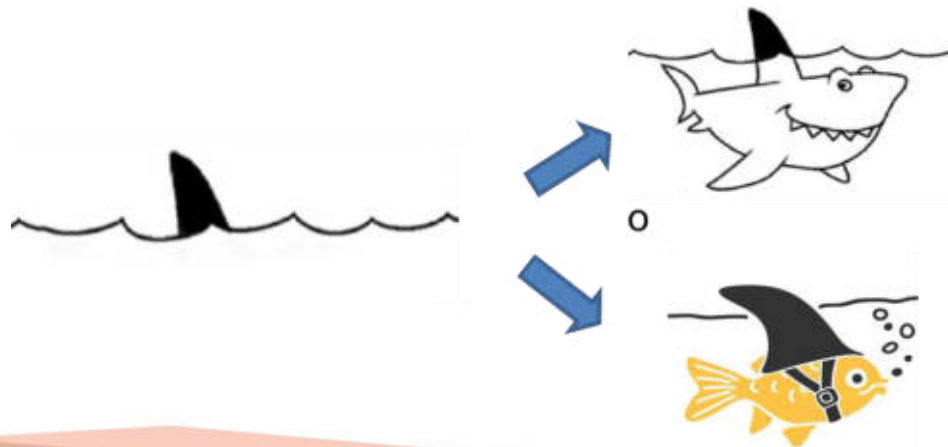
# Monitoraggio - Definizioni

## Monitoraggio continuo/periodico

**Monitoraggio superficiale:** Determinazione della cinematica dei movimenti e della geometria del corpo di frana.

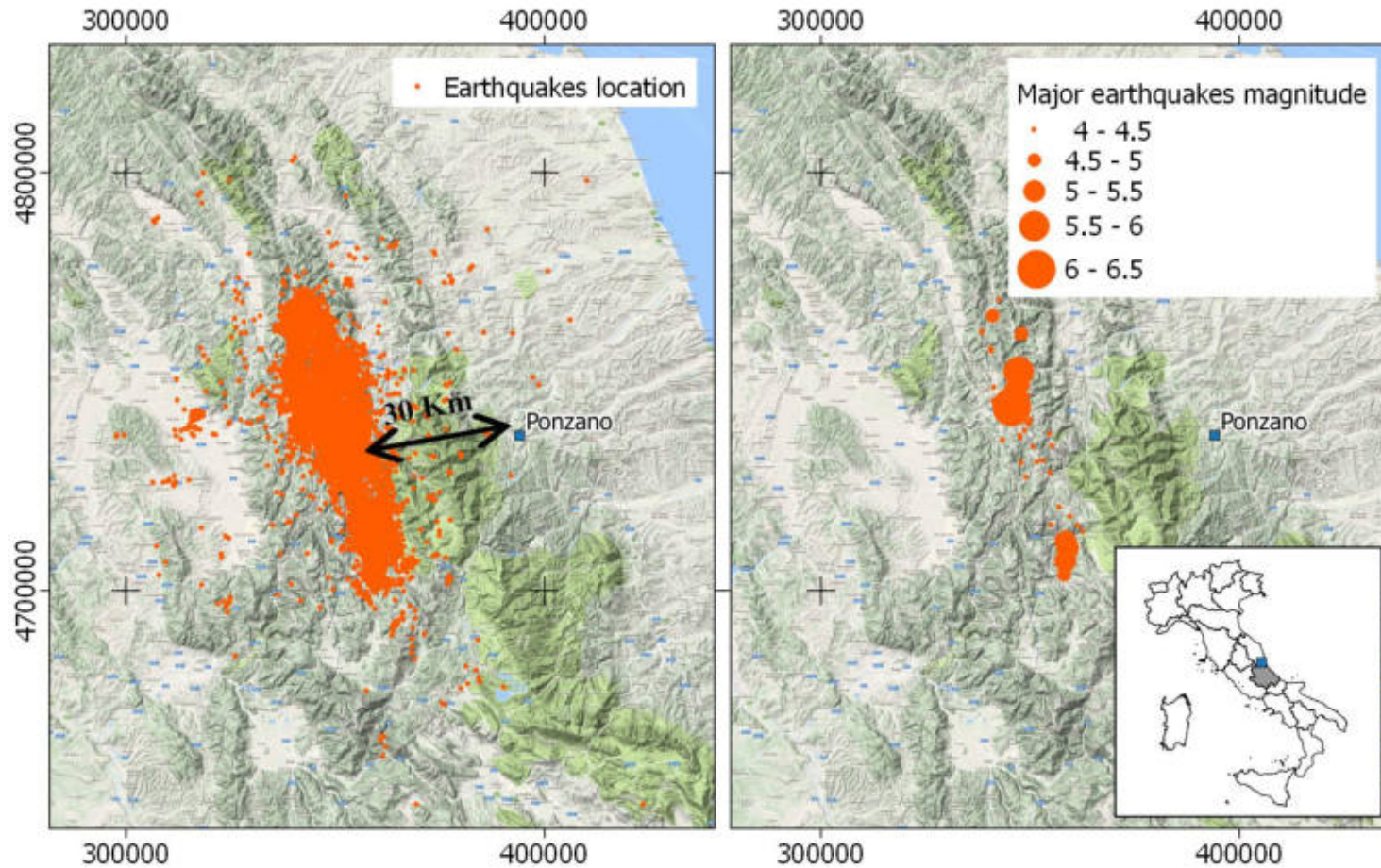
## Monitoraggio profondo:

- Determinazione del campo deformativo in profondità;
- Identificazione della profondità della superficie di rottura;
- Misura delle pressioni interstiziali;

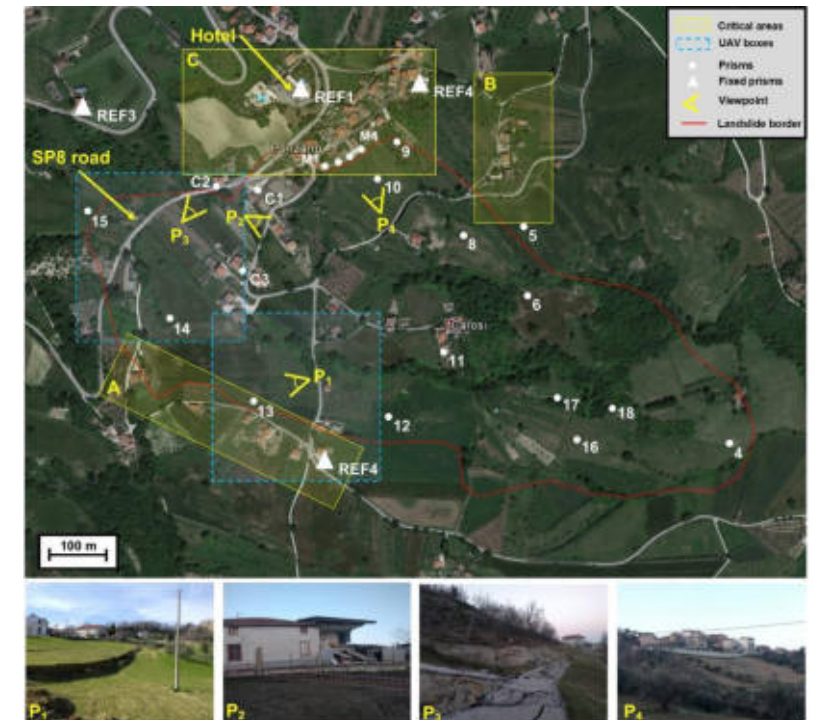


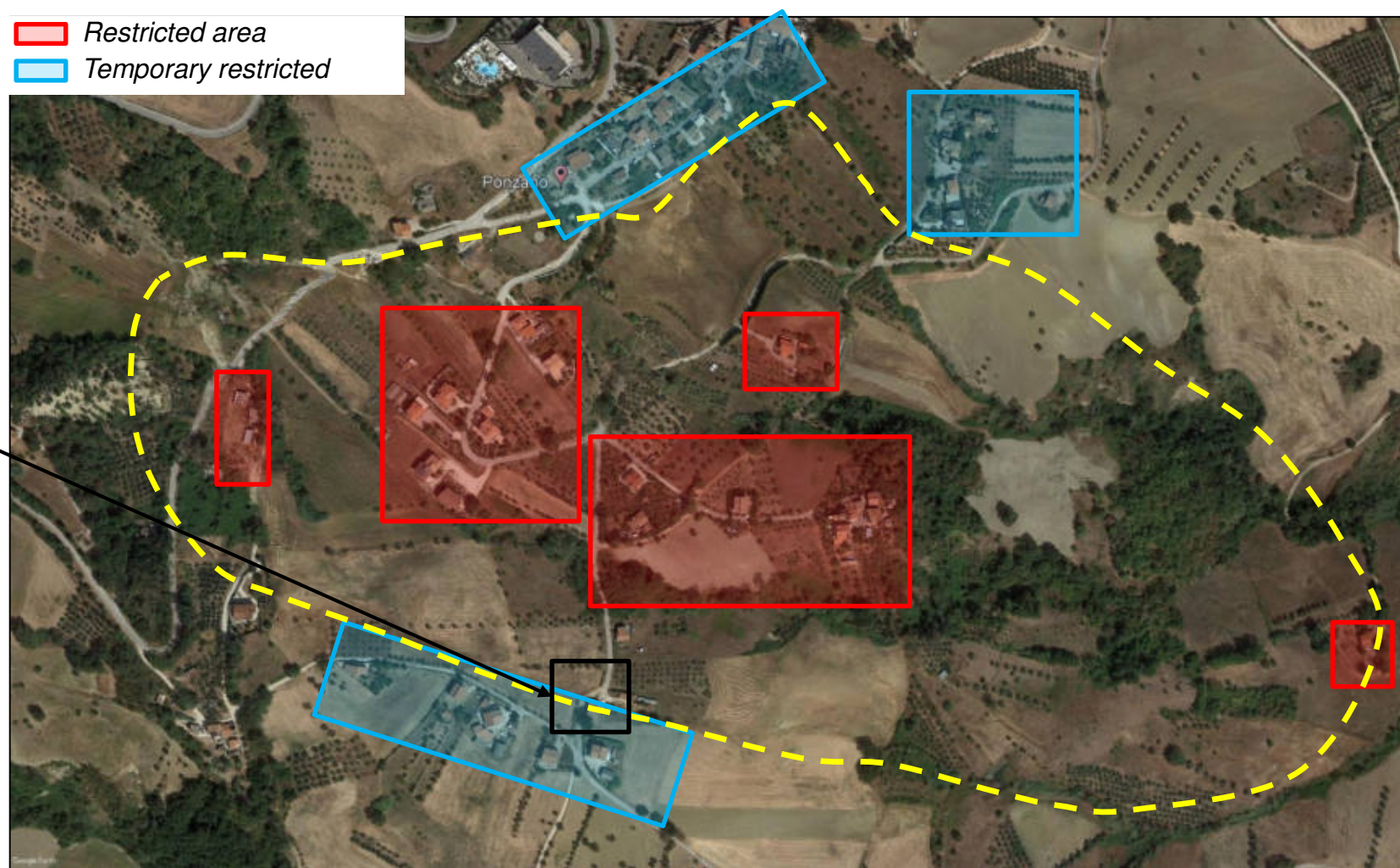


# Ponzano (TE) Landslide

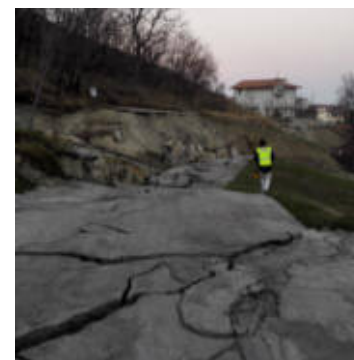
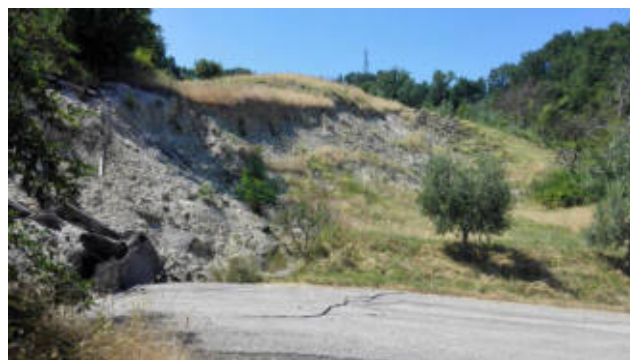


- 12 Febbraio 2017
- Riattivazione della frana di Ponzano
- Fase critica → spostamenti fino a ~8 m





- Superficie: ~ 60 ha
- Profondità media: 12÷15 m
- Volume: ~  $4\div 5 \cdot 10^6$  m<sup>3</sup>
- Deformazione 6÷8 m
- 33 edifici danneggiati
- 100 persone evacuate
- **Stima dei danni: > M€**



# Anomalie meteoclimatiche



**SETTORE GRANDI MASSICCI APPENNINICI E APPENNINO ABRUZZESE**

BOLLETTINO VALANGHE - EMESSE ALLE ORE 14:00 del 21/01/2017

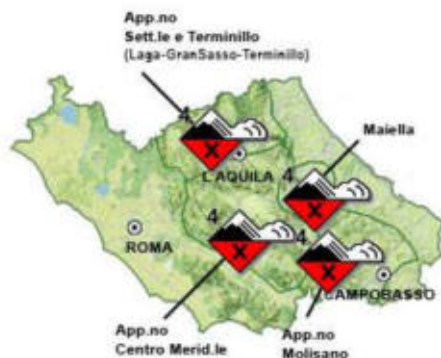
a cura del **COMANDO UNITA' TUTELA FORESTALE AMBIENTALE E AGROALIMENTARE**

In collaborazione con il Comando Truppe Alpine e il Servizio Meteo dell'Aeronautica Militare

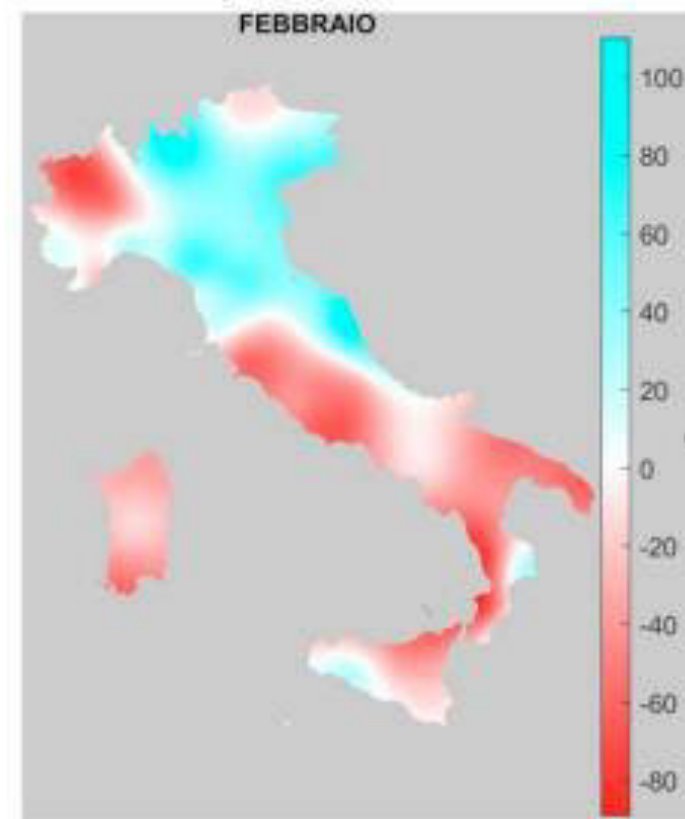
SITUAZIONE alle 14.00 del 21/01/2017

DISTRIBUZIONE PERICOLO: FORTE 4.

TIPO DI PERICOLO: NEVE FRESCA - NEVE PALLOTTOLARE COPERTA DA NEVE FRESCA

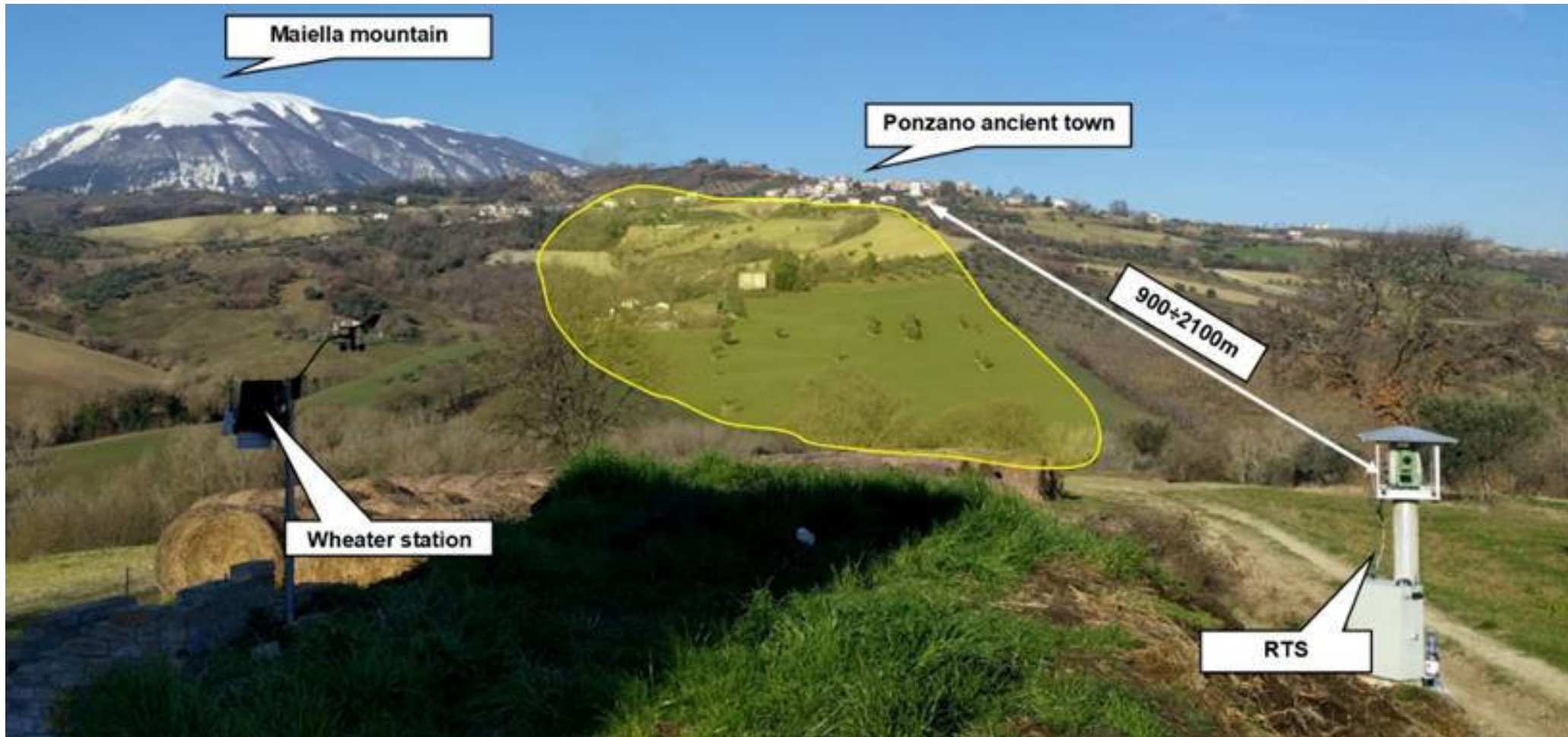


SOTTOSETTORE	PROBLEMA	ESPOSIZIONI PIU' CRITICHE	QUOTE PIU' CRITICHE	QUOTA NEVE m.		ALTEZZA NEVE		
				NORD	SUD	NEVE sm.	NEVE FRESCA sm.	QUOTA
LAGA GRANSASSO TERMINILLO				500	600	220	000	1050
APP.NO CENTRO MERIDIONALE				1000	1200	238	000	1729
MARELLA				300	500	145	000	650
APP.NO MOLISANO				500	700	160	000	1429

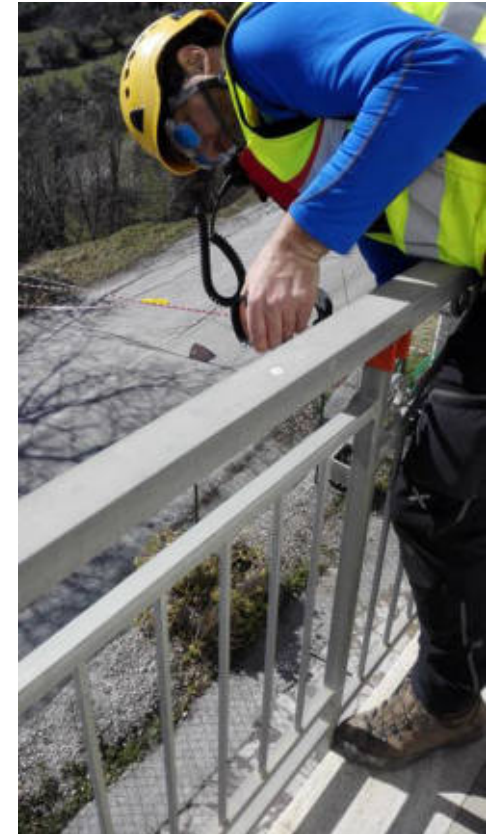
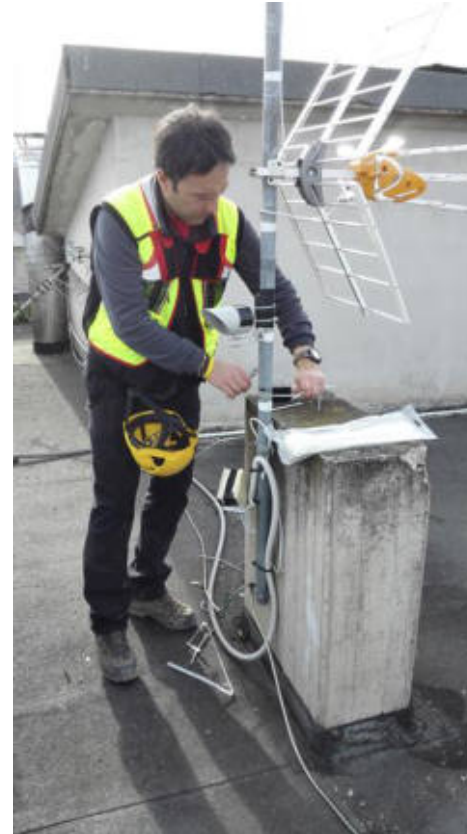


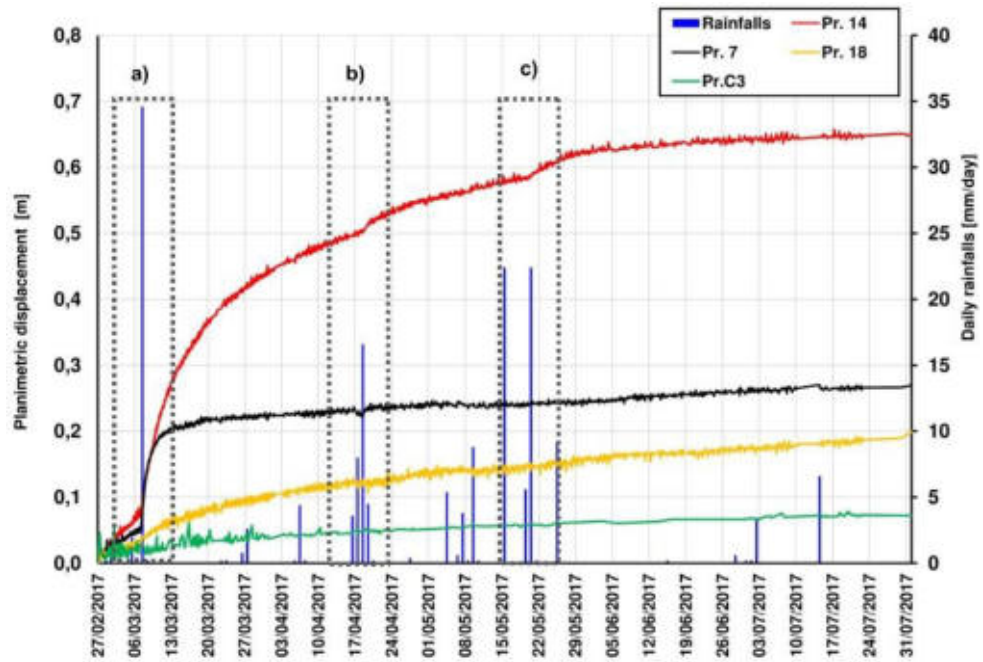
Anomalia della precipitazione cumulata mensile, espressa in percentuali, rispetto al valore normale 1961-1990  
[https://www.isprambiente.gov.it/files2018/pubblicazioni/statoambiente/SA\\_80\\_18\\_Indicatori\\_clima\\_2017.pdf](https://www.isprambiente.gov.it/files2018/pubblicazioni/statoambiente/SA_80_18_Indicatori_clima_2017.pdf)

