



UNIVERSITÀ
DEGLI STUDI
DI UDINE

Università degli studi di Udine

Assessing the long-term effectiveness of channel control works and supporting watershed management through sediment dynamics studies

Original

Availability:

This version is available <http://hdl.handle.net/11390/1267309> since 2024-02-13T09:55:33Z

Publisher:

Published

DOI:

Terms of use:

The institutional repository of the University of Udine (<http://air.uniud.it>) is provided by ARIC services. The aim is to enable open access to all the world.

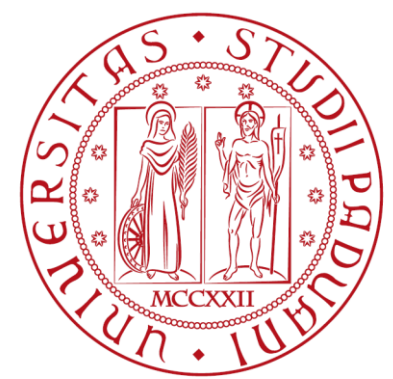
Publisher copyright

(Article begins on next page)



UNIVERSITÀ
DEGLI STUDI
DI UDINE

uniUD
HydroLab
Progress in hydrology



UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Assessing the long-term effectiveness of channel control works and supporting watershed management through sediment dynamics studies

Sara Cucchiaro^{1*}, Lorenzo Martini², Eleonora Maset³, Giacomo Pellegrini², Giorgia Chiarel², Francesco Piccinin², Maria Eliana Poli¹, Alberto Bein³, Federico Cazorzi¹, Lorenzo Picco²

¹ Department of Agricultural, Food, Environmental and Animal Sciences, University of Udine, Italy (sara.cucchiaro@uniud.it)

² Department of Land, Environment, Agriculture and Forestry, University of Padova, Italy

³ University of Udine, Polytechnic Department of Engineering and Architecture, Udine, Italy



GIT – GEOSCIENCES &
INFORMATION TECHNOLOGY
of the Italian Geological Society

XVII CONVEGNO NAZIONALE

11-13 Settembre 2023
Pietrasanta (Lu)

WHY

Background