# Monitoraggio RTS (Robotized Total Station)



## Monitoraggio RTS - Prismi

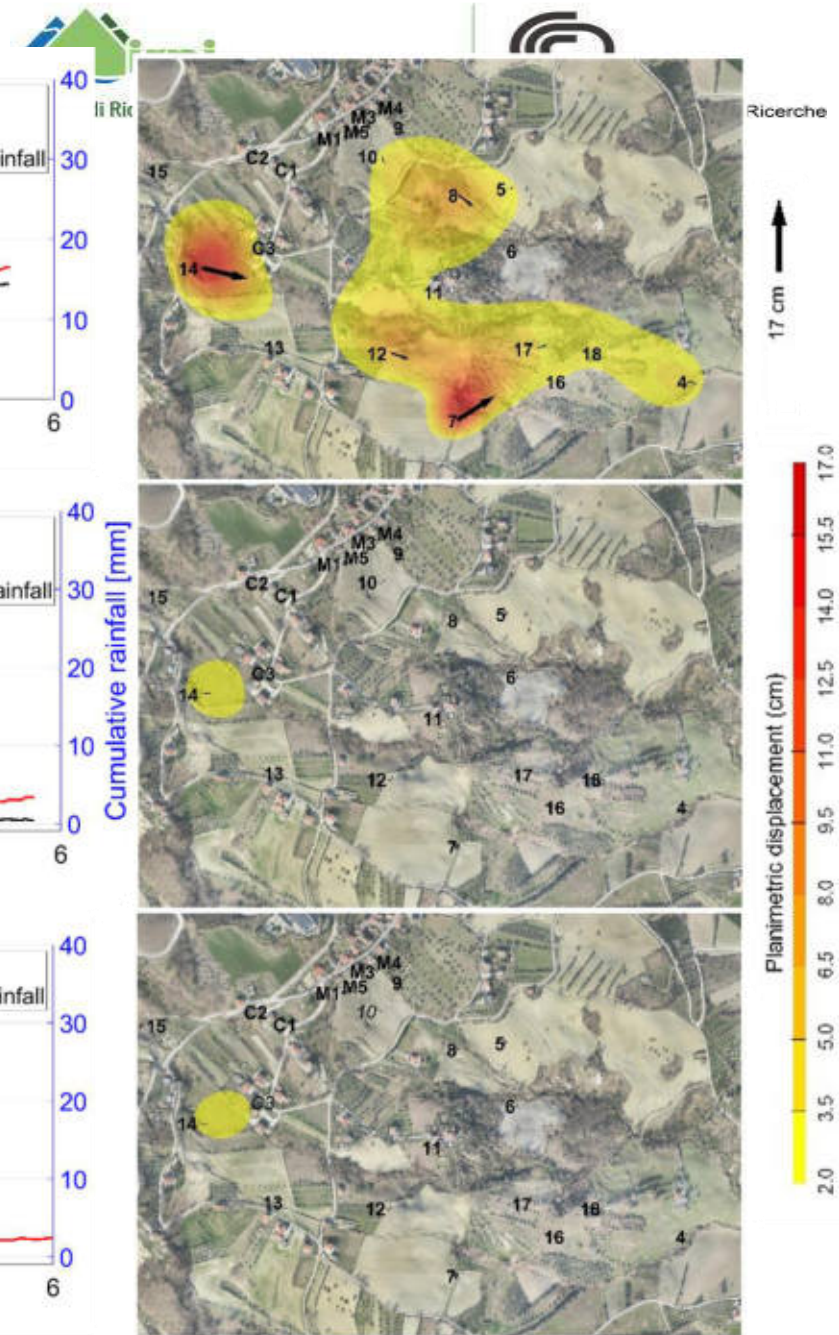
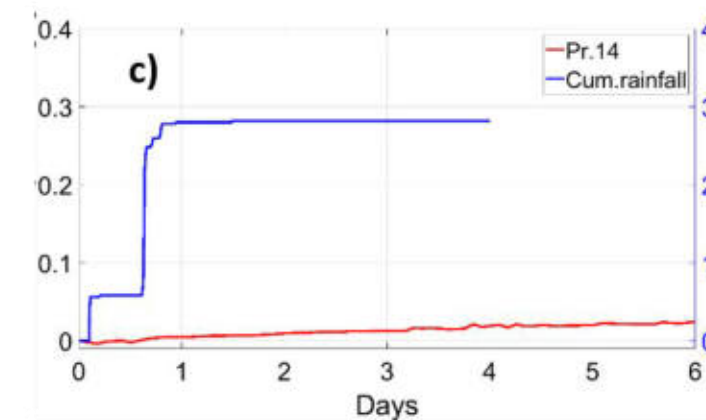
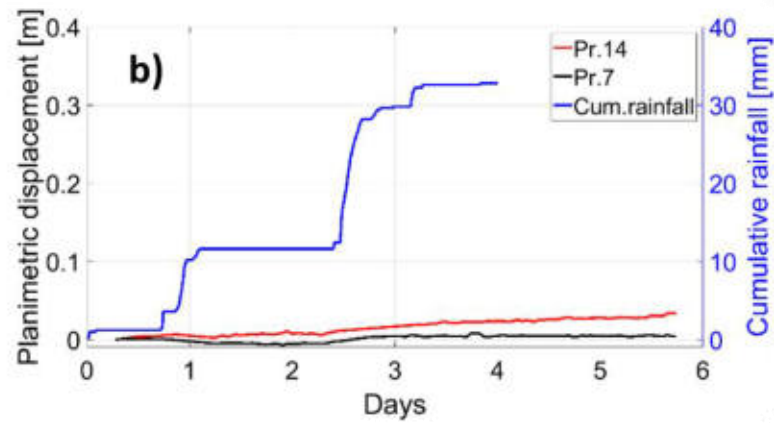
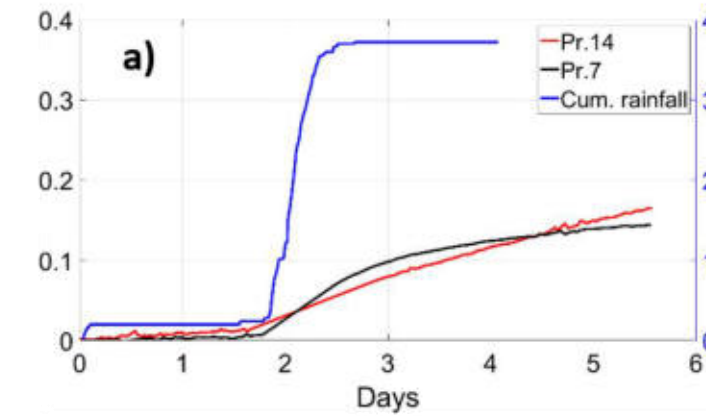


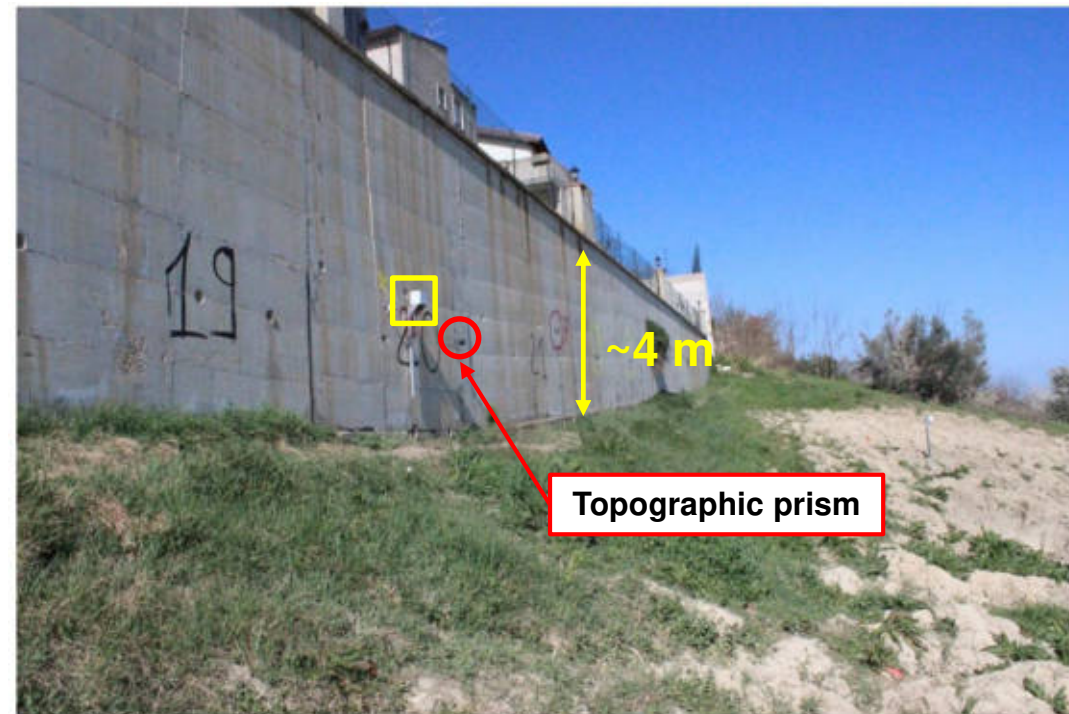


Progressiva riduzione della sensibilità della frana alle precipitazioni.

30 mm / 3 days  
vs  
Prism n.14

- a) 20 cm
- b) 5 cm
- c) 1 cm





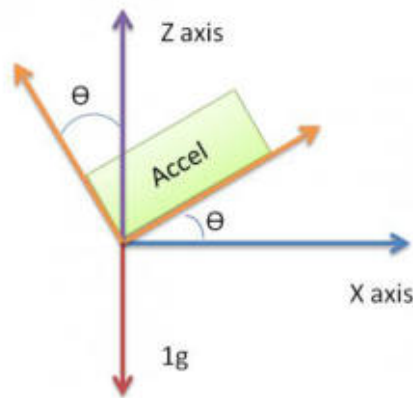
**Topographic prism**



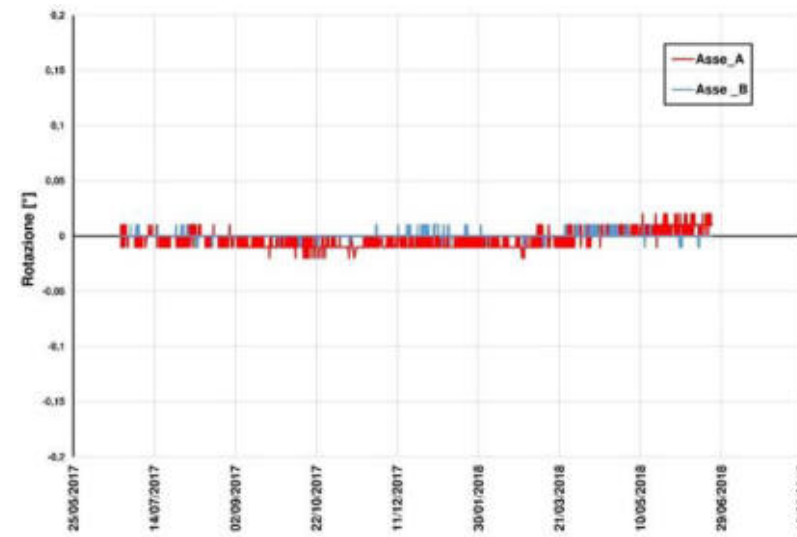
**P<sub>4</sub>**



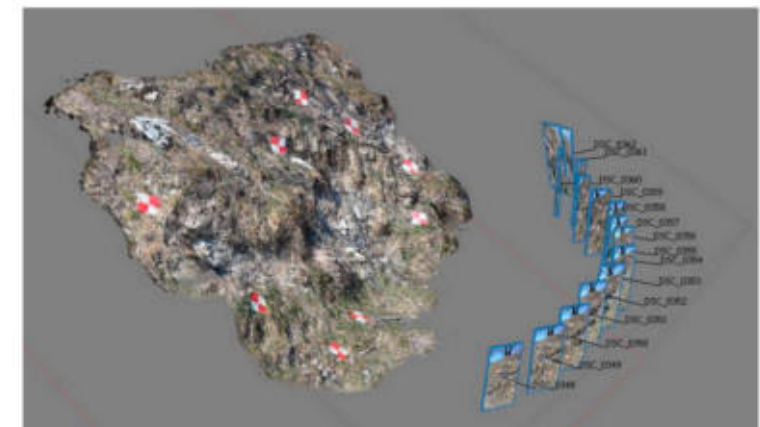
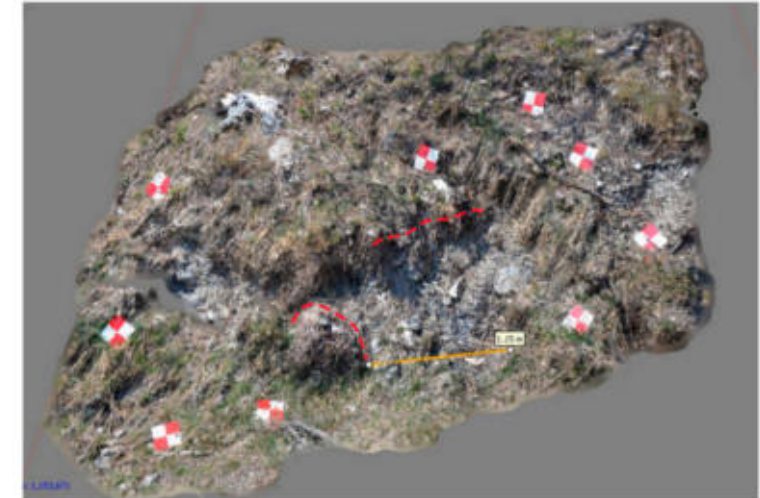
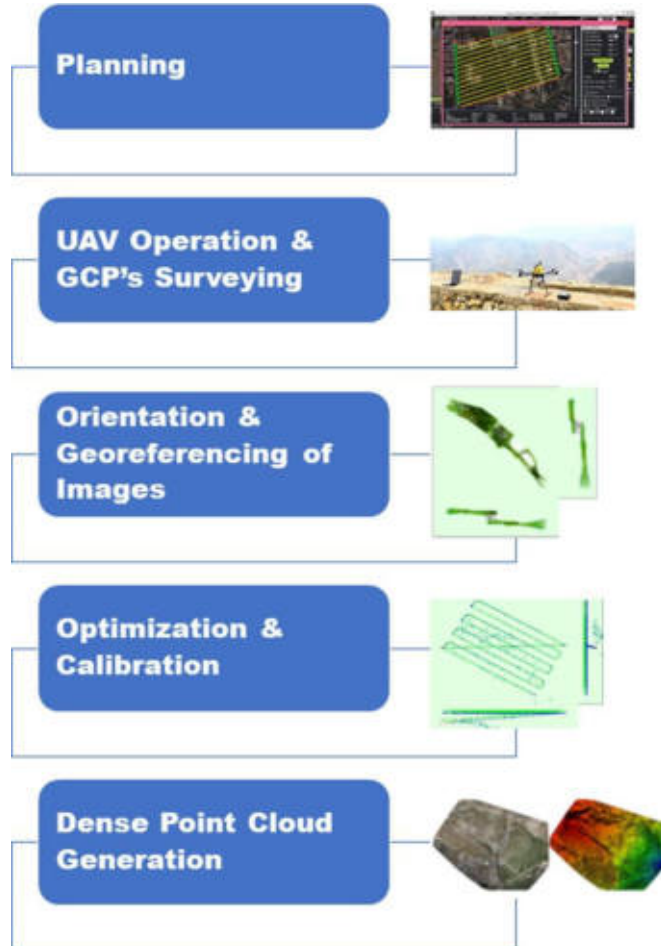
**Biaxial tiltmeter**



[electronics.stackexchange.com/](https://electronics.stackexchange.com/)



# Monitoraggio periodico con UAV



M. Zeybek, İ. Şanlıoğlu, Point cloud filtering on UAV based point cloud, Measurement, 2019, [10.1016/j.measurement.2018.10.013](https://doi.org/10.1016/j.measurement.2018.10.013).

Cignetti, M.; Godone, D.; Wrzesniak, A.; Giordan, D. Structure from Motion Multisource Application for Landslide Characterization and Monitoring: The Champlas du Col Case Study, Sestriere, North-Western Italy. Sensors 2019, 19, 2364. [10.3390/s19102364](https://doi.org/10.3390/s19102364)



## Set up UAV ala fissa



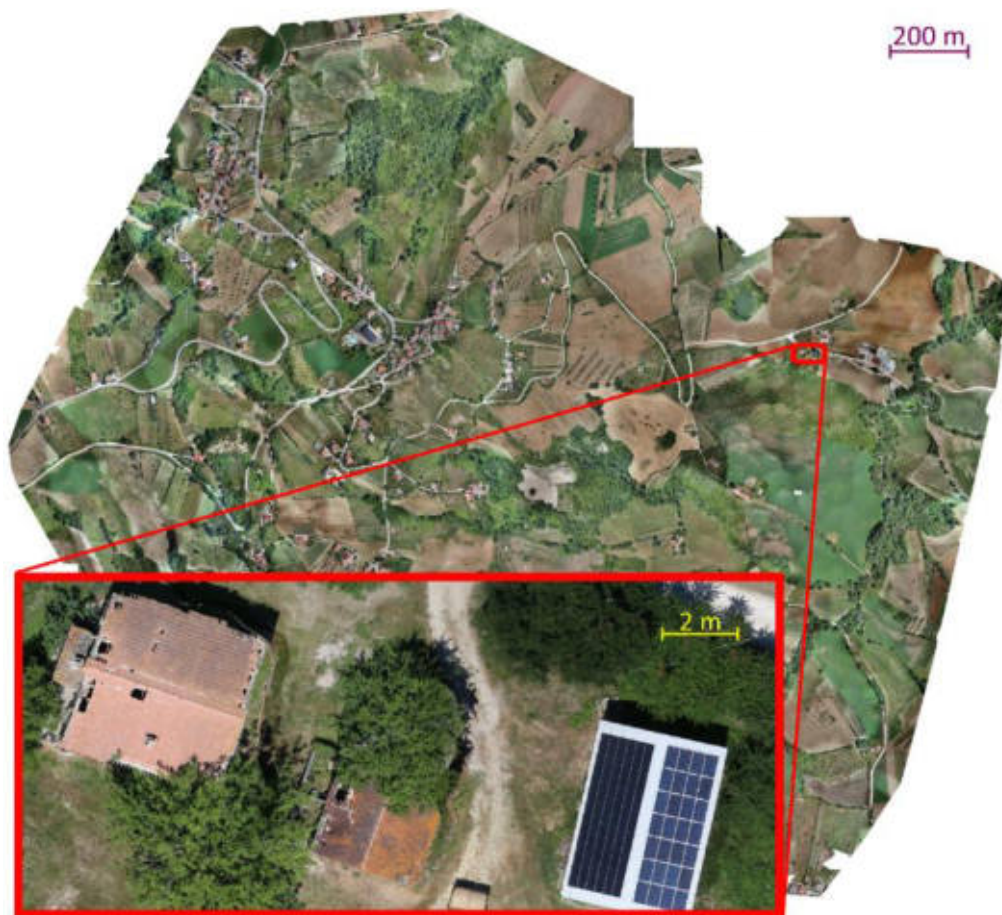
**GoPro**

**RedEdge**  
by MicaSense®

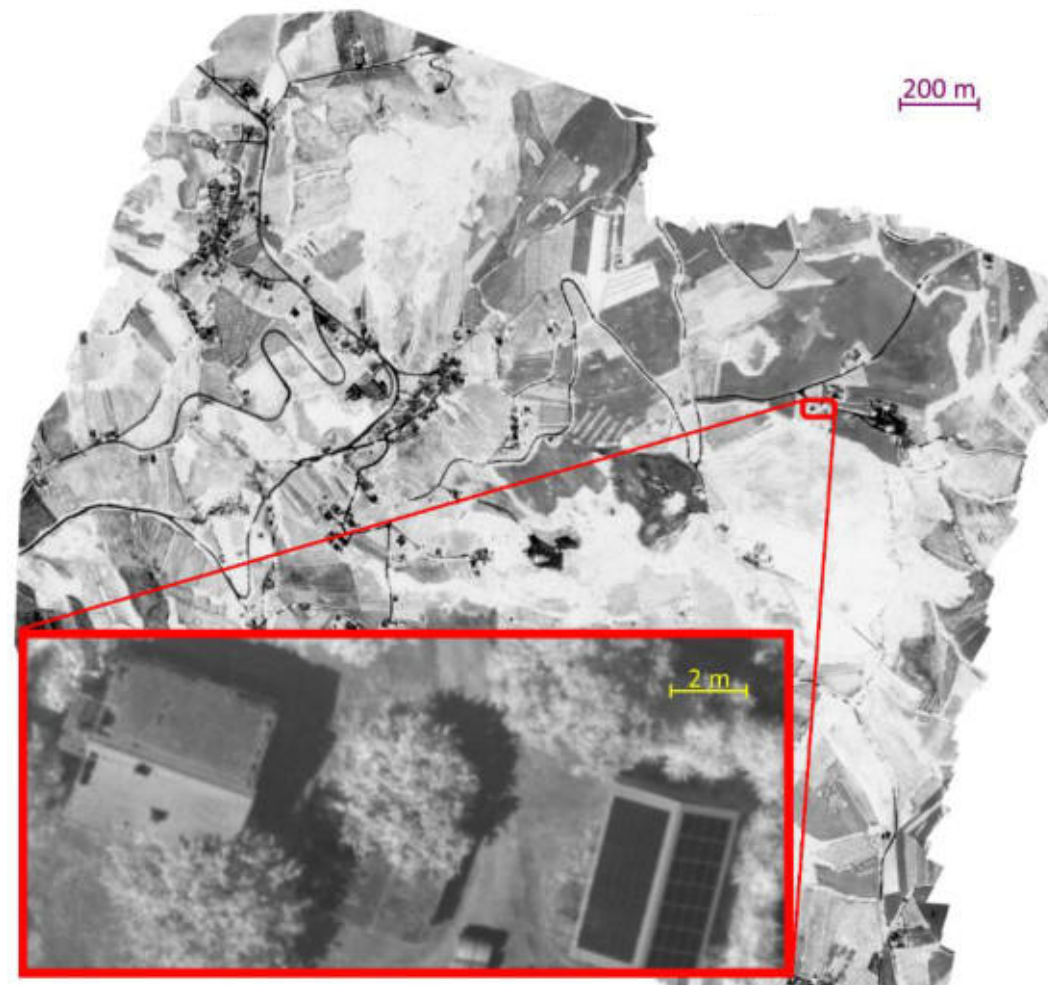
**SONY**

# Risultati

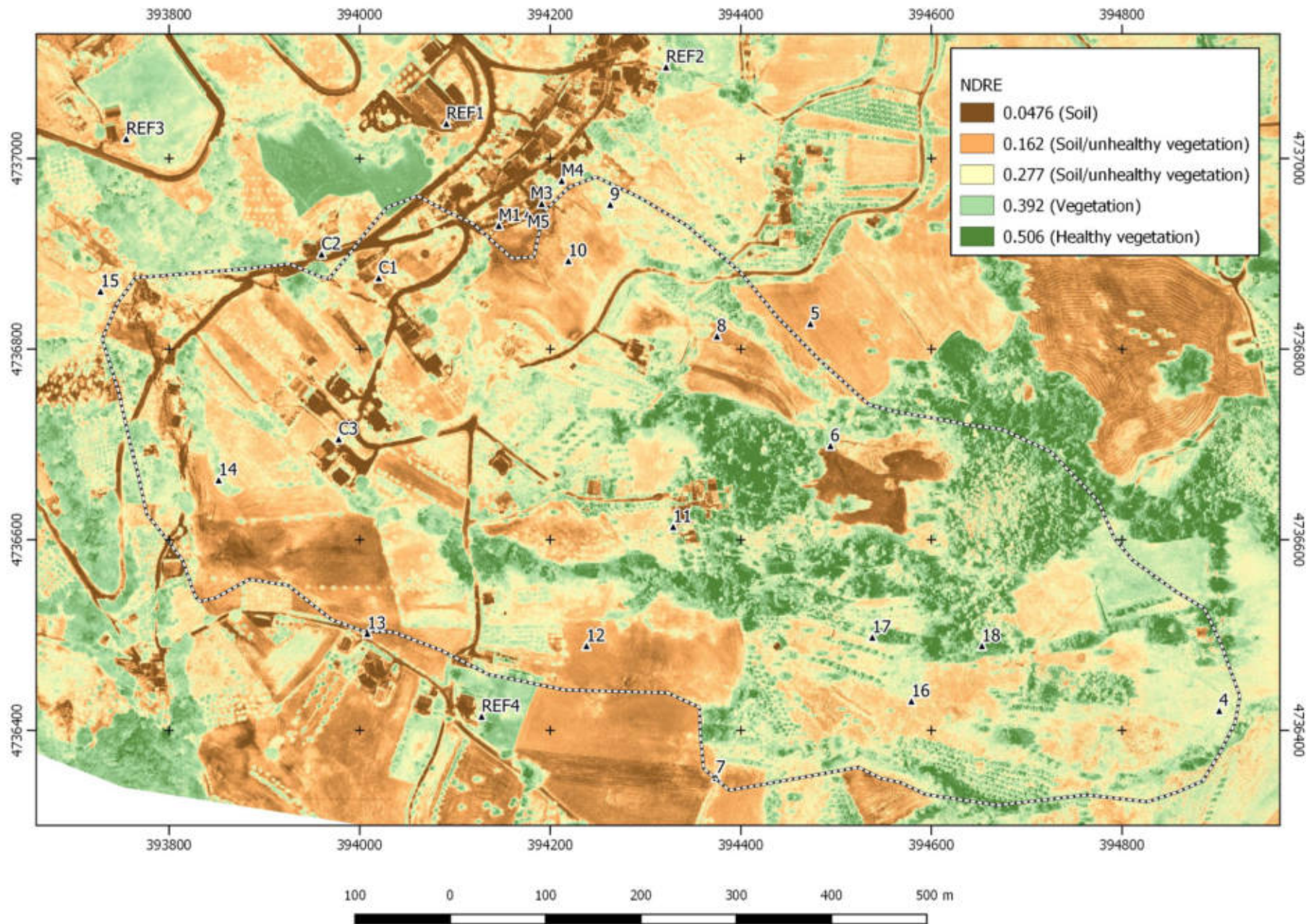
RGB



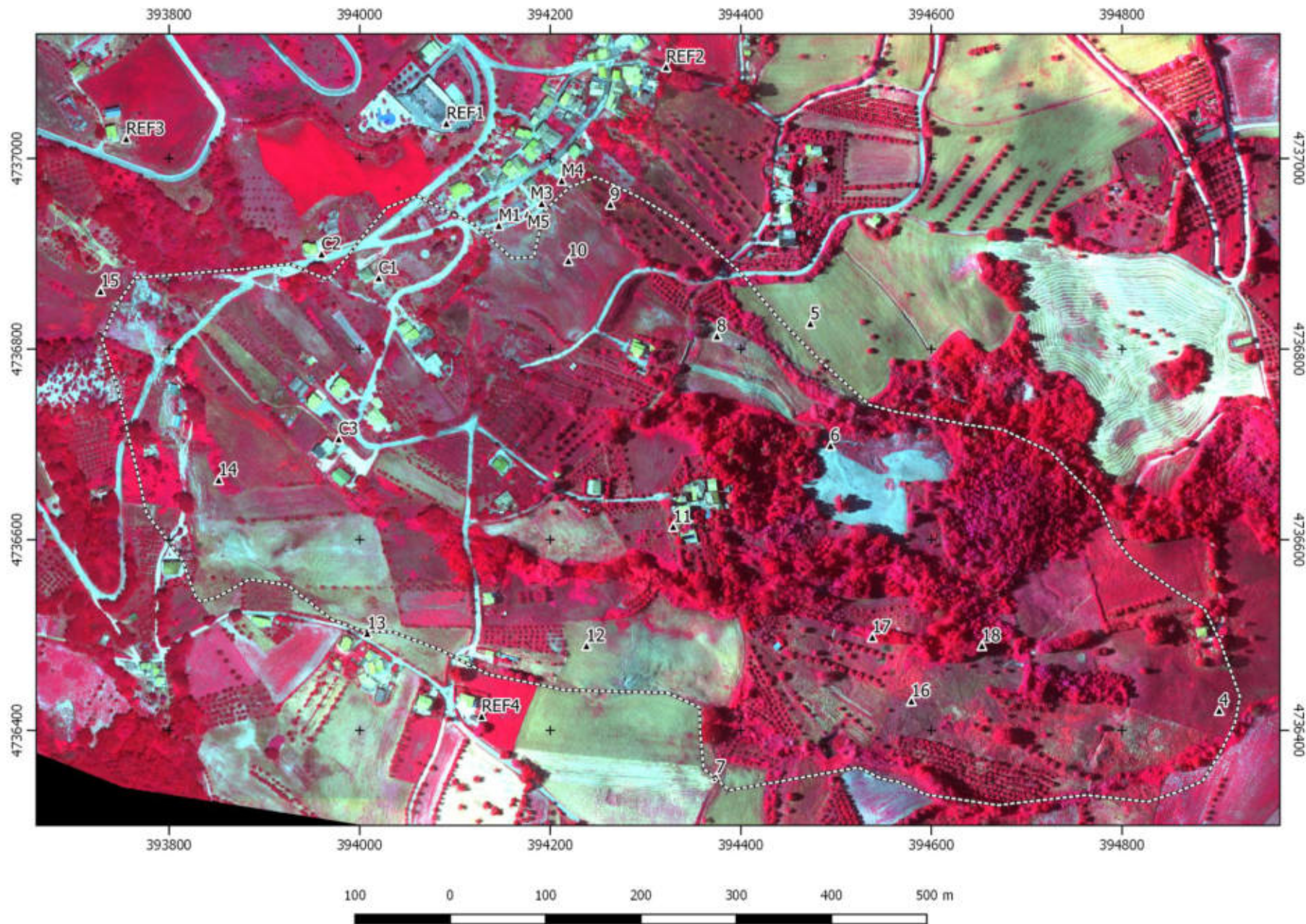
NDVI



# Normalized Difference Red Edge (NDRE)



# CIR Composite



## Differenze?

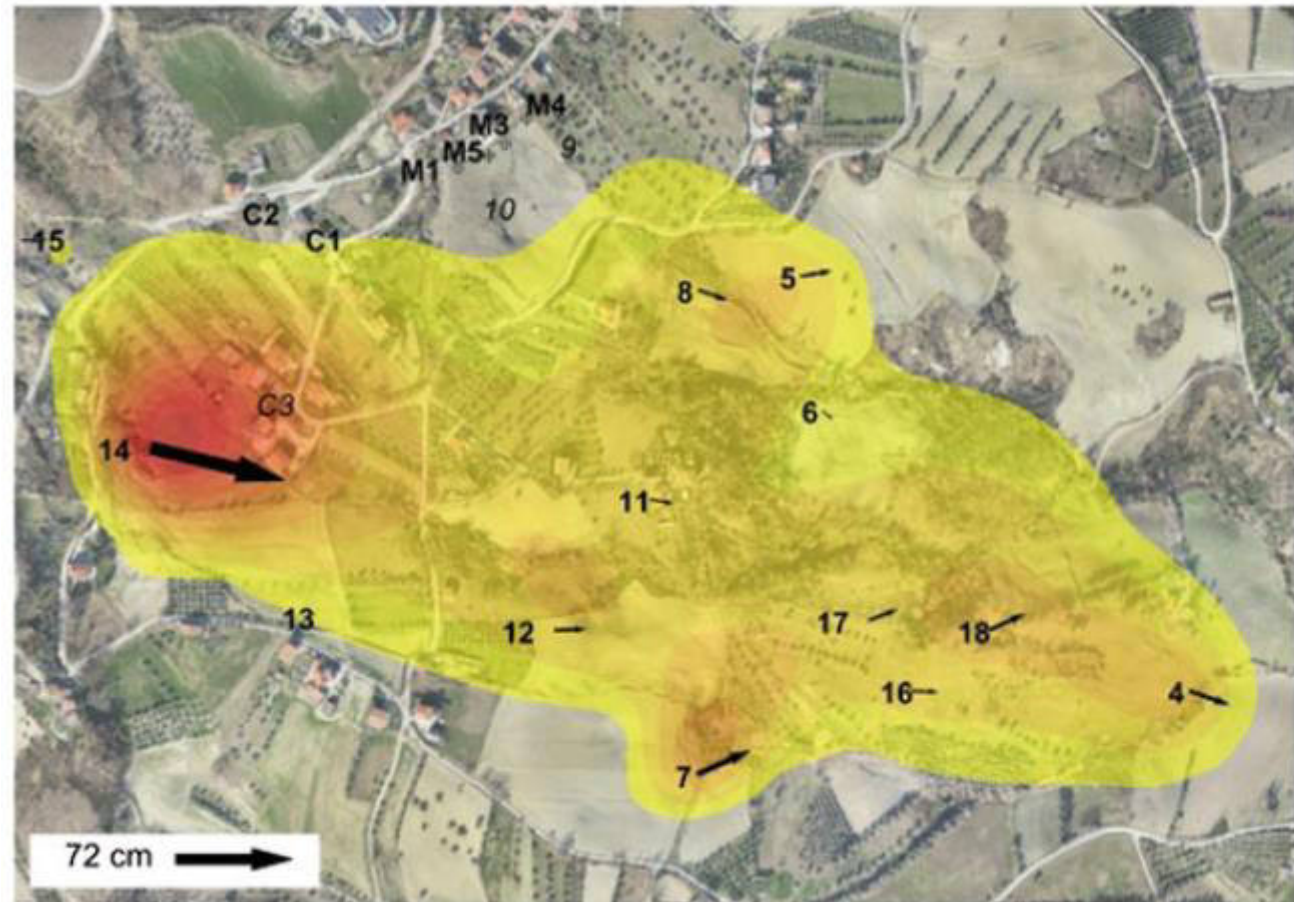


21/06/2017

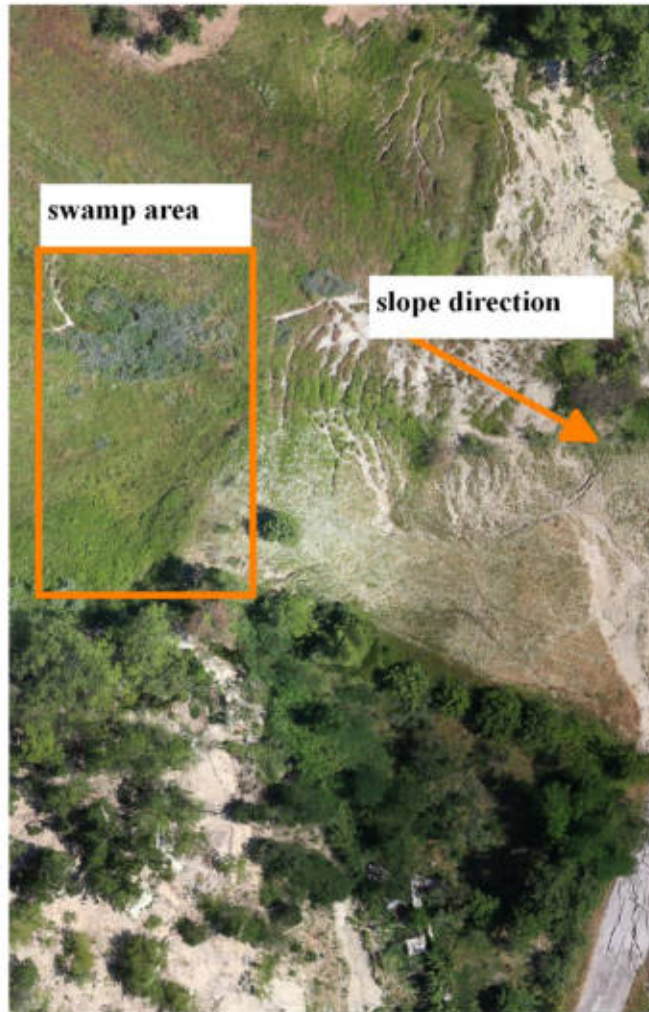
# *Equisetum spp* Vs spostamenti



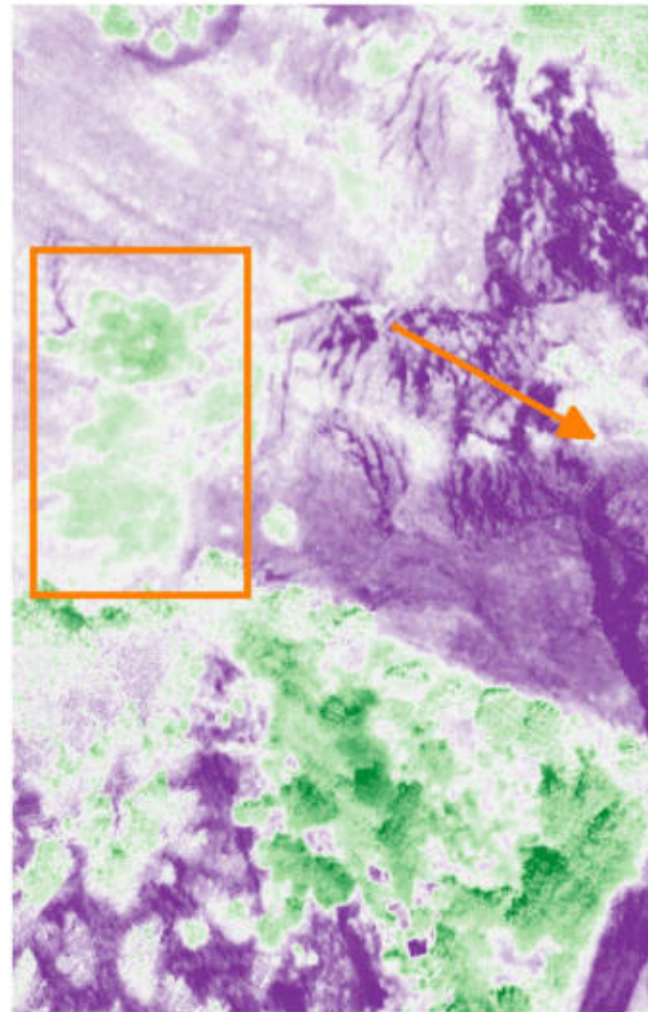
**VS**



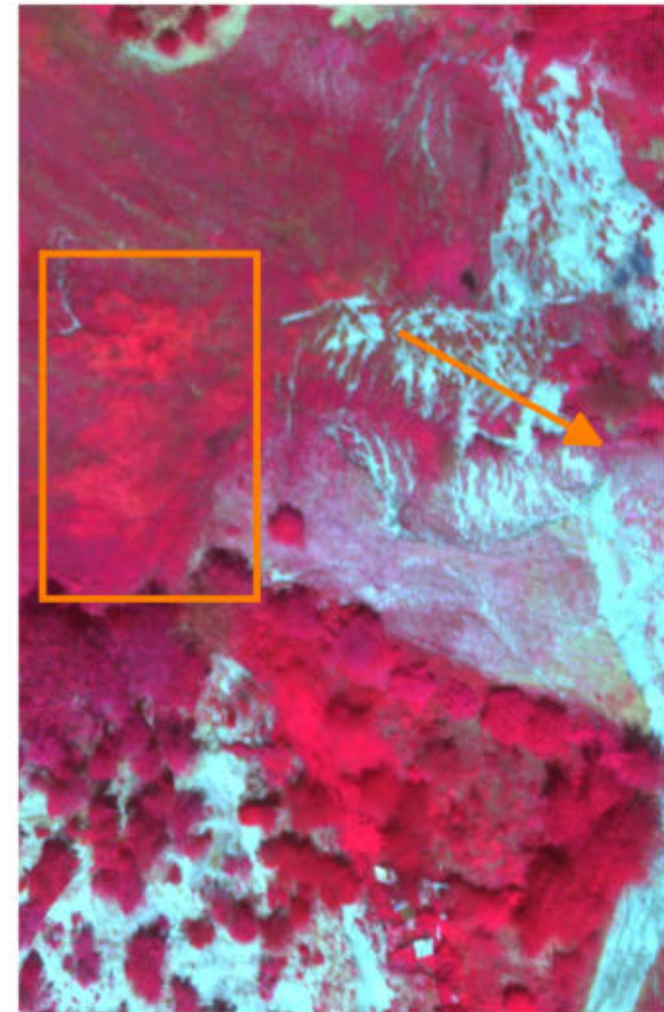
**RGB**



**NDRE**



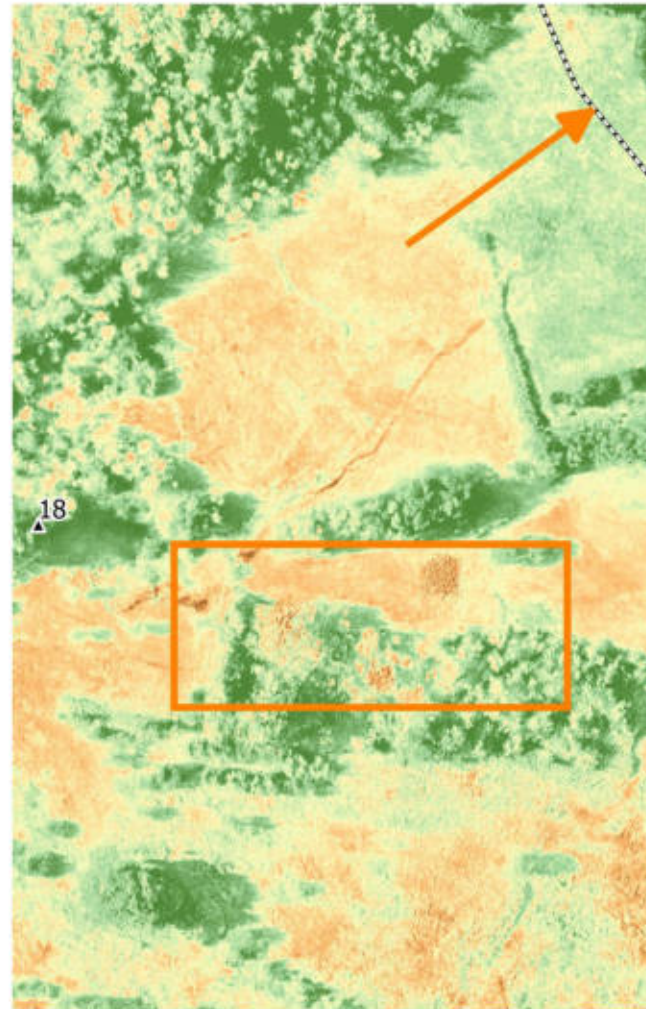
**CIR**



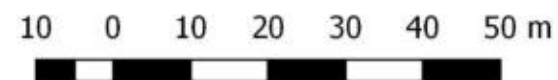
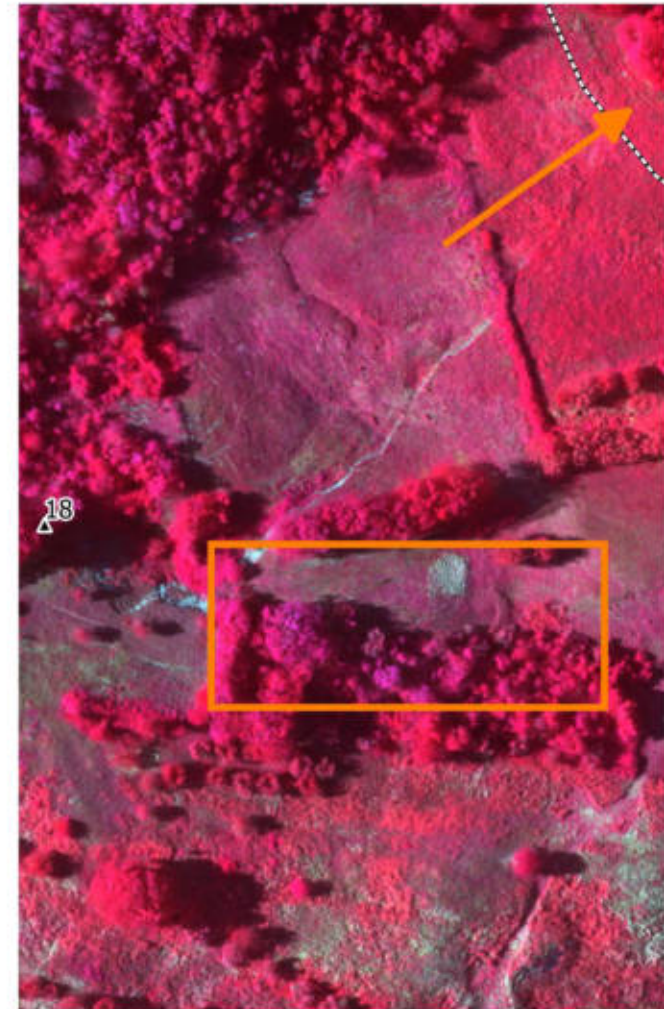
**RGB**



**NDRE**

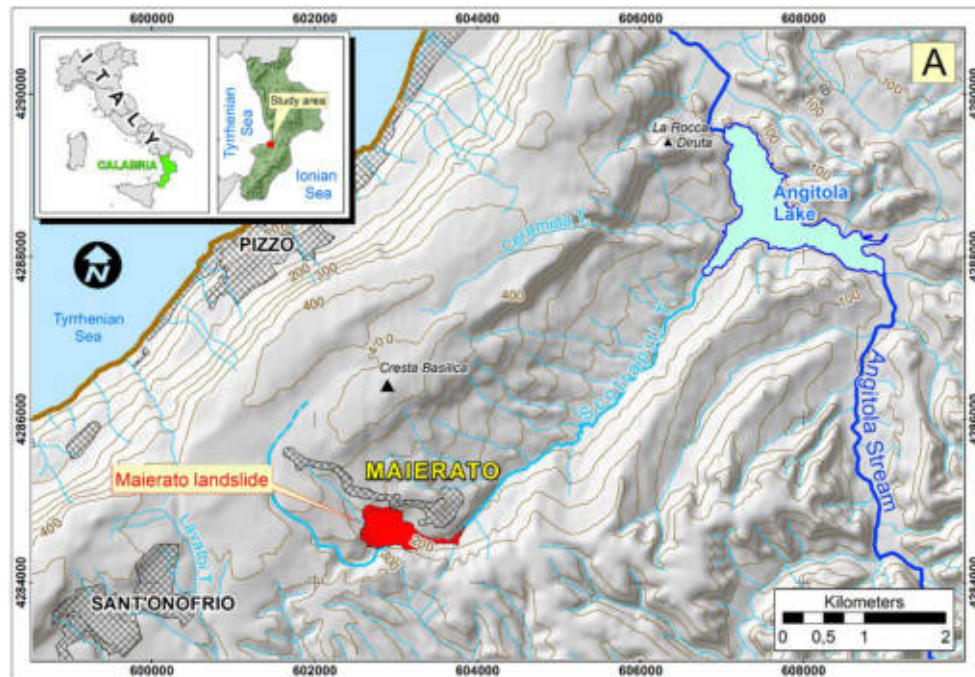


**CIR**





# Maierato landslide (VV)



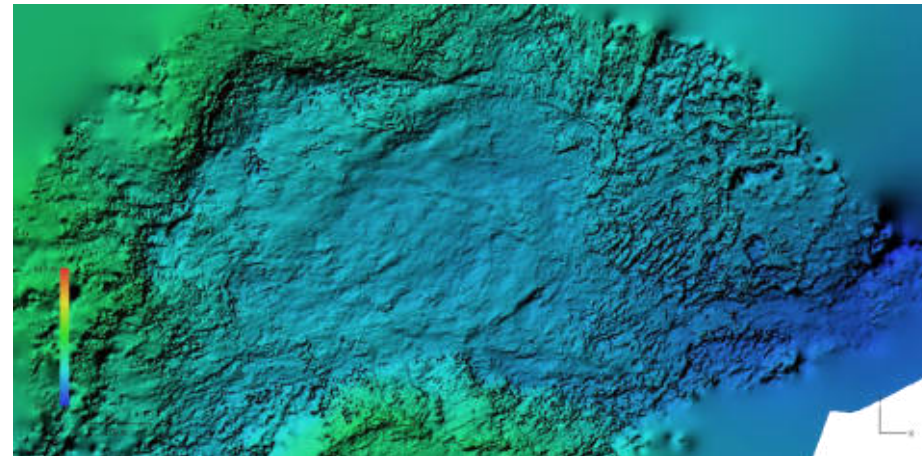
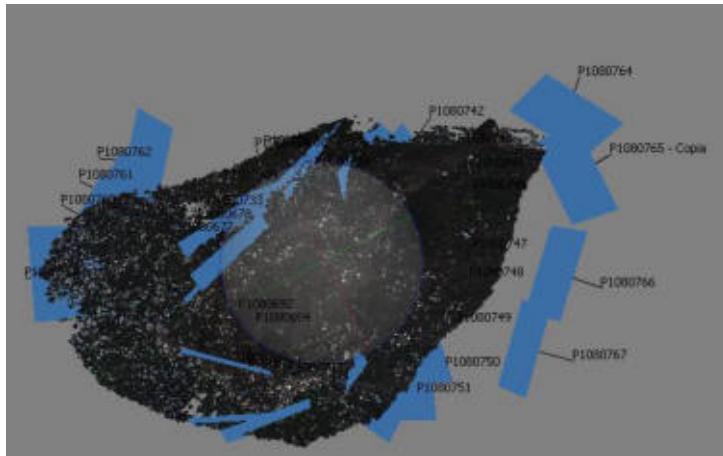


## “Salvaged images”

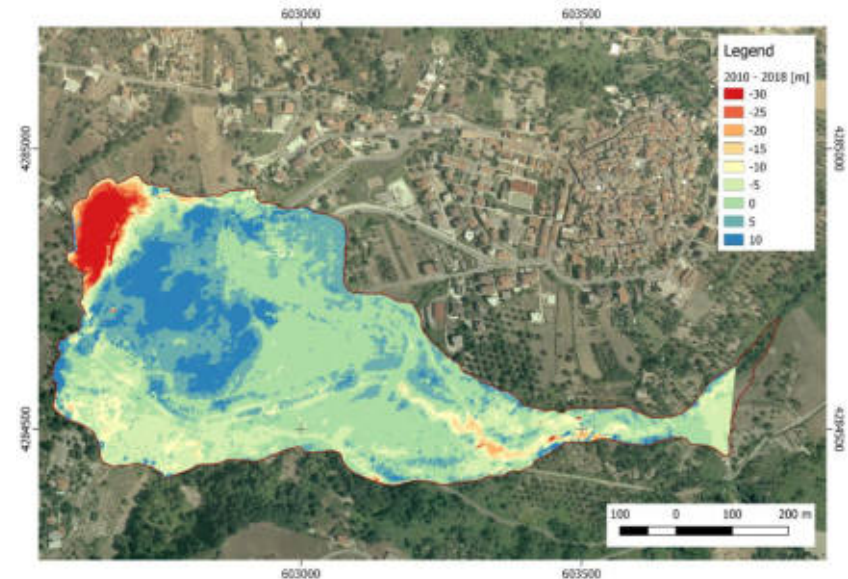
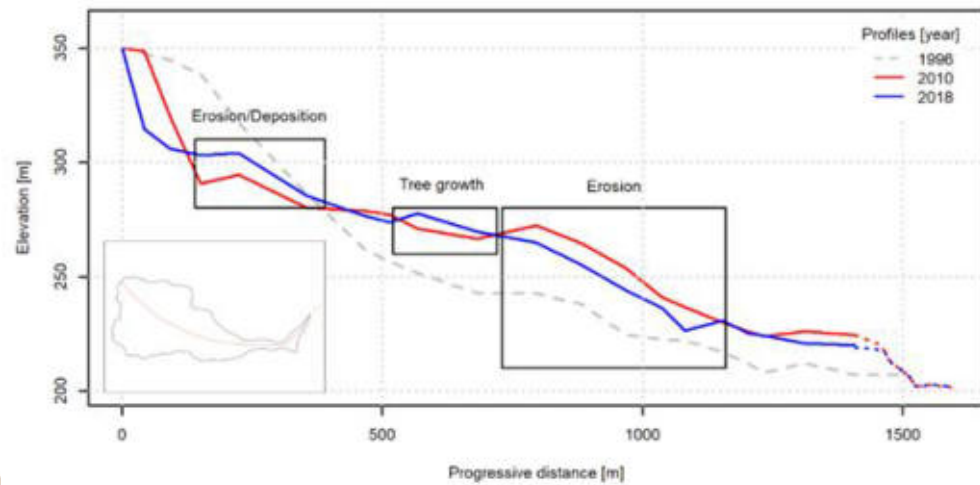
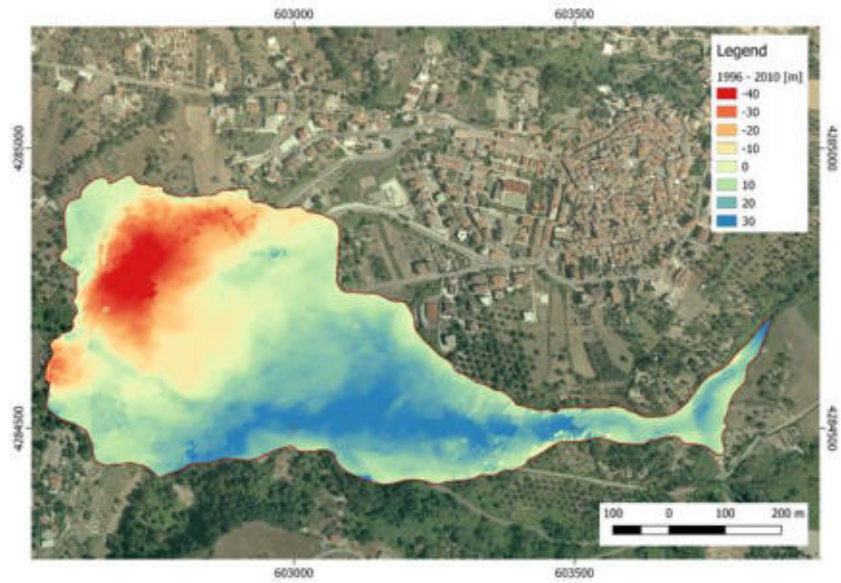
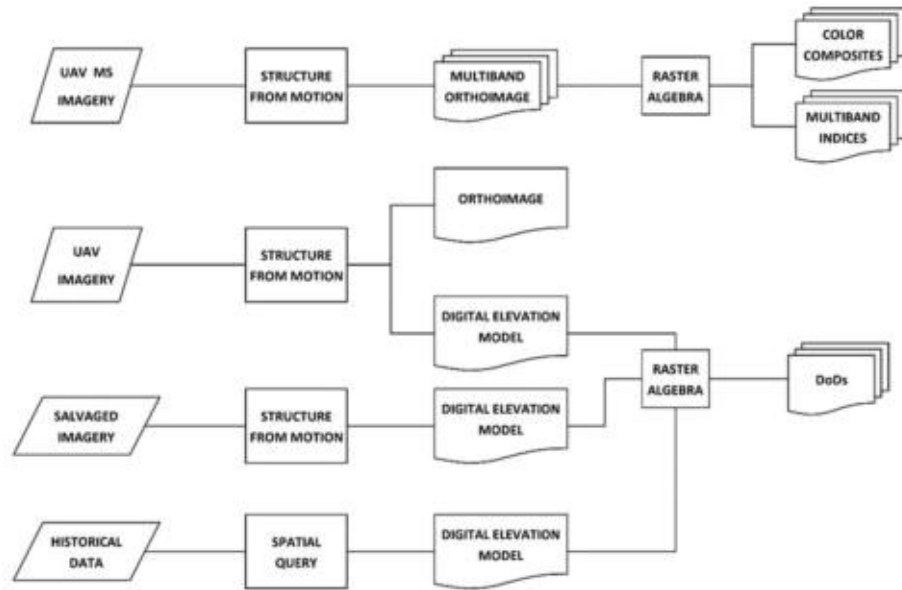


Fotografie scattate da elicottero,  
dopo l'evento.

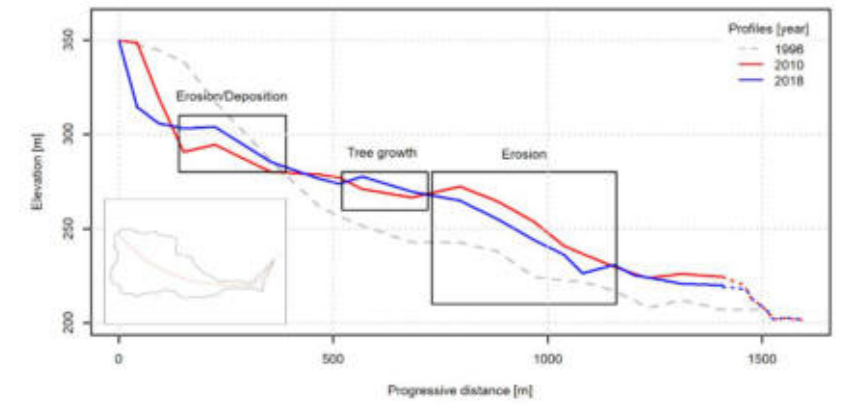
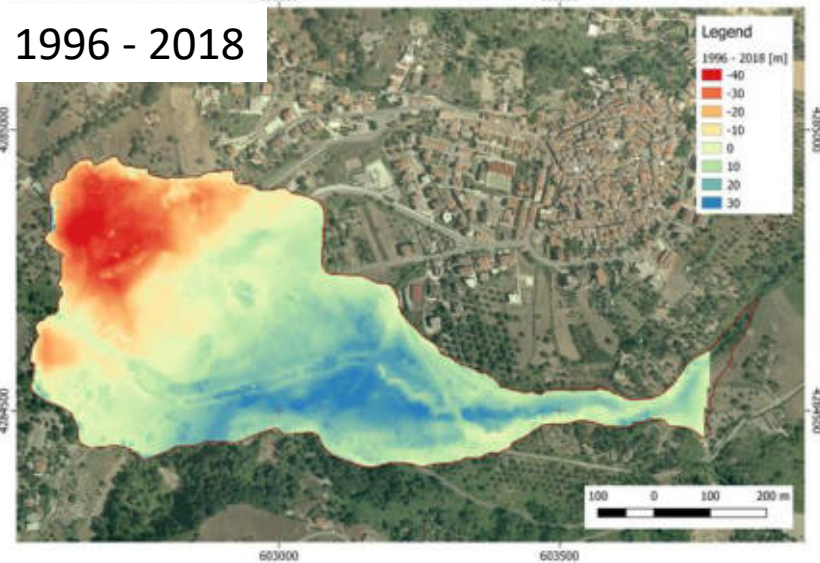
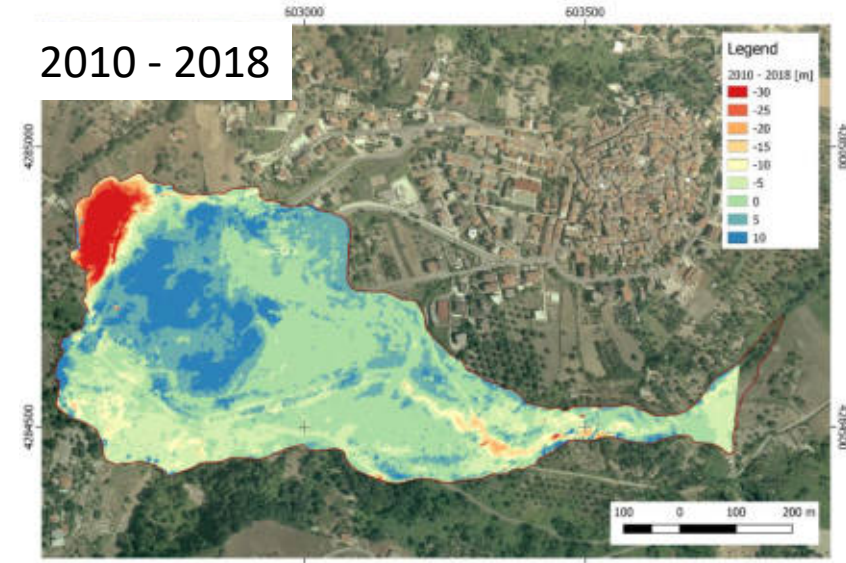
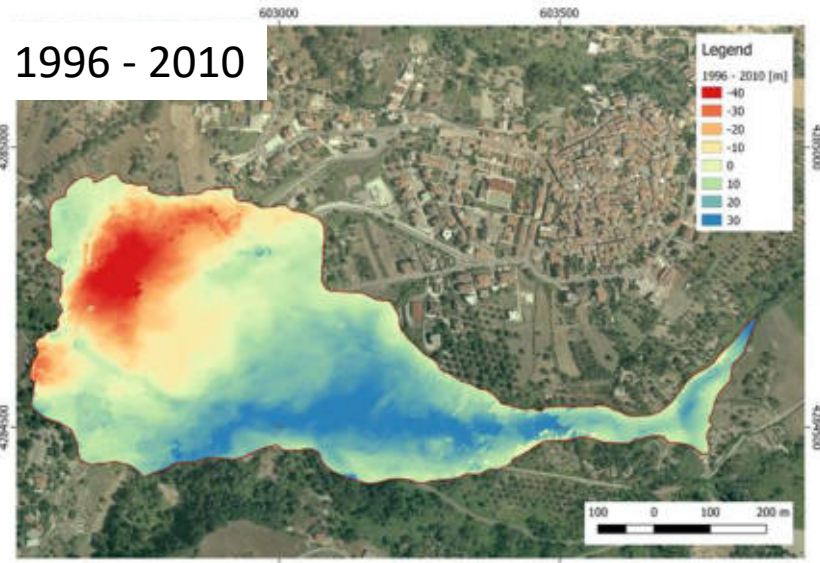
- Oblique;
- Con ostruzioni;
- Nessuno scopo fotogrammetrico.



# Metodologia e risultati



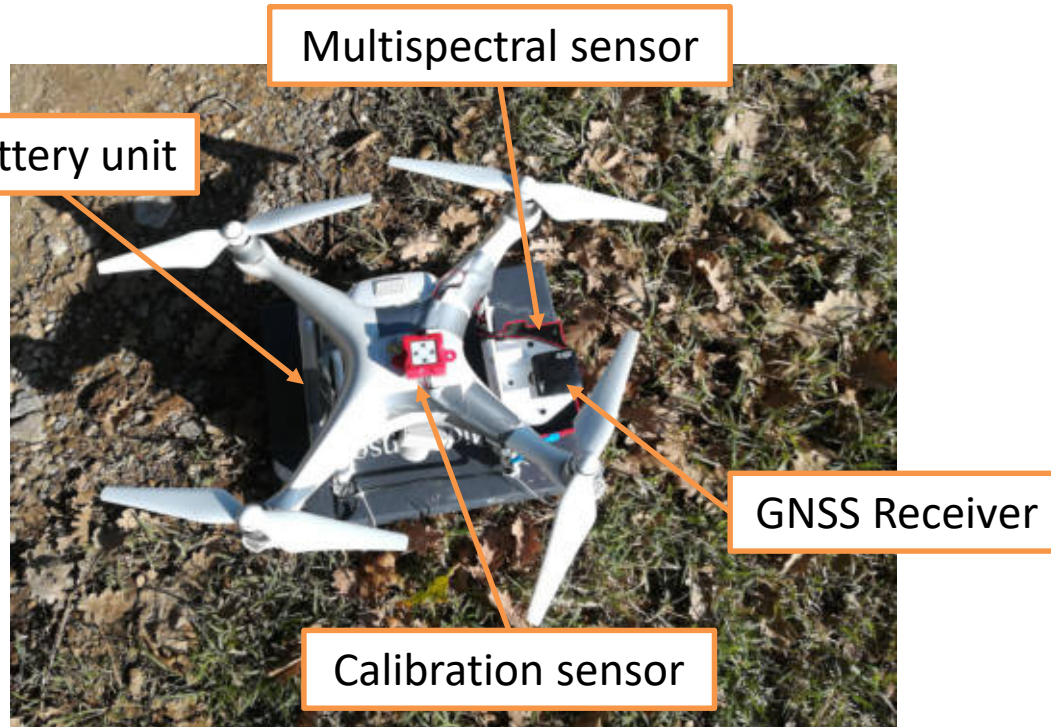
# Differenze di DEM



# Valutazioni puntuali di spostamento



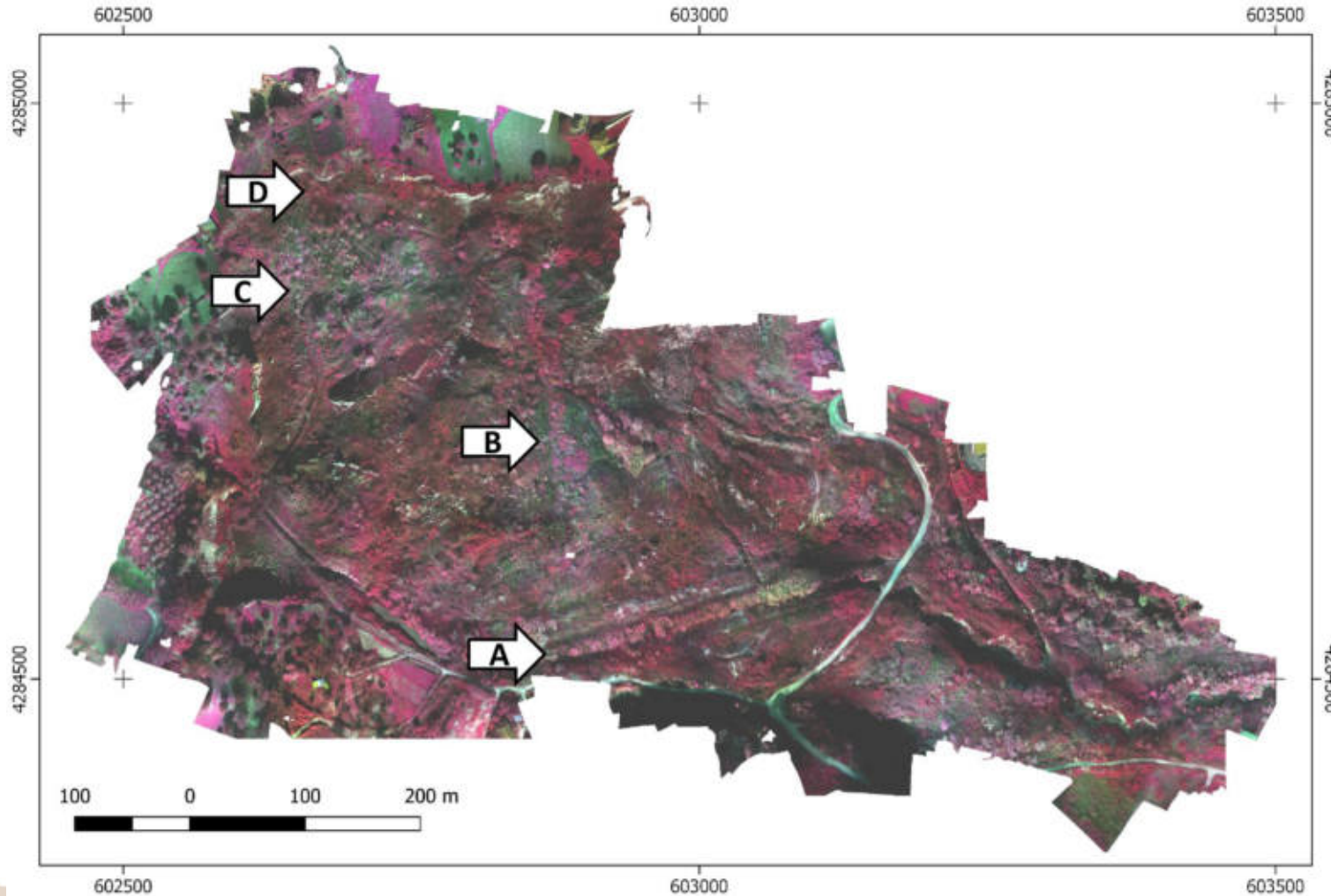
# Set up UAV multirotores



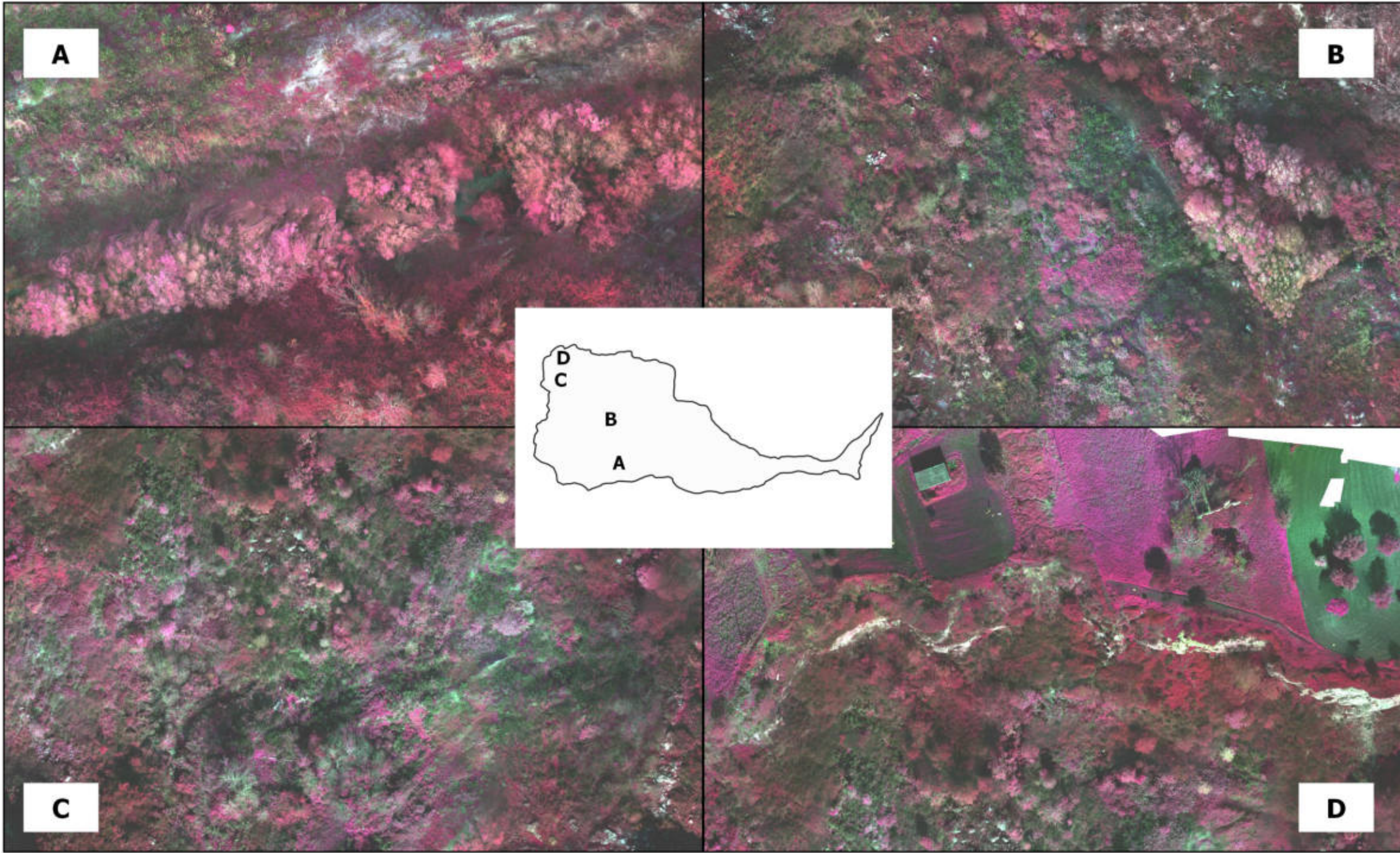
Band	Center [nm]	Bandwidth [nm]
Blue	475	20
Green	560	20
Red	668	10
Red edge	717	10
Near infrared	840	40



## CIR composite - interpretazione

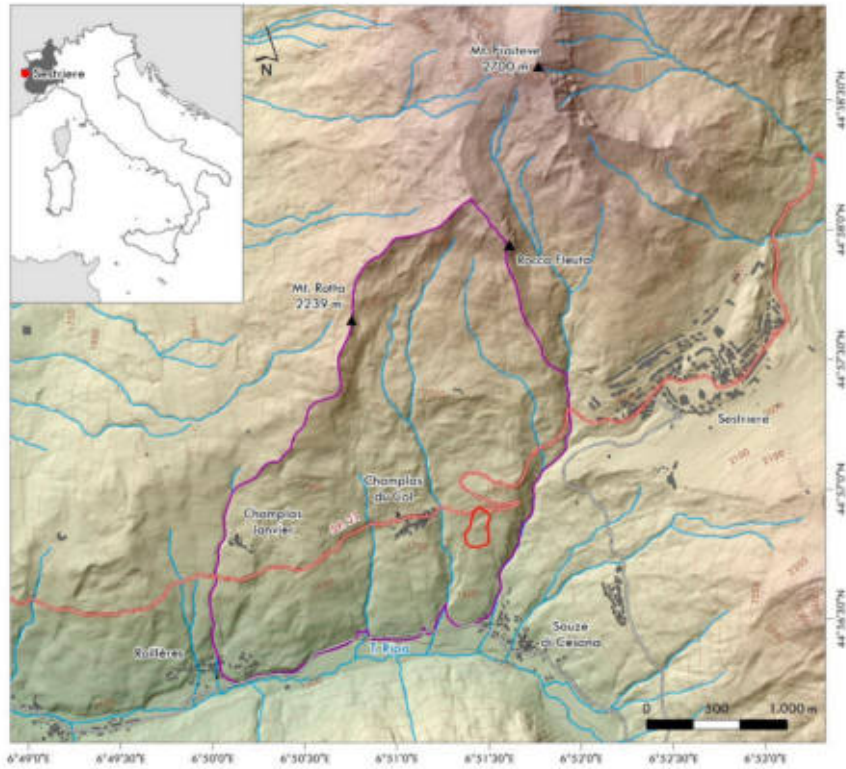


- A. Tree canopies in stress;
- B, C. Pioneer vegetation on poorly evolved soils under stress;
- D. Healthy trees (entire soil blocks shifted by landslide).

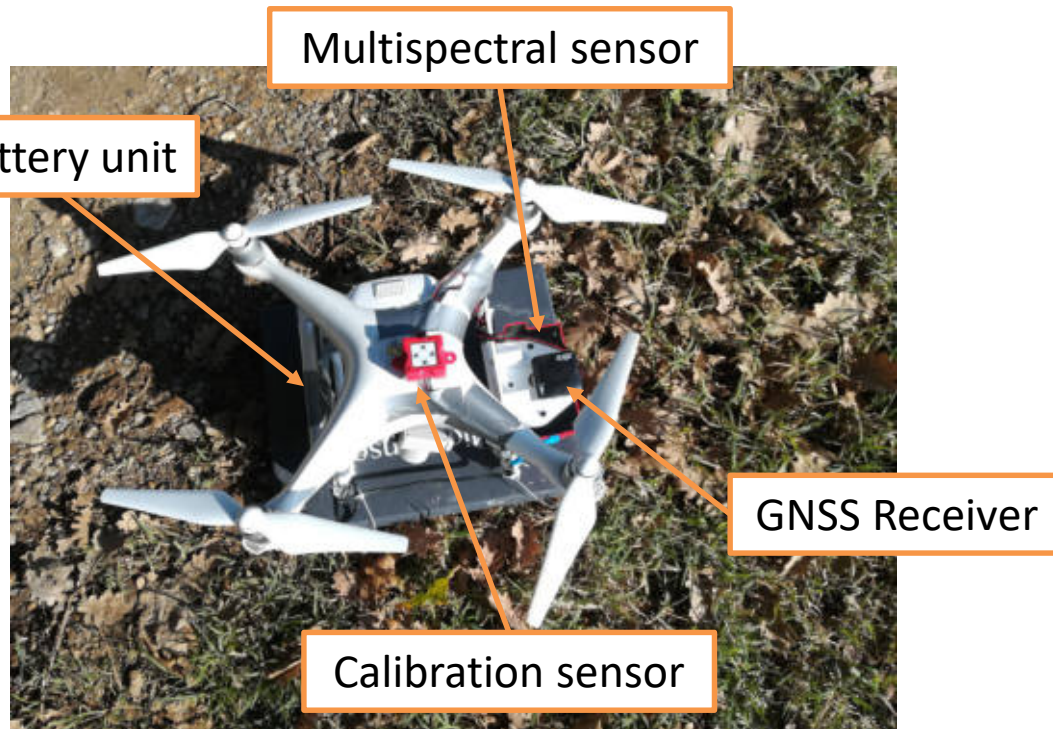




# Champlas du Col landslide (TO)



# Set up UAV multirotores

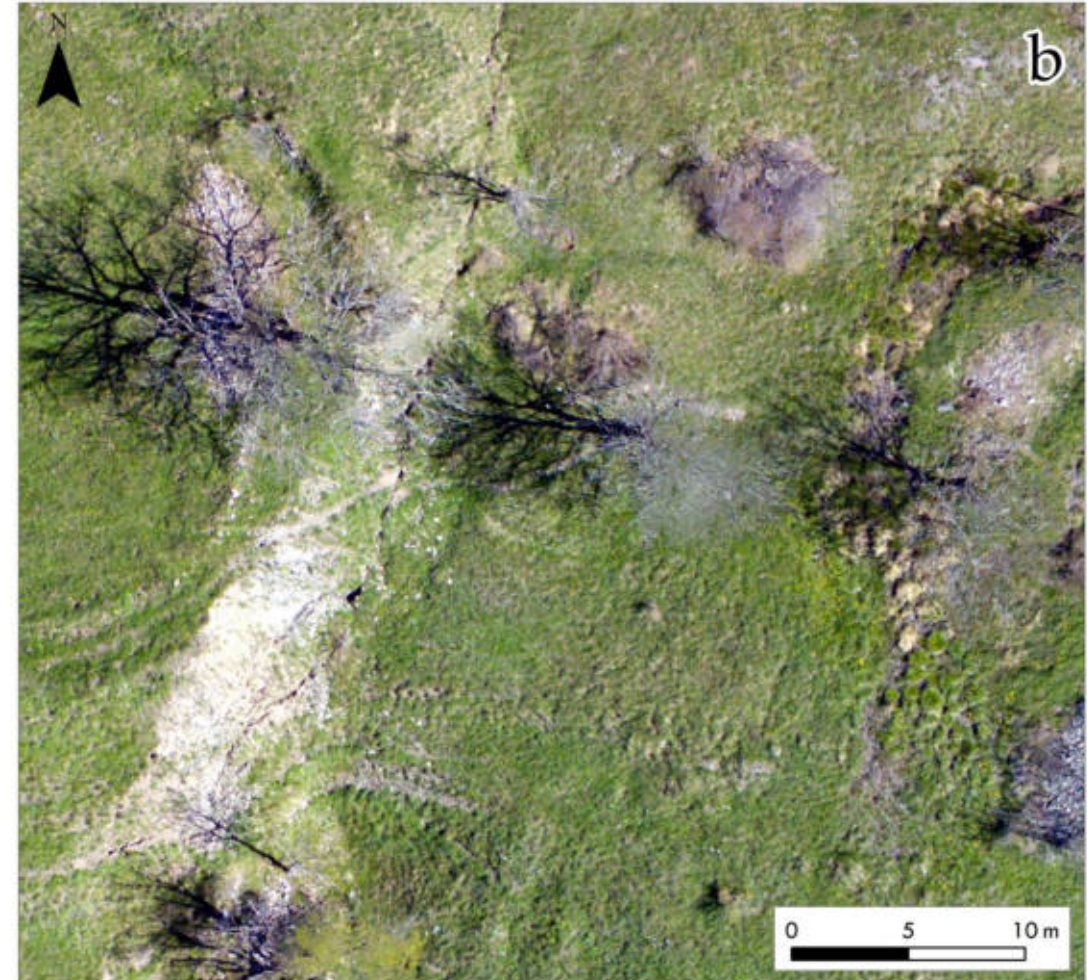


Band	Center [nm]	Bandwidth [nm]
Blue	475	20
Green	560	20
Red	668	10
Red edge	717	10
Near infrared	840	40



Micasense.com

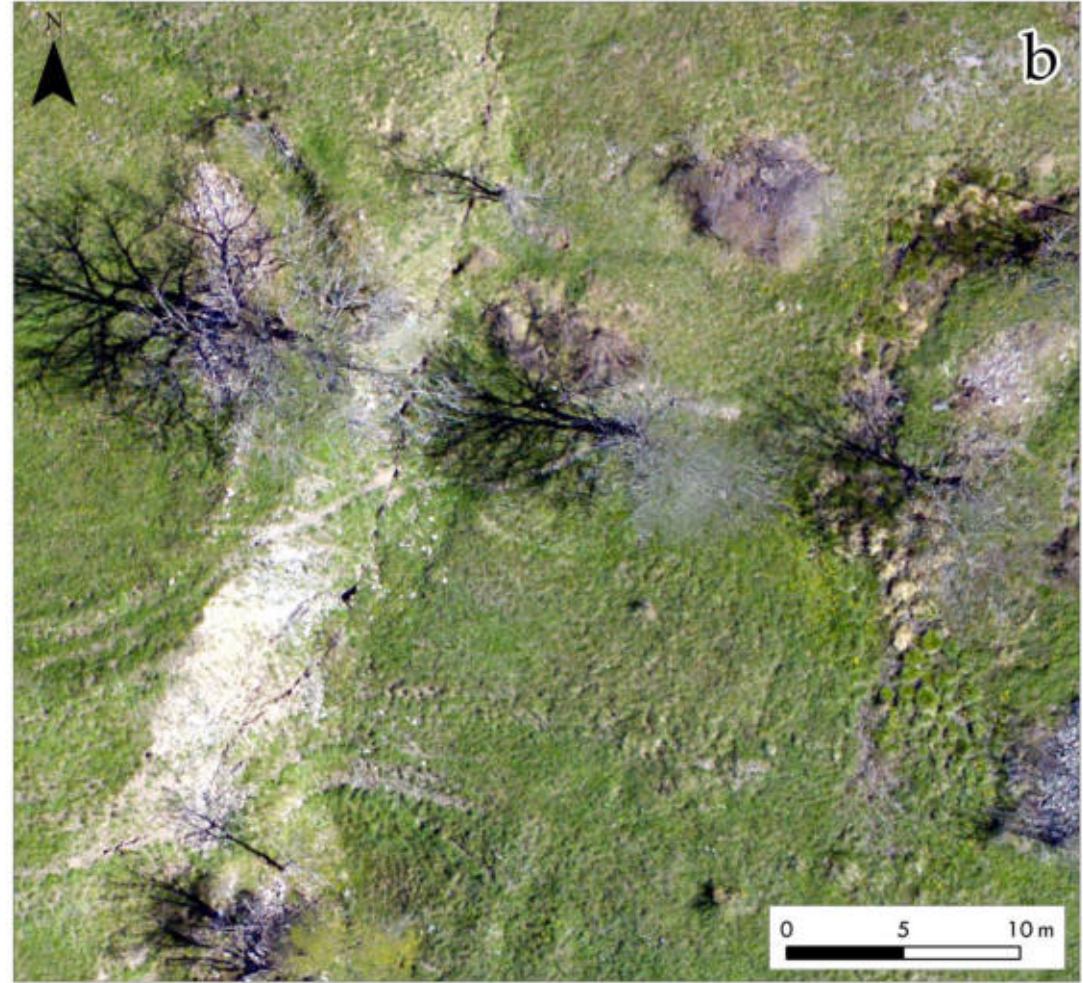
# Risultati



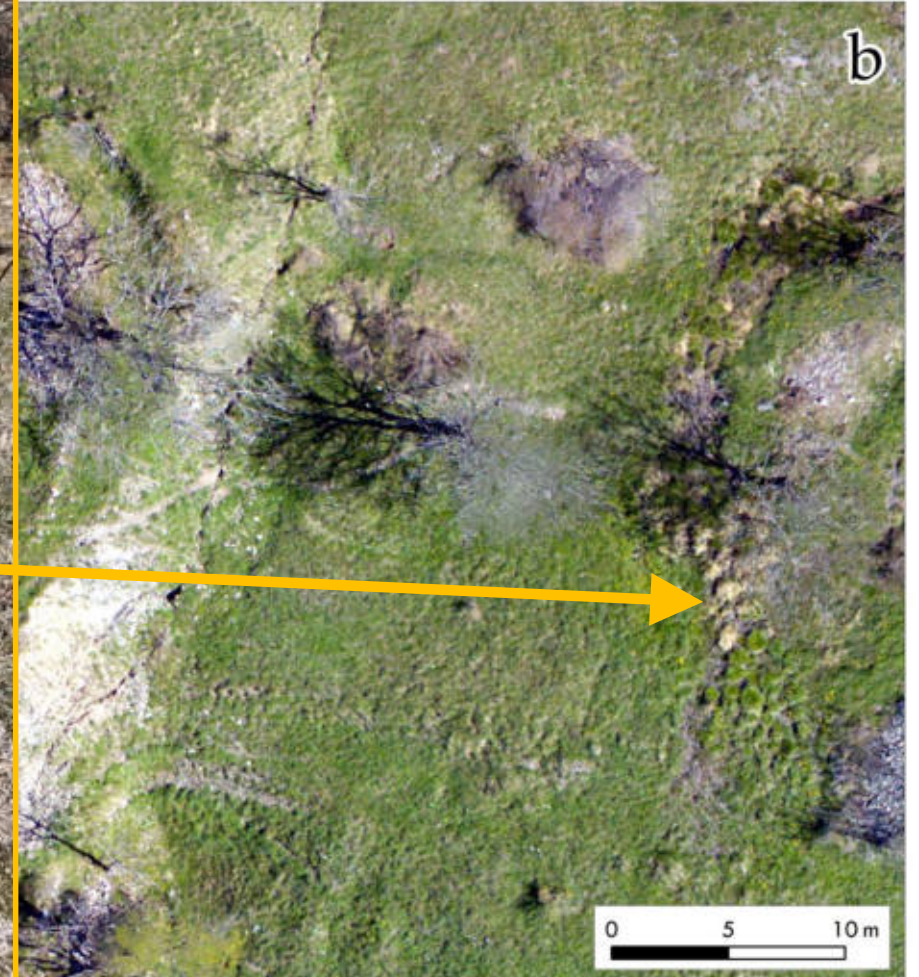
# Results



- Fissure
- Main scarp
- Minor scarp
- Wetland
- Road damage
- Landslide
- Local 3D analysis

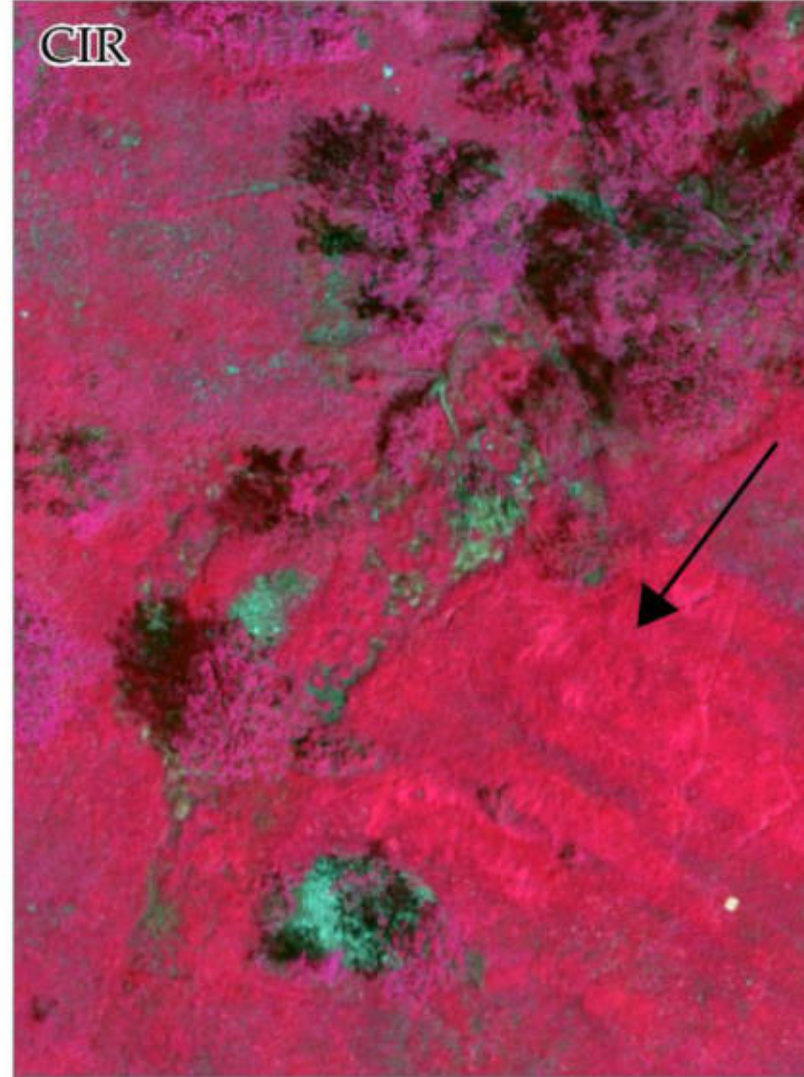


# Results

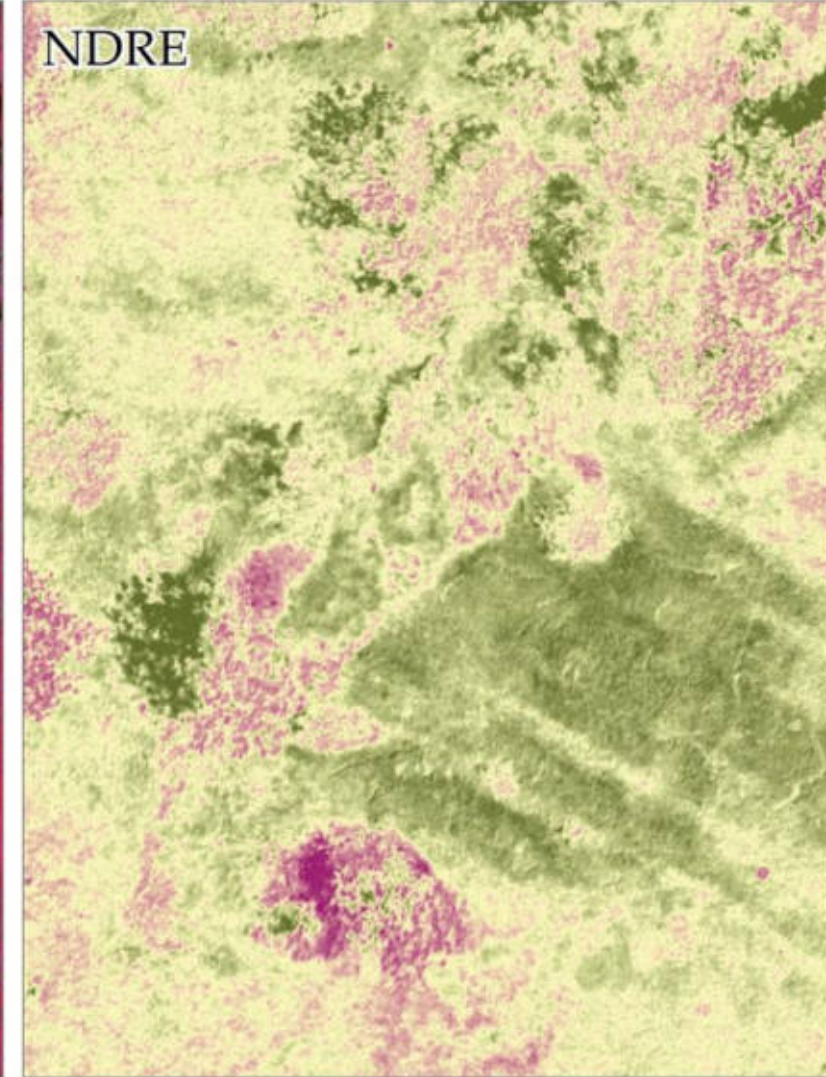




Hummock-and-hollow pattern



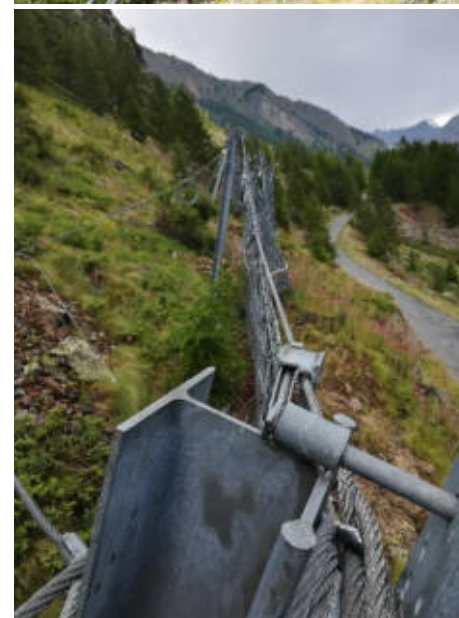
Long leaf grass lodging



Water abundance/surficial flux

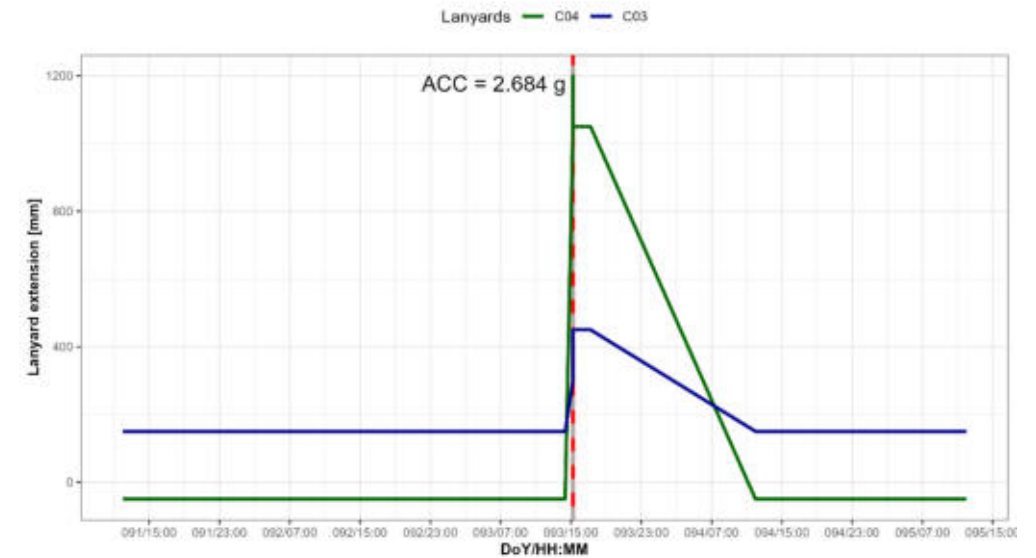
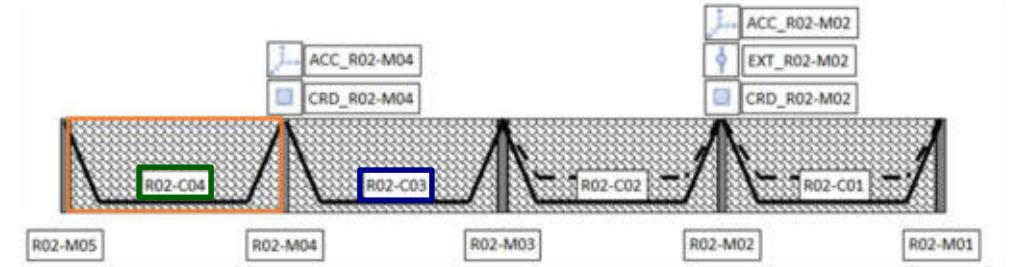
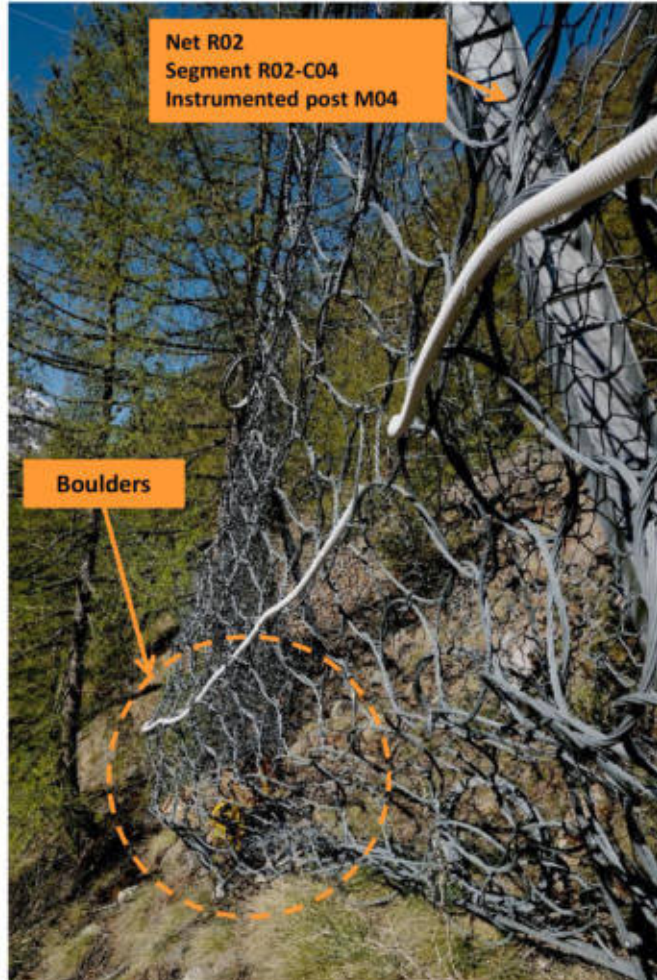
# Smart Network

## LASMON Landslide Smart Monitoring Network



Il progetto LASMON è stato realizzato grazie al co-finanziamento del POR FESR Piemonte 2014-2020 - ASSE I - AZIONE I.1.b.1.2

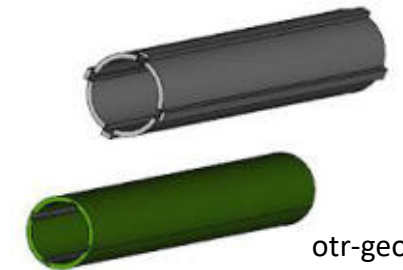
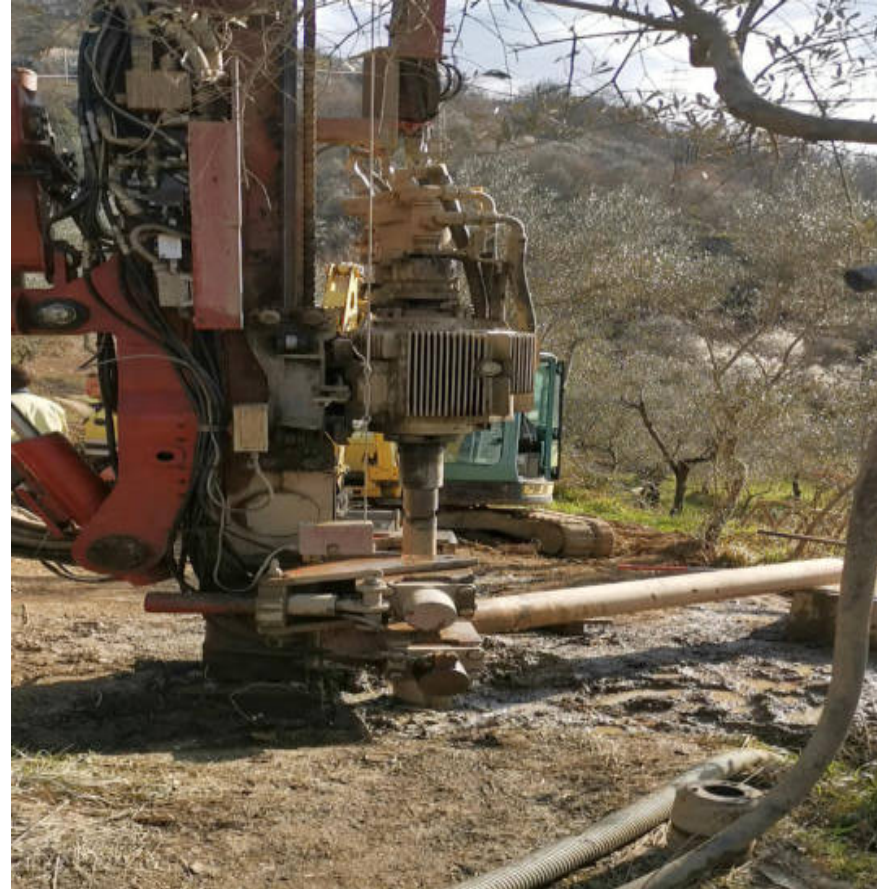
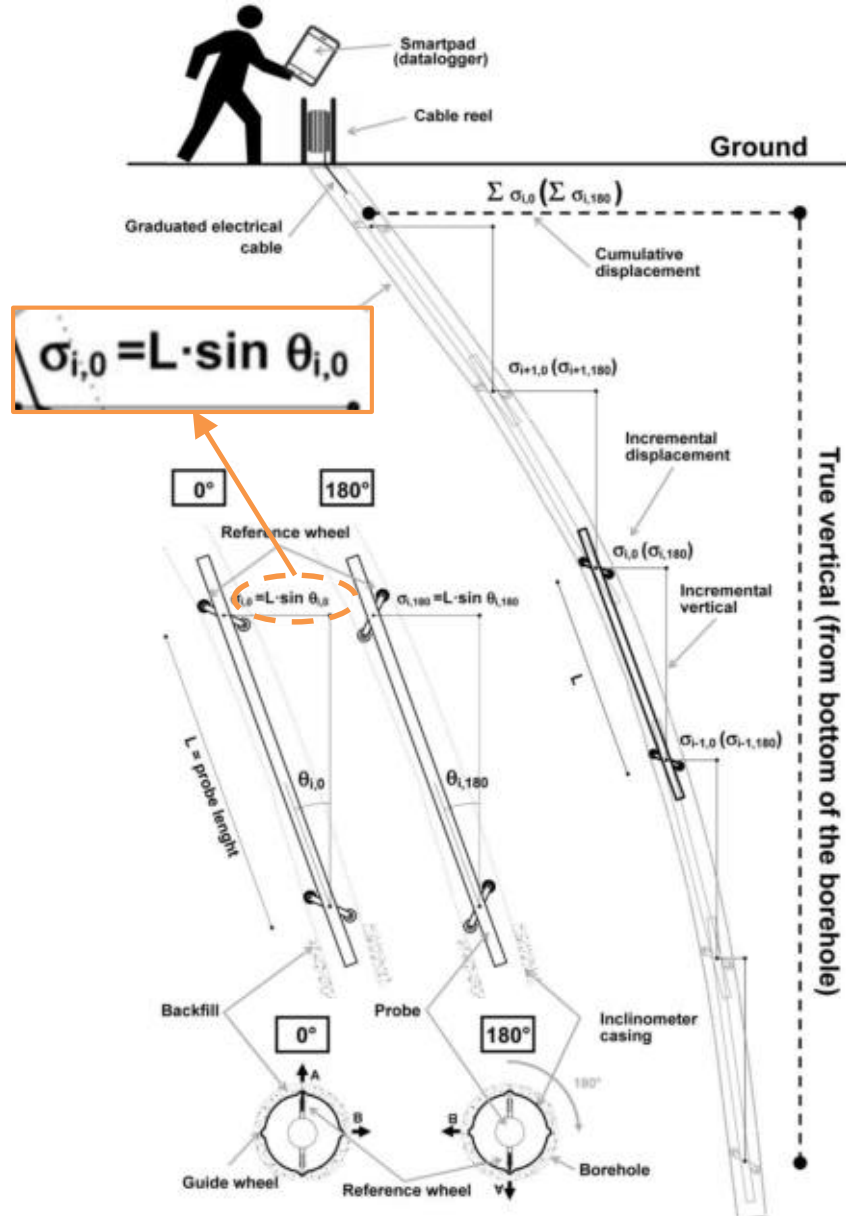
# Smart Network





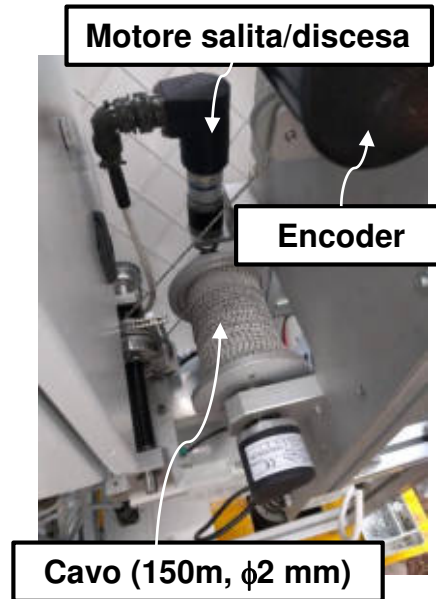
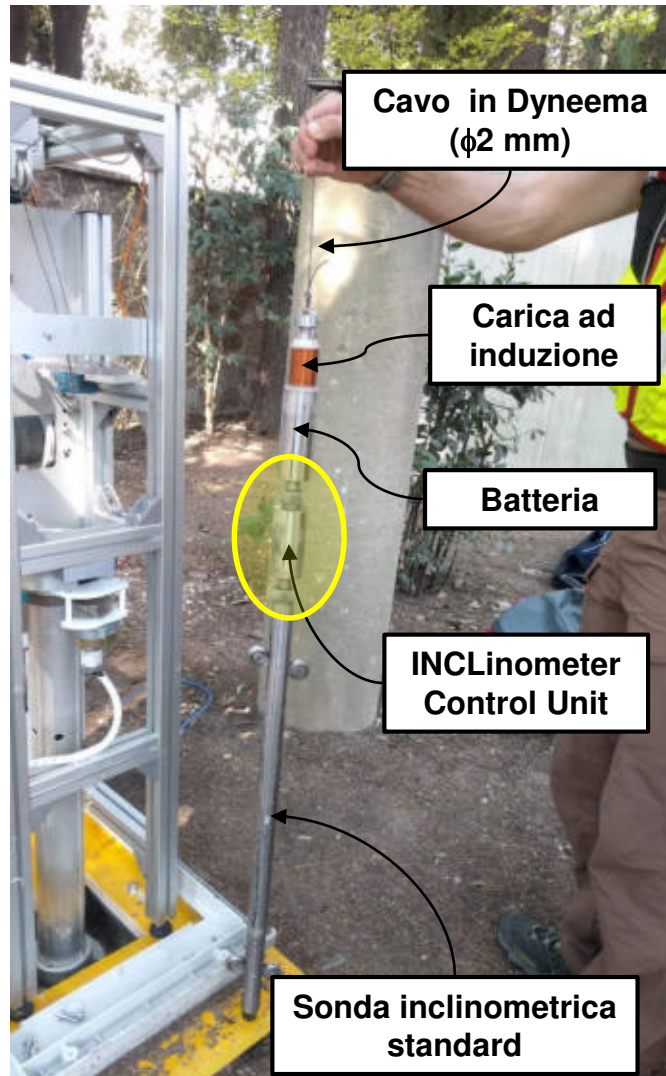
# Inclinometro

## Monitoraggio profondo



otr-geo.com

# Inclinometro

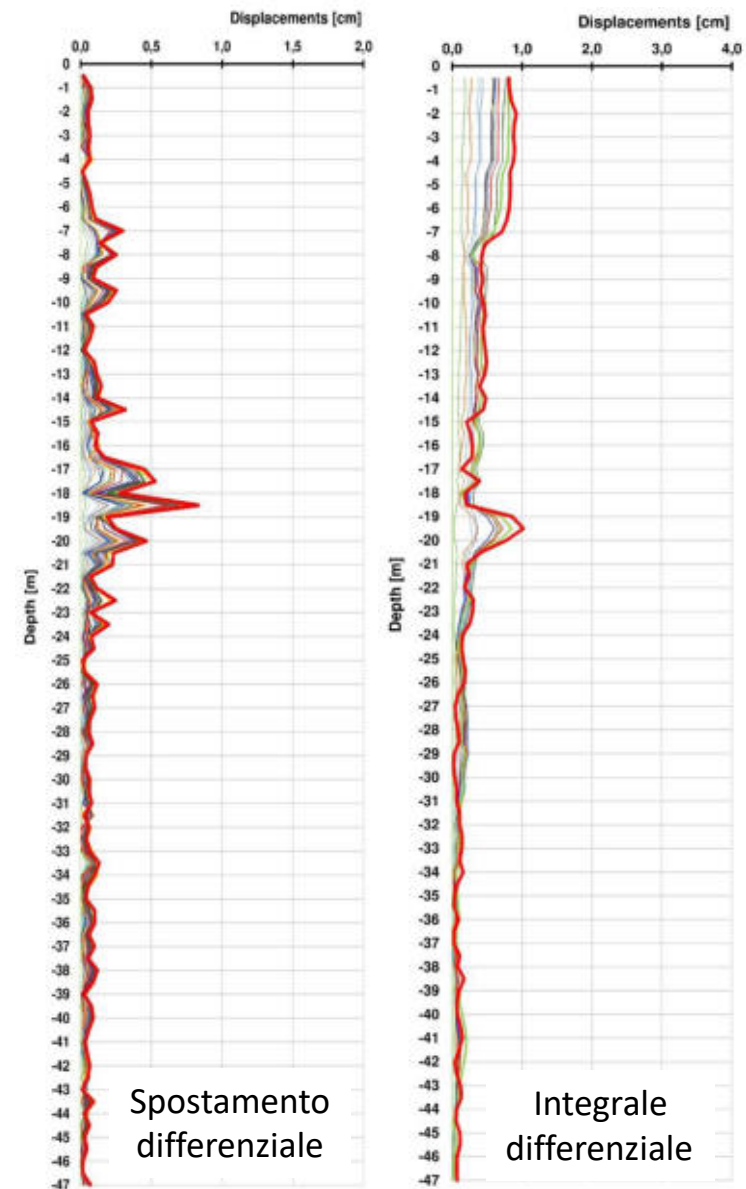
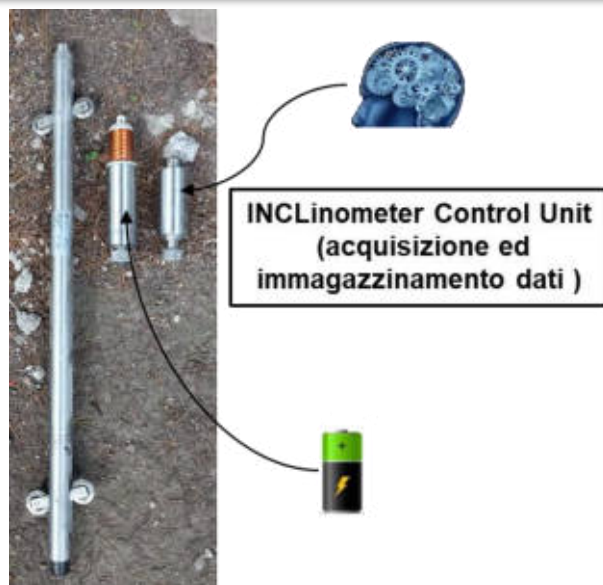
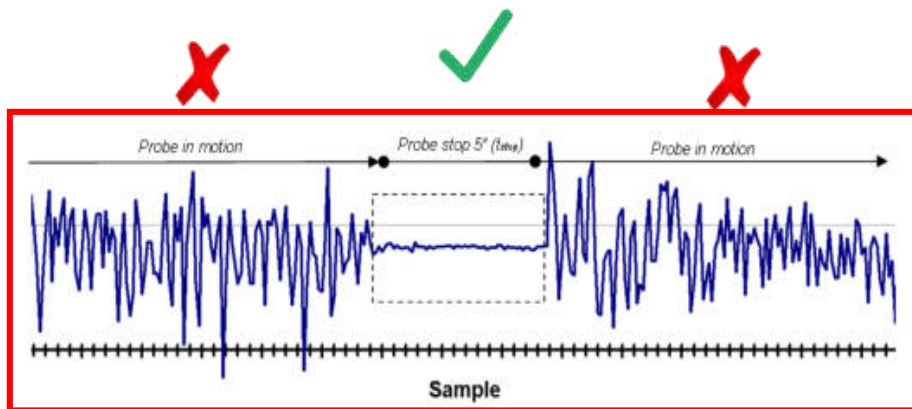
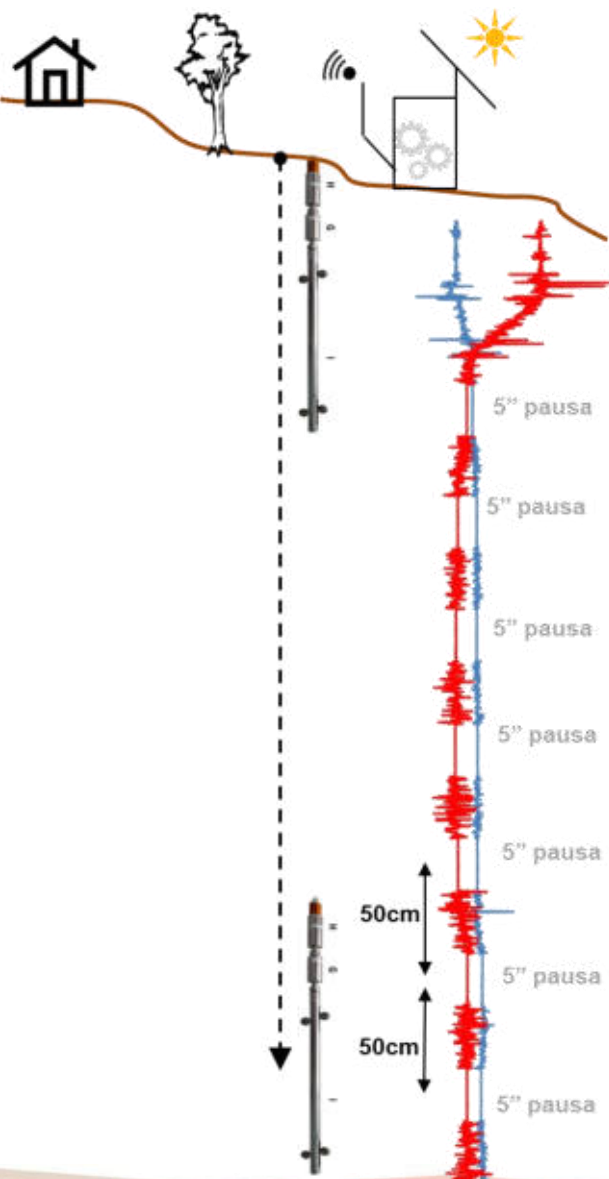


01/12/2021

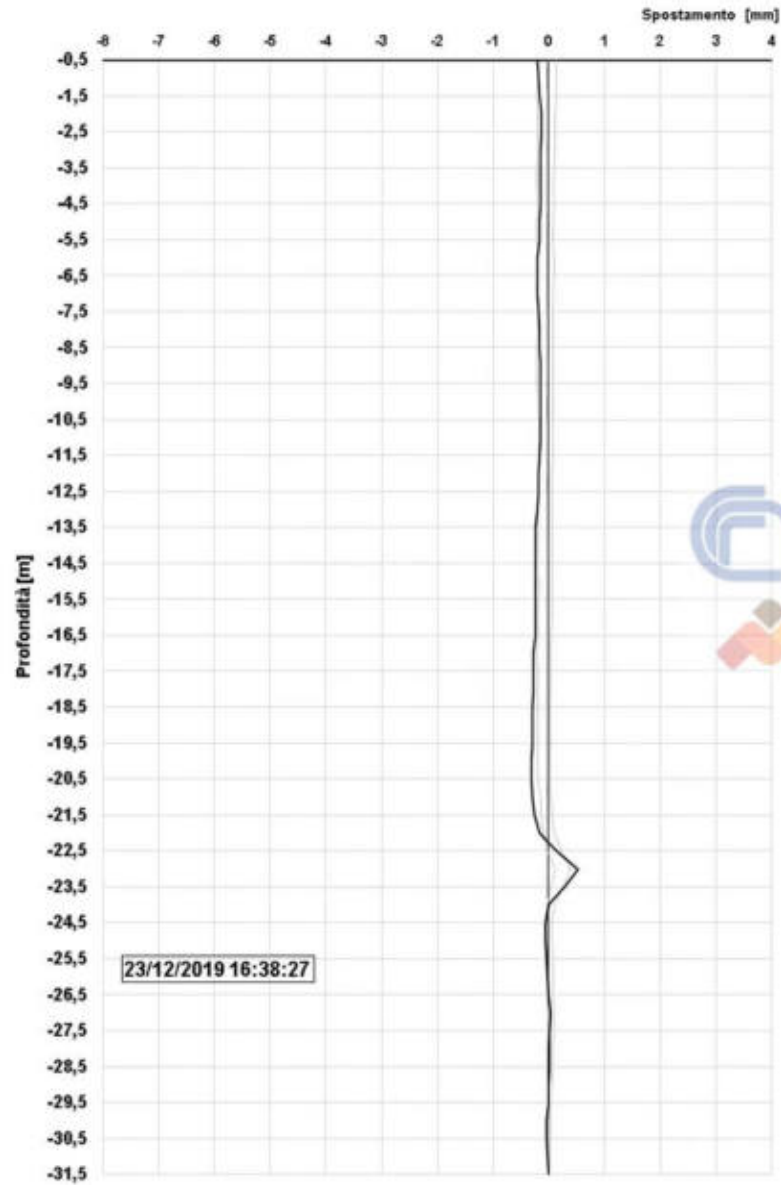
***Robotized Inclinometer System (CNR IRPI Pat. & Italsensor)***

- Allasia, P.; Godone, D.; Giordan, D.; Guenzi, D.; Lollino, G. Advances on Measuring Deep-Seated Ground Deformations Using Robotized Inclinometer System. Sensors 2020, 20, 3769. <https://doi.org/10.3390/s20133769>
- Italian Patent UIBM 0001391881—2012

# Inclinometro



**Integrale differenziale - Canale A**

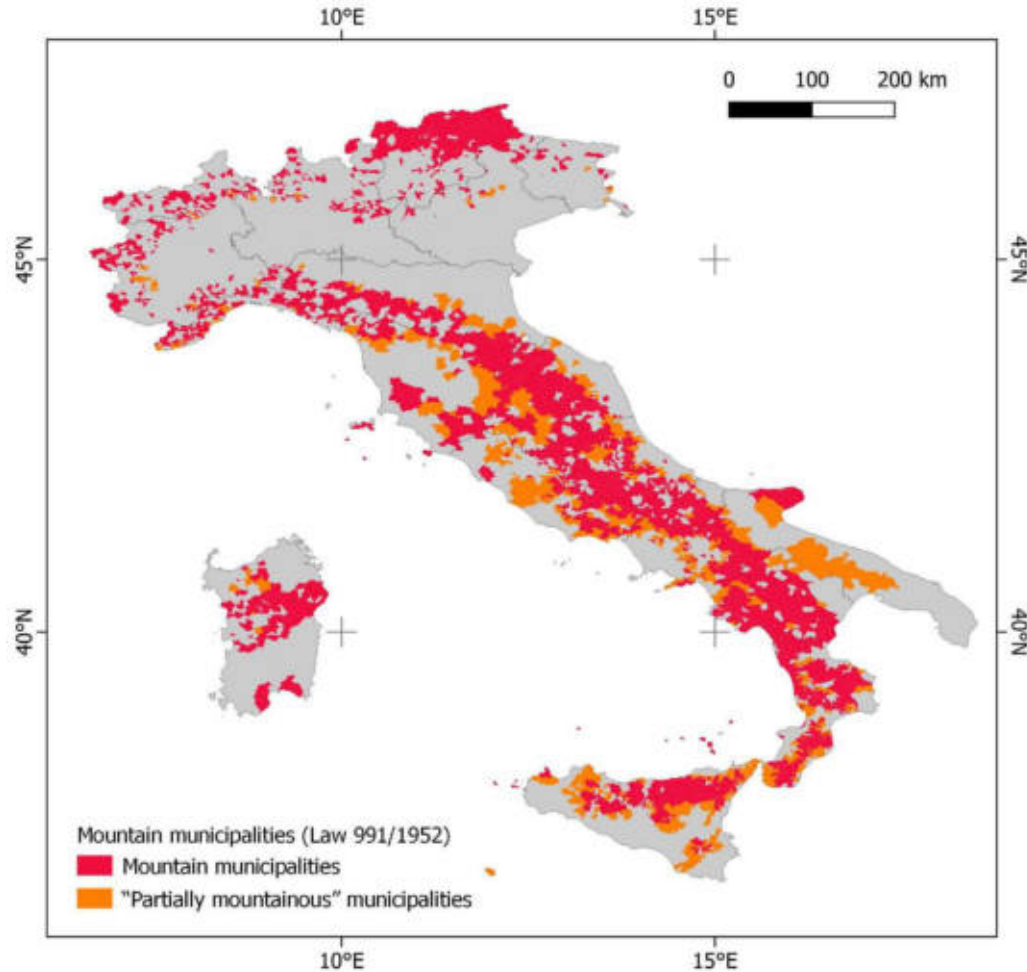


**Spostamento differenziale per Punti - Canale A**



# Dal monitoraggio...

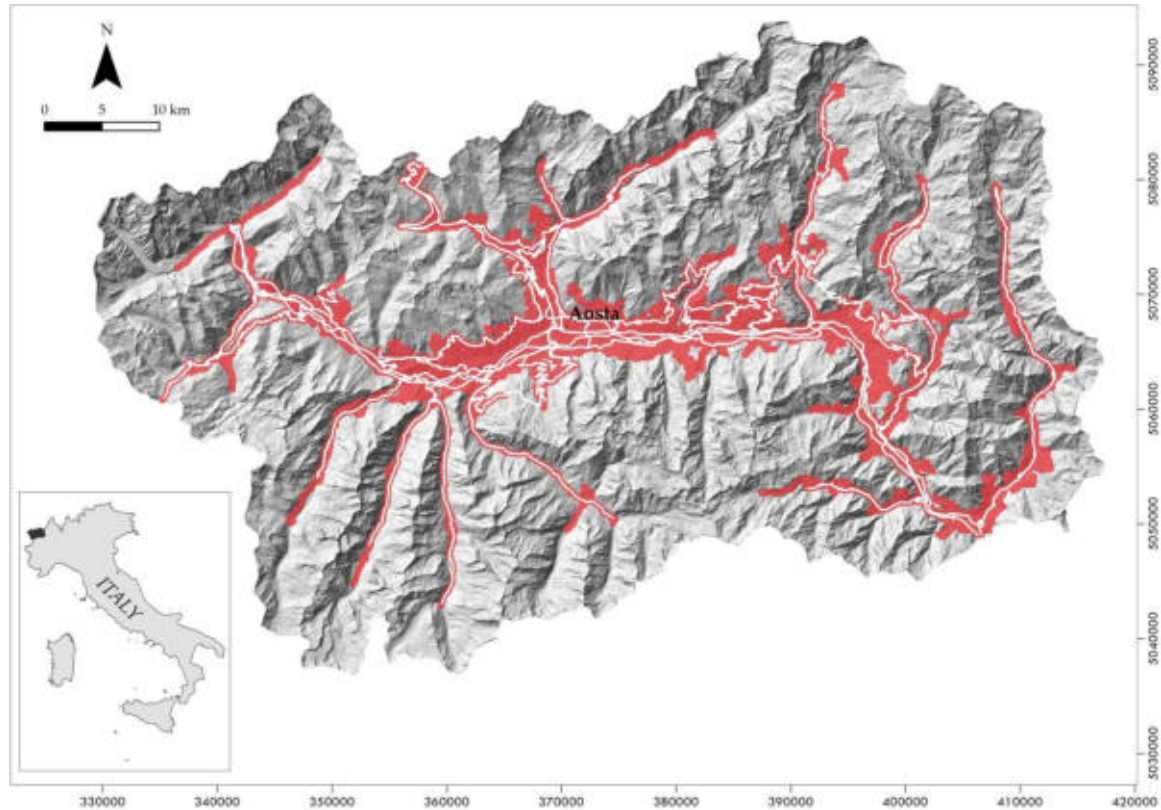
# Interazioni con problematiche socio-economiche



Godone D, Allasia P, Notti D, Baldo M, Poggi F, Faccini F. Coexistence of a Marginal Mountain Community with Large-Scale and Low Kinematic Landslide: The Intensive Monitoring Approach. *Remote Sensing*. 2023; 15(13):3238. <https://doi.org/10.3390/rs15133238>

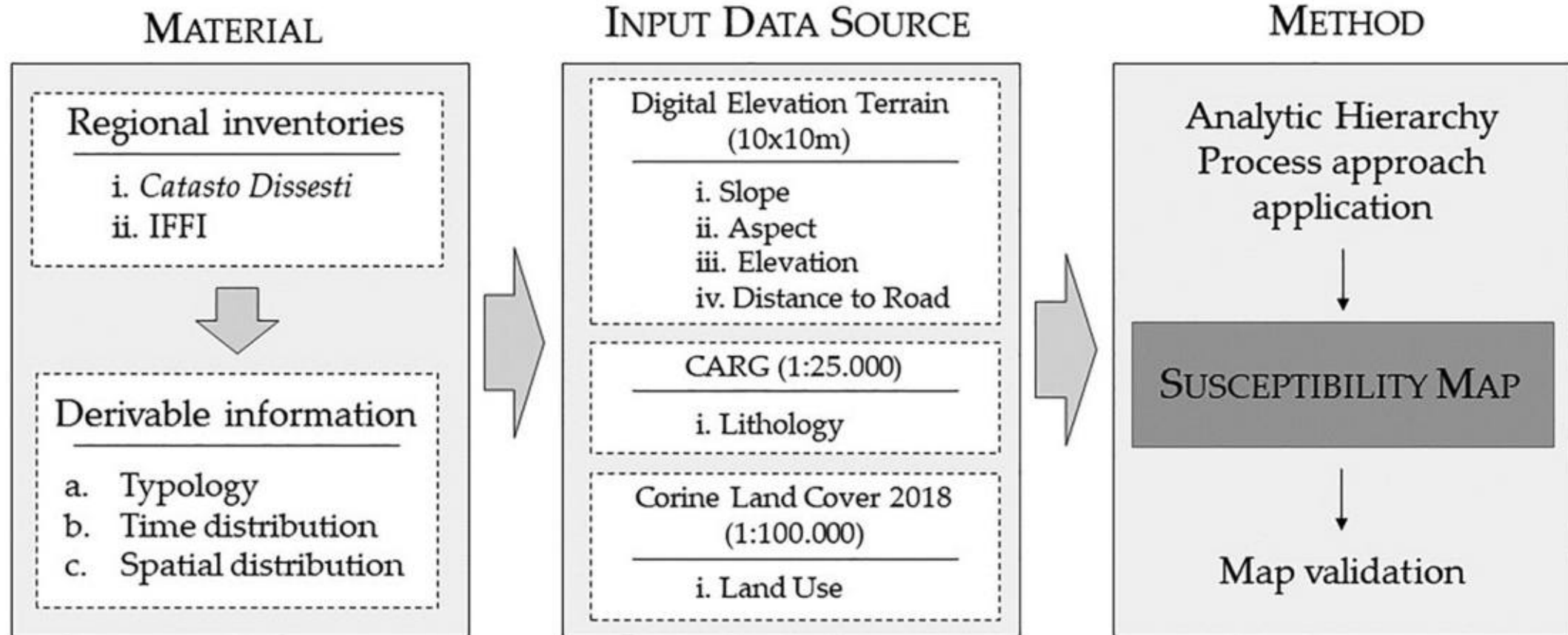
Beltramo R., Favaro E., Godone D., Vesce E., Cantore P., Vari C., Pizzighella E., De Bellis L. 2023; *FragMont Sistema integrato per la gestione della FRAGilità in MONTagna, Collane@unito.it*, ISBN 9788875902643

# Analisi di suscettibilità



M. Cignetti, D. Godone, D. Bertolo, M. Paganone, P. Thuegaz, D. Giordan (2021) Rockfall susceptibility along the regional road network of Aosta Valley Region (northwestern Italy), *Journal of Maps*, 17:3, 5464, DOI: [10.1080/17445647.2020.1850534](https://doi.org/10.1080/17445647.2020.1850534)  
Giordan, D.; Cignetti, M.; Godone, D.; Bertolo, D.; Paganone, M. Definition of an Operative Methodology for the Management of Rockfalls along with the Road Network. *Sustainability* 2021, 13, 7669. <https://doi.org/10.3390/su1314766>

# Metodologia







# Rockfall susceptibility along the regional road network of Aosta Valley Region (northwestern Italy)

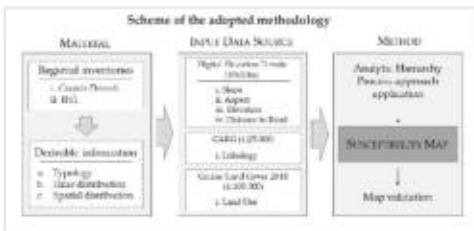
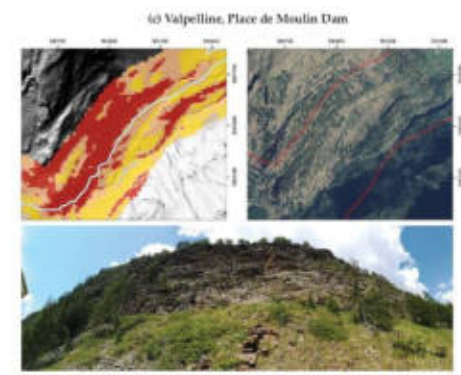
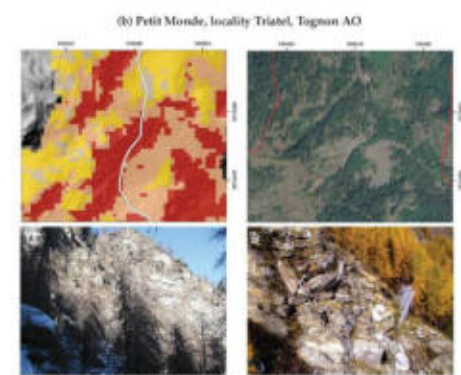
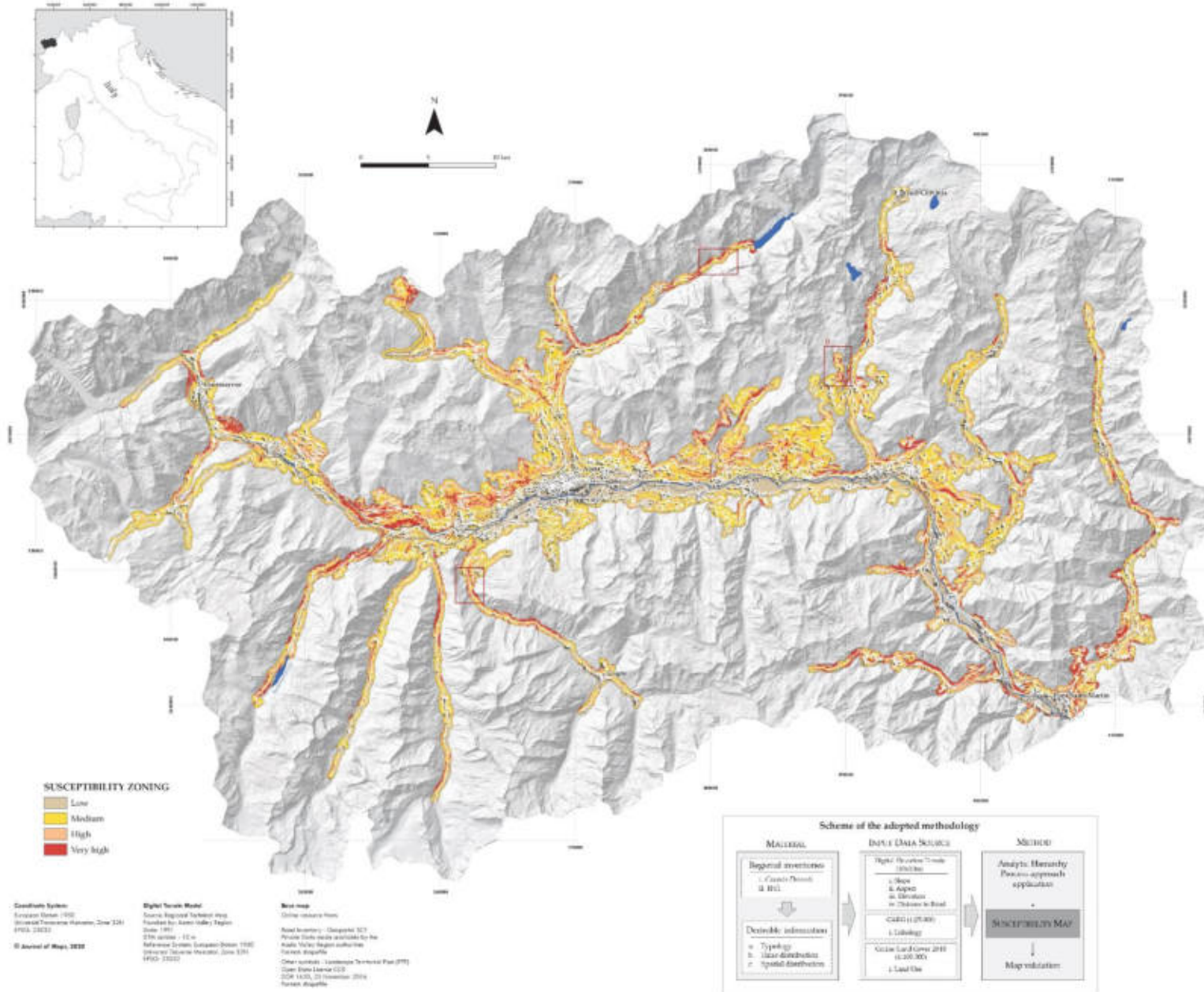
Cignetti, M.<sup>1,2</sup>, Godone, D.<sup>3,4</sup>, Bertolo, D.<sup>1</sup>, Paganone, M.<sup>1</sup>, Thuegaz, P.<sup>1</sup>, Giordan, D.<sup>1</sup>

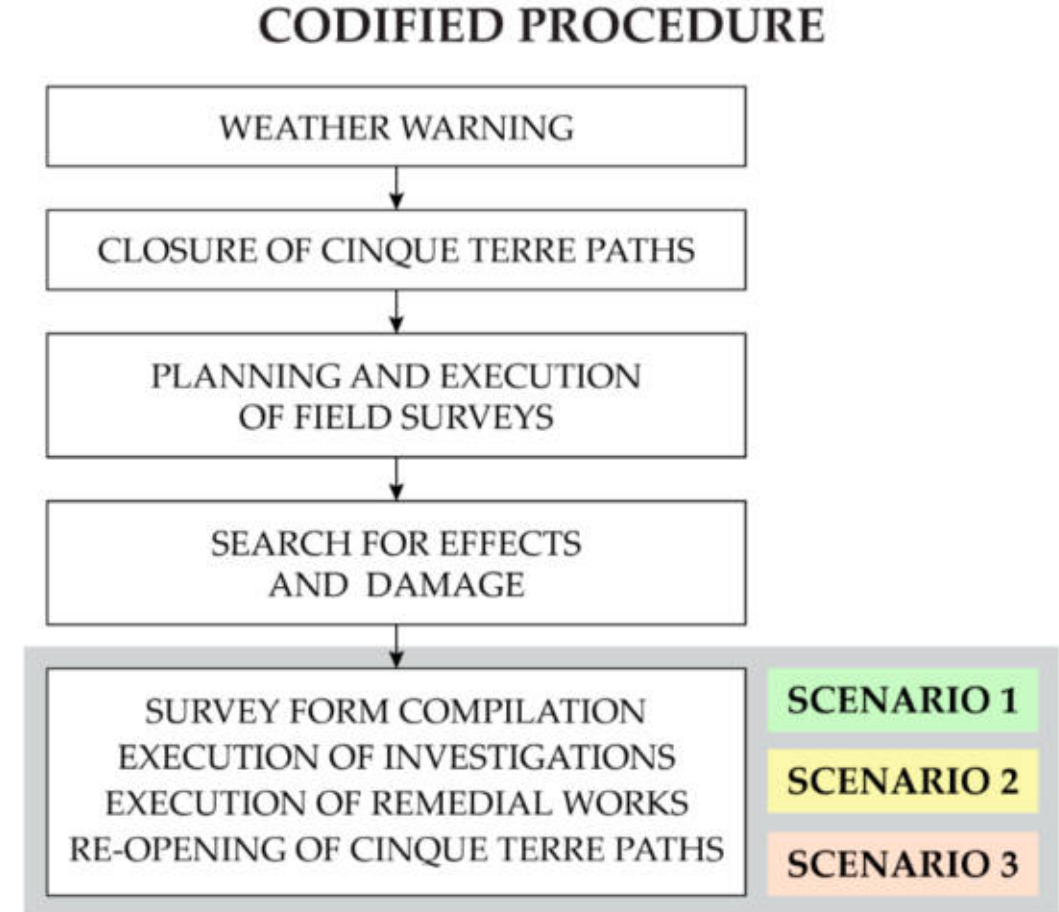
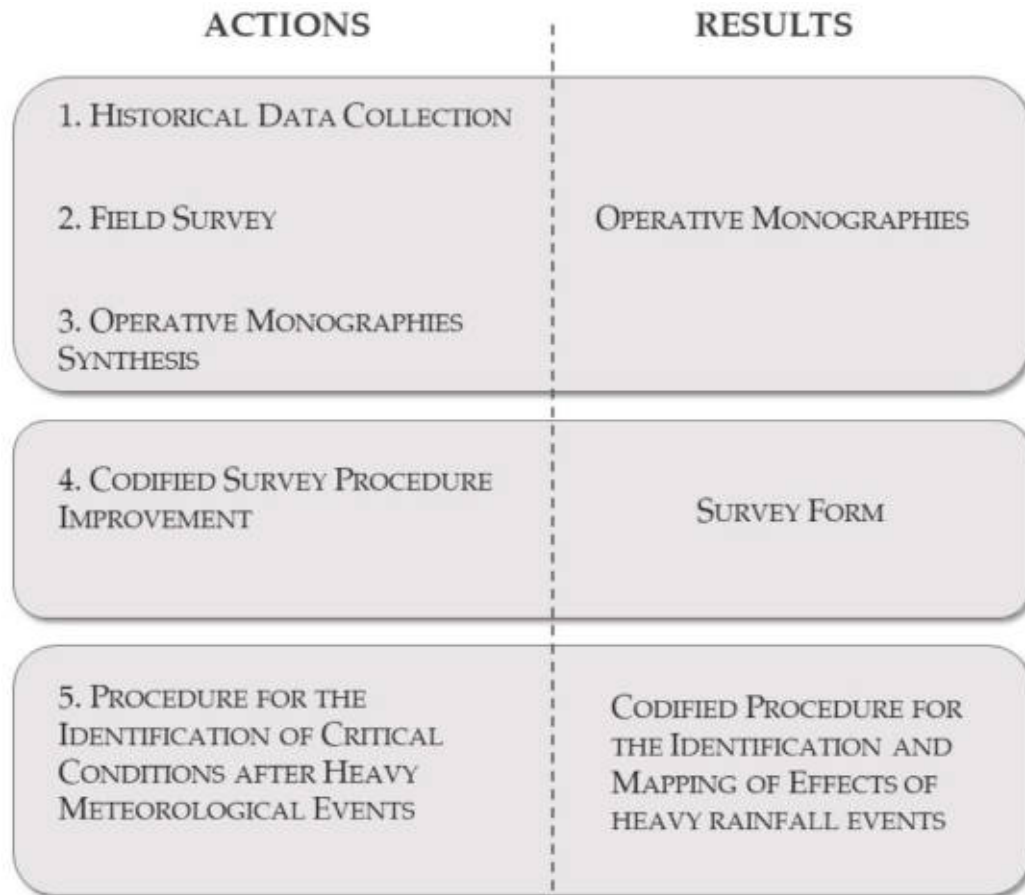
<sup>1</sup>National Research Council of Italy, Research Institute for Geo-Hydrological Protection (CNR IRPI), Via dei Solati 100/3, Italy; [marco.cignetti@cnr.it](mailto:marco.cignetti@cnr.it) (M.C.); [davide.godone@ipg.cnr.it](mailto:davide.godone@ipg.cnr.it) (D.G.); [daniela.giordan@ipg.cnr.it](mailto:daniela.giordan@ipg.cnr.it) (D.G.)

<sup>2</sup>Department of Earth and Environmental Sciences, University of Pavia, 27100, Italy;

<sup>3</sup>Struttura Attività Geologica, Regione Autonoma Valle d'Aosta, Quart 1103, Italy; [d.bertolo@regione.vda.it](mailto:d.bertolo@regione.vda.it) (D.B.); [m.paganone@regione.vda.it](mailto:m.paganone@regione.vda.it) (M.P.); [p.thuegaz@regione.vda.it](mailto:p.thuegaz@regione.vda.it) (P.T.)

<sup>4</sup>Correspondence: [davide.godone@ipg.cnr.it](mailto:davide.godone@ipg.cnr.it) (D.G.)





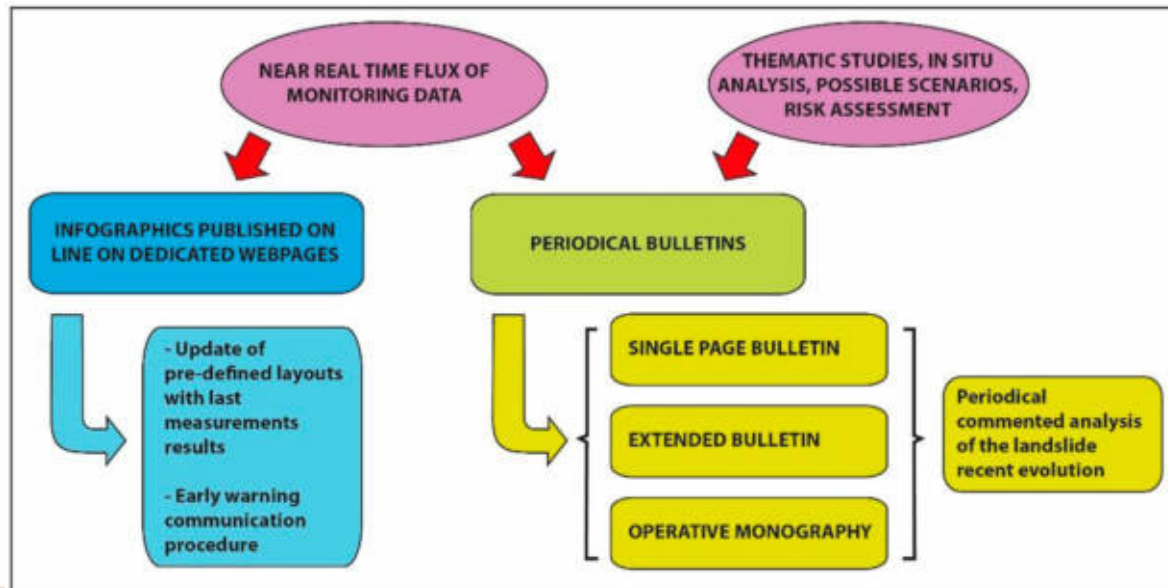
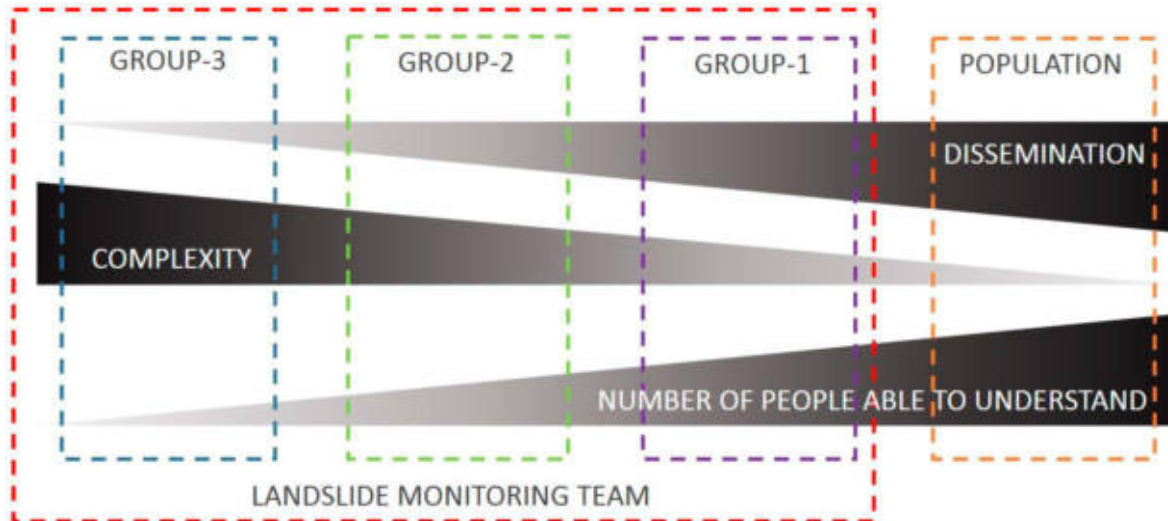
Giordan, D.; Cignetti, M.; Godone, D.; Peruccacci, S.; Raso, E.; Pepe, G.; Calcaterra, D.; Cevasco, A.; Firpo, M.; Scarpellini, P.; Gnone, M. A New Procedure for an Effective Management of Geo-Hydrological Risks across the “Sentiero Verde-Azzurro” Trail, Cinque Terre National Park, Liguria (North-Western Italy). Sustainability 2020, 12, 561.

<https://doi.org/10.3390/su12020561>

Giordan D, Cignetti M, Godone D, Bertolo D, Paganone M. Definition of an Operative Methodology for the Management of Rockfalls along with the Road Network. Sustainability. 2021;

13(14):7669. <https://doi.org/10.3390/su13147669>

# Comunicazione



**BULLETIN OF DISPLACEMENT MONITORING LANDSLIDE OF MONT DE LA SAXE (AO)**  
Reference period 06/04/2014 00:00:00 - 07/04/2014 00:00:00  
bulletin issued on 07/04/2014

**HIGH ACTIVITY**

General activity level is disseminated by coloured eye-catching logo

Surface deformation map and three-dimensional arrows showing the real direction of movement overprinted on the photographic representation of the slide and surrounding elements at risk with the limits of each sector

Trend of the maximum displacement over the last 24h with respect to the previous update	SECTOR A	SECTOR B	SECTOR C
	CONSTANT	ACCELERATE	ACCELERATE
(mm/24h) displacement measured in the last 24h	1/1	10.7/32.2	30.9/36.1
		PREVIOUS PERIOD   CURRENT PERIOD	

Movement trend for each sector is disseminated by simple icon representing a tachometer

Maximum registered displacement in each sector for current and previous period

Brief description of each general activity level (logo colour changes gradually as for well-known traffic light)

- LOW ACTIVITY** (Green logo): Landslide is active and displacements are involved, displacement level is low. Considering past records, the local activities and/or rock falls cannot be excluded.
- MODERATE ACTIVITY** (Orange logo): Displacements are locally high, and elevated attention is required. Considering past records, moderate to large size activations cannot be excluded.
- HIGH ACTIVITY** (Red logo): Displacements are high, and acceleration level is possible. A careful landslide evaluation is strongly recommended.

The monitoring network is divided, for simplicity, in three sectors corresponding to the Civil Protection plan.  
\*maximum values measured in each sector.

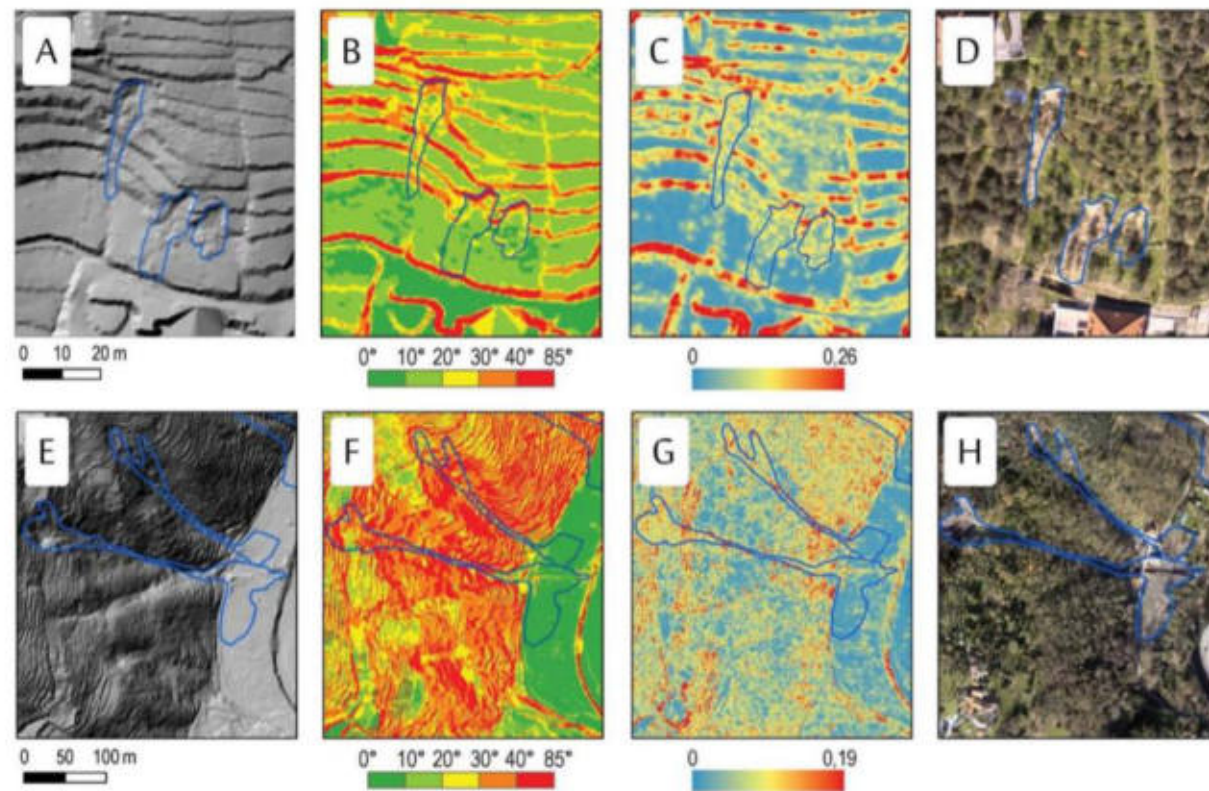
Giordan, D.; Wrzesniak, A.; Allasia, P. The Importance of a Dedicated Monitoring Solution and Communication Strategy for an Effective Management of Complex Active Landslides in Urbanized Areas. Sustainability 2019, 11, 946.

<https://doi.org/10.3390/su11040946>

# Analisi statistica Frane superficiali Vs Land use

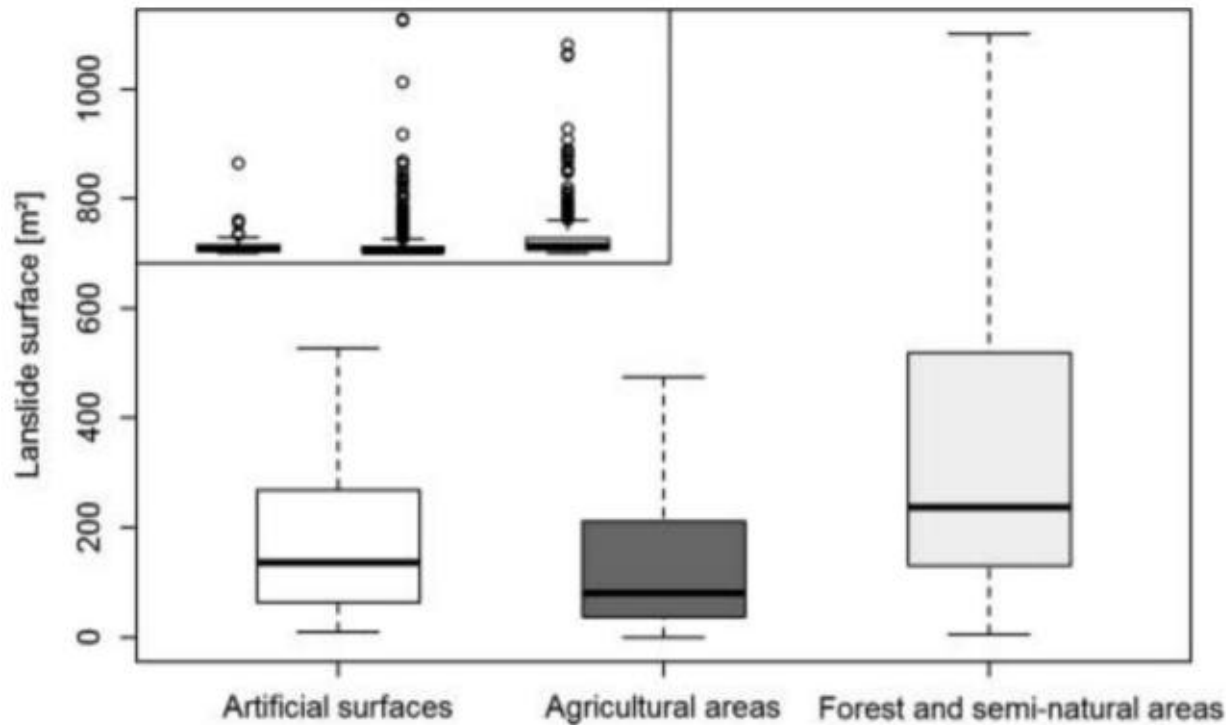


Rilievi LiDAR post alluvione 2014



Mapping frane superficiali

## Frane superficiali Vs Land use



The Chi square values, calculated for each one, suggest that the 'Agricultural surfaces' categories are most strongly related to landslides distribution (Table 3).

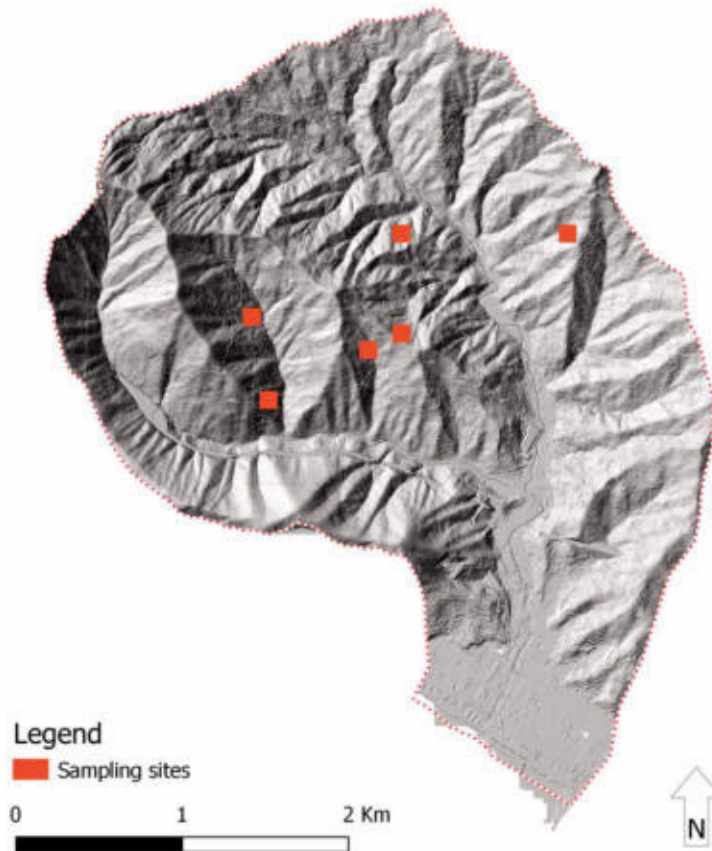
In detail, among agricultural subclasses, the analysis points out 'Vineyards, olive groves and greenhouses' as the most associated one in terms of landslides occurrence (Tables 4 and 5). Tables framework is the same as the previous ones.

Concerning man-made structures both terraces and roads have shown similar behaviour on landslide occurrence (Table 5), thus showing their effective influence.

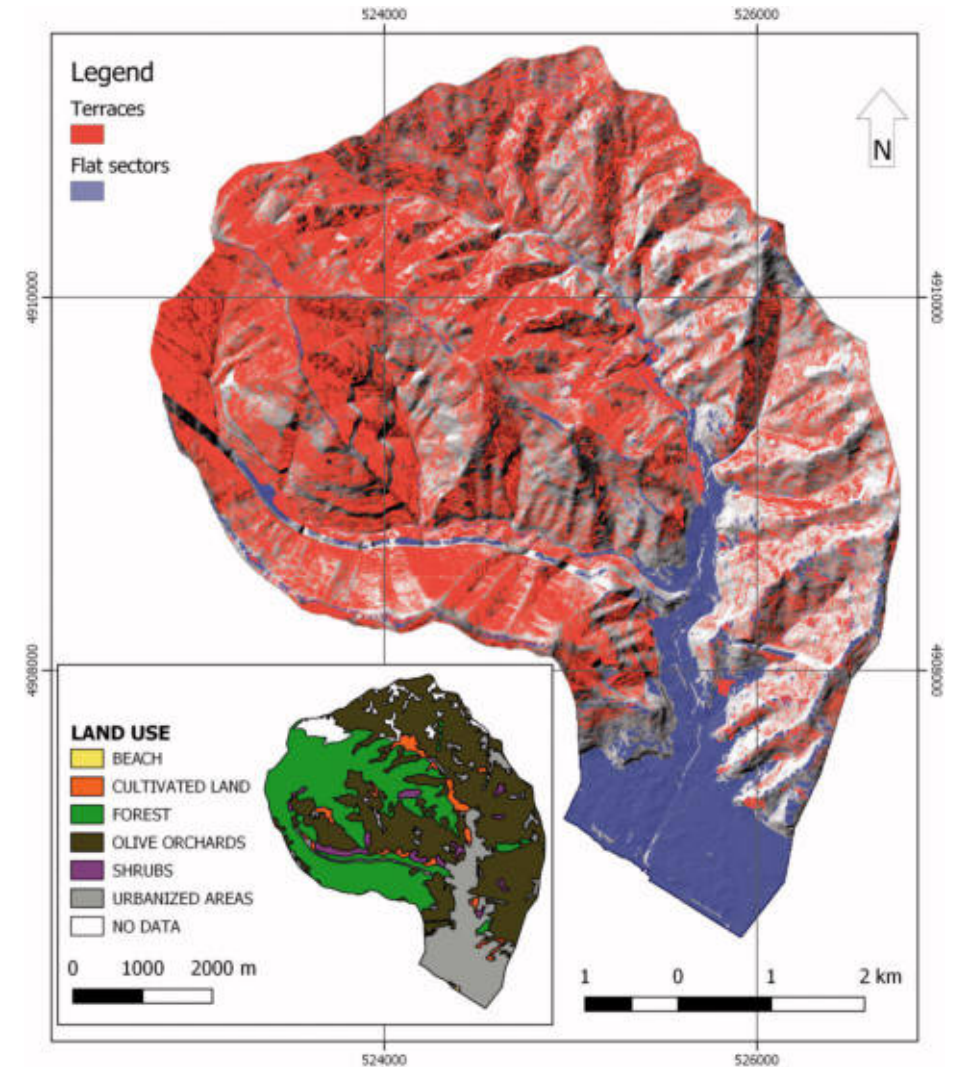
Variable	$\chi^2$	df	<i>p</i>
Terraces	14.3	1	***
Roads	592.68	1	***

## Mapping automatico aree terrazzate

(a)



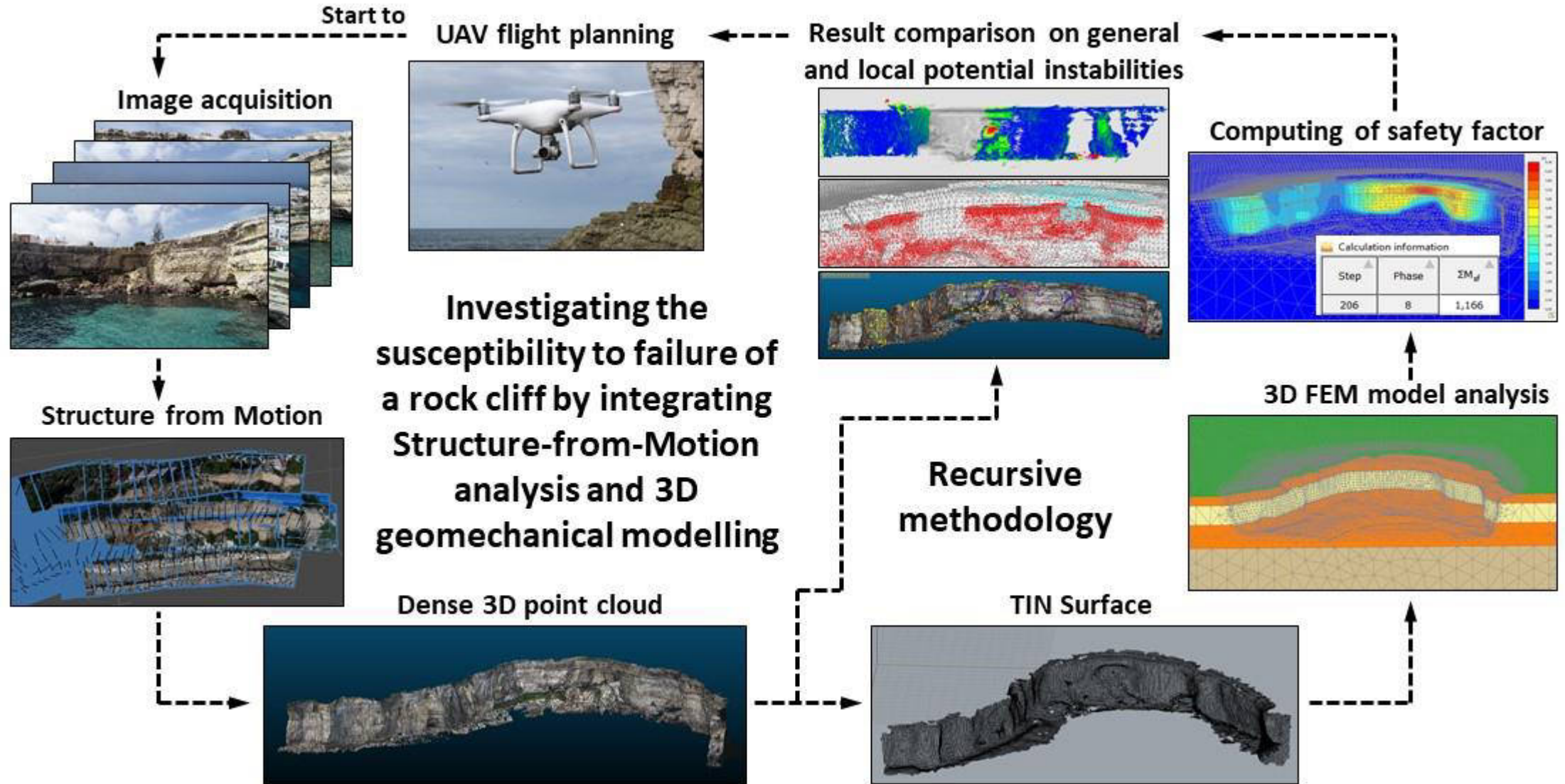
(b)



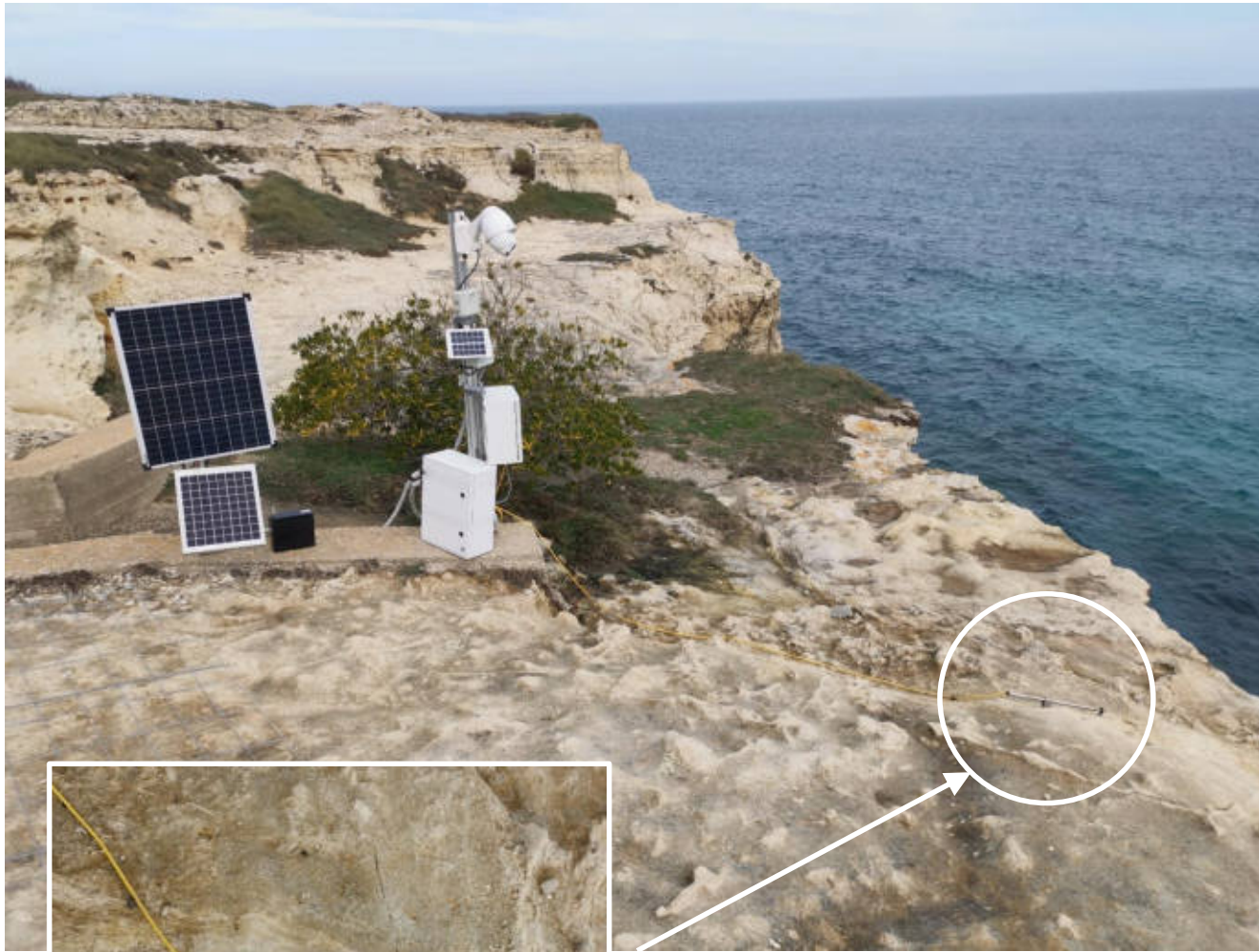
D. Godone, D. Giordan, M. Baldo (2018) Rapid mapping application of vegetated terraces based on high resolution airborne LiDAR, *Geomatics, Natural Hazards and Risk*, 9:1, 970-985, DOI: [10.1080/19475705.2018.1478893](https://doi.org/10.1080/19475705.2018.1478893)

M. Cignetti, D. Godone, D. Giordan (2019) Shallow landslide susceptibility, Rupinaro catchment, Liguria (northwestern Italy), *Journal of Maps*, 15:2, 333-345, DOI: [10.1080/17445647.2019.1593252](https://doi.org/10.1080/17445647.2019.1593252)

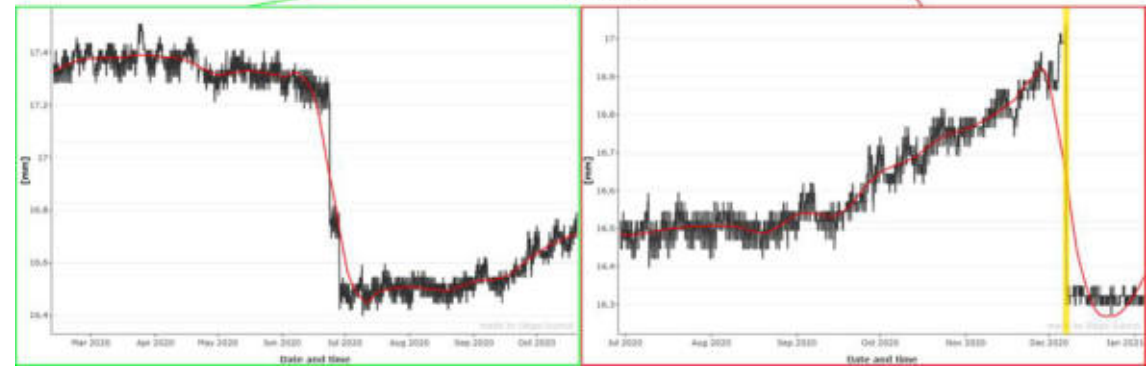
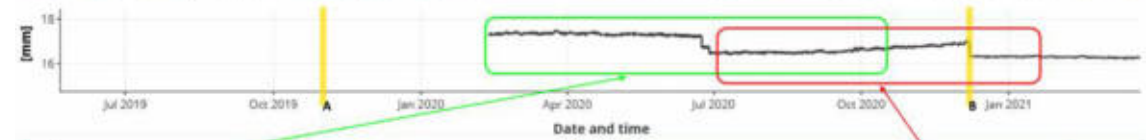
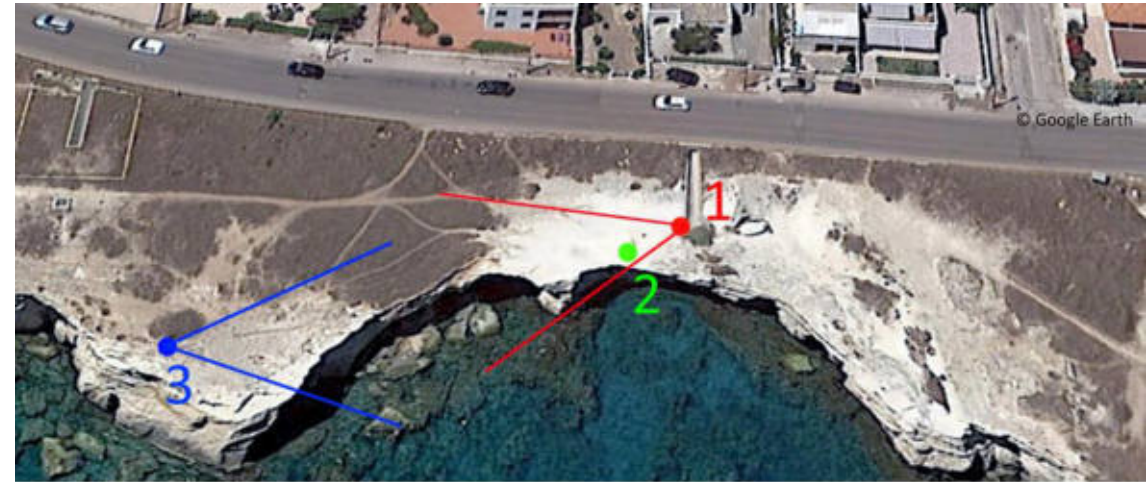
Se funziona in montagna...





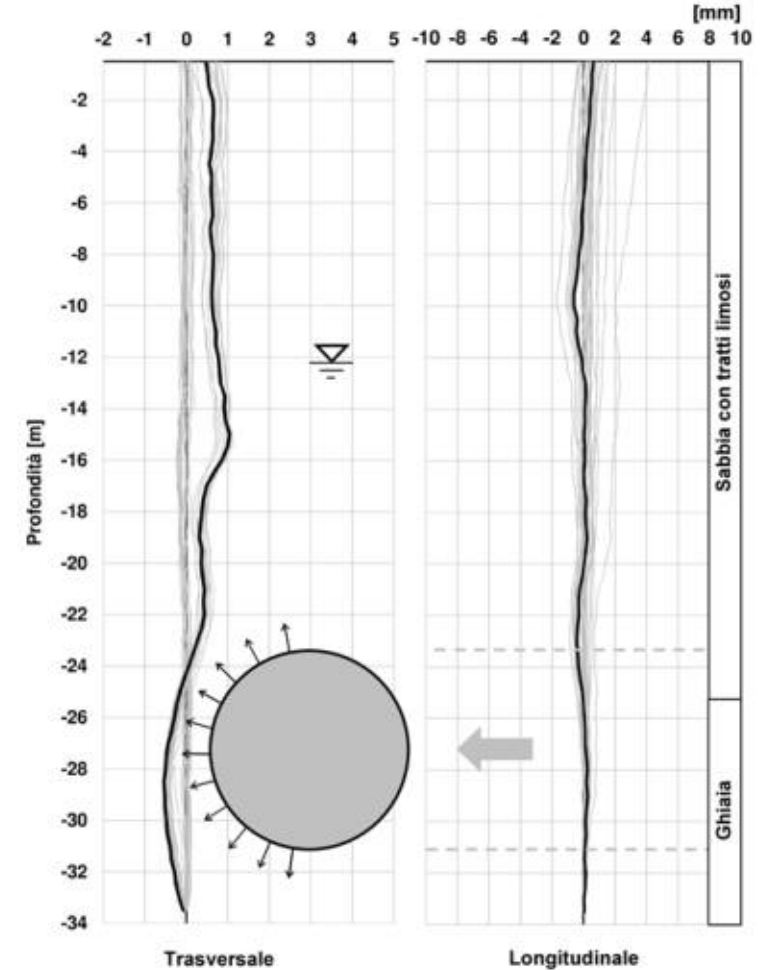


Estensimetro

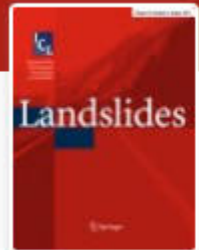


Guenzi, D., Godone, D., Allasia, P., Fazio, N. L., Perrotti, M., and Lollino, P.: Brief communication: monitoring a soft-rock coastal cliff using webcams and strain sensors, Nat. Hazards Earth Syst. Sci., <https://doi.org/10.5194/nhess-22-207-2022>.

## Monitoraggio deformazioni indotte dallo scavo della Metro C tramite TBM



# Un ultimo esempio di collaborazione...



## Landslides

Journal of the International Consortium on Landslides

### Technical note

Impacts on mountain settlements of a large slow rock-slope deformation: a multi-temporal and multi-source investigation.

Cignetti M.<sup>1</sup>, Godone D.<sup>1,\*</sup>, Notti D.<sup>1</sup>, Lanteri L.<sup>2</sup>, Giordan D.<sup>1</sup>

<sup>1</sup> National Research Council of Italy, Research Institute for Geo-Hydrological Protection (CNR-IRPI), 10135 Turin, Italy

<sup>2</sup> Dipartimento Rischi Naturali e Ambientali, ARPA Piemonte - Agenzia Regionale per la Protezione Ambientale, 10121 Turin, Italy.

\* Corresponding author: danilo.godone@irpi.cnr.it, National Research Council of Italy, Research Institute for Geo-Hydrological Protection (CNR-IRPI), Turin, Italy

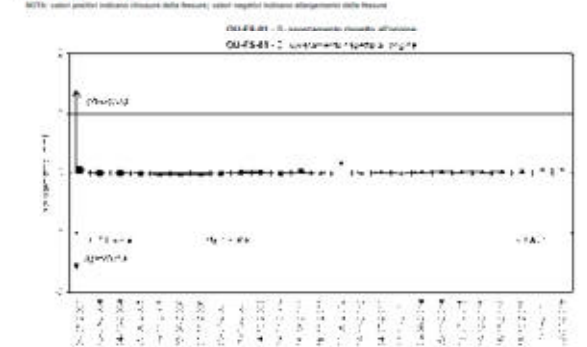
In preparation

**CONSORZIO FORESTALE ALTA VALLE SUSA**  
Via Petousiers 6, 10056 Oulx (To)  
Tel. +39 0122 831079 Fax +39 0122 831282  
e-mail: cfas@postecert.it - cfas@irpi.cnr.it Web: www.cfas.it  
P.IVA: 03070290110 C.F. 05501300110

Area Bacini Montani  
**MONITORAGGIO GEOTECNICO** PHO TO29-14-SS001\_01

Strumento: **OU-FS-01 - fessurimetro meccanico** via Des Ambros n. 1  
computer meccanico Sageo 30 mm rs. 0,01 mm  
misura: Secl. 7, Vangelista - Ing. D. Giardi

data	valore mm	Δ mm	misura
2011-01-01	0.00	0.00	CIT/Emme
2011-01-02	0.00	0.00	
2011-01-03	0.00	0.00	
2011-01-04	0.00	0.00	
2011-01-05	0.00	0.00	
2011-01-06	0.00	0.00	
2011-01-07	0.00	0.00	
2011-01-08	0.00	0.00	
2011-01-09	0.00	0.00	
2011-01-10	0.00	0.00	
2011-01-11	0.00	0.00	
2011-01-12	0.00	0.00	
2011-01-13	0.00	0.00	
2011-01-14	0.00	0.00	
2011-01-15	0.00	0.00	
2011-01-16	0.00	0.00	
2011-01-17	0.00	0.00	
2011-01-18	0.00	0.00	
2011-01-19	0.00	0.00	
2011-01-20	0.00	0.00	
2011-01-21	0.00	0.00	
2011-01-22	0.00	0.00	
2011-01-23	0.00	0.00	
2011-01-24	0.00	0.00	
2011-01-25	0.00	0.00	
2011-01-26	0.00	0.00	
2011-01-27	0.00	0.00	
2011-01-28	0.00	0.00	
2011-01-29	0.00	0.00	
2011-01-30	0.00	0.00	
2011-01-31	0.00	0.00	
2011-02-01	0.00	0.00	
2011-02-02	0.00	0.00	
2011-02-03	0.00	0.00	
2011-02-04	0.00	0.00	
2011-02-05	0.00	0.00	
2011-02-06	0.00	0.00	
2011-02-07	0.00	0.00	
2011-02-08	0.00	0.00	
2011-02-09	0.00	0.00	
2011-02-10	0.00	0.00	
2011-02-11	0.00	0.00	
2011-02-12	0.00	0.00	
2011-02-13	0.00	0.00	
2011-02-14	0.00	0.00	
2011-02-15	0.00	0.00	
2011-02-16	0.00	0.00	
2011-02-17	0.00	0.00	
2011-02-18	0.00	0.00	
2011-02-19	0.00	0.00	
2011-02-20	0.00	0.00	
2011-02-21	0.00	0.00	
2011-02-22	0.00	0.00	
2011-02-23	0.00	0.00	
2011-02-24	0.00	0.00	
2011-02-25	0.00	0.00	
2011-02-26	0.00	0.00	
2011-02-27	0.00	0.00	
2011-02-28	0.00	0.00	
2011-02-29	0.00	0.00	
2011-03-01	0.00	0.00	
2011-03-02	0.00	0.00	
2011-03-03	0.00	0.00	
2011-03-04	0.00	0.00	
2011-03-05	0.00	0.00	
2011-03-06	0.00	0.00	
2011-03-07	0.00	0.00	
2011-03-08	0.00	0.00	
2011-03-09	0.00	0.00	
2011-03-10	0.00	0.00	
2011-03-11	0.00	0.00	
2011-03-12	0.00	0.00	
2011-03-13	0.00	0.00	
2011-03-14	0.00	0.00	
2011-03-15	0.00	0.00	
2011-03-16	0.00	0.00	
2011-03-17	0.00	0.00	
2011-03-18	0.00	0.00	
2011-03-19	0.00	0.00	
2011-03-20	0.00	0.00	
2011-03-21	0.00	0.00	
2011-03-22	0.00	0.00	
2011-03-23	0.00	0.00	
2011-03-24	0.00	0.00	
2011-03-25	0.00	0.00	
2011-03-26	0.00	0.00	
2011-03-27	0.00	0.00	
2011-03-28	0.00	0.00	
2011-03-29	0.00	0.00	
2011-03-30	0.00	0.00	
2011-03-31	0.00	0.00	
2011-04-01	0.00	0.00	
2011-04-02	0.00	0.00	
2011-04-03	0.00	0.00	
2011-04-04	0.00	0.00	
2011-04-05	0.00	0.00	
2011-04-06	0.00	0.00	
2011-04-07	0.00	0.00	
2011-04-08	0.00	0.00	
2011-04-09	0.00	0.00	
2011-04-10	0.00	0.00	
2011-04-11	0.00	0.00	
2011-04-12	0.00	0.00	
2011-04-13	0.00	0.00	
2011-04-14	0.00	0.00	
2011-04-15	0.00	0.00	
2011-04-16	0.00	0.00	
2011-04-17	0.00	0.00	
2011-04-18	0.00	0.00	
2011-04-19	0.00	0.00	
2011-04-20	0.00	0.00	
2011-04-21	0.00	0.00	
2011-04-22	0.00	0.00	
2011-04-23	0.00	0.00	
2011-04-24	0.00	0.00	
2011-04-25	0.00	0.00	
2011-04-26	0.00	0.00	
2011-04-27	0.00	0.00	
2011-04-28	0.00	0.00	
2011-04-29	0.00	0.00	
2011-04-30	0.00	0.00	





gmg.irpi.cnr.it



@GMG.IRPI

Danilo Godone, PhD  
[danilo.godone@irpi.cnr.it](mailto:danilo.godone@irpi.cnr.it)

Grazie per l'attenzione!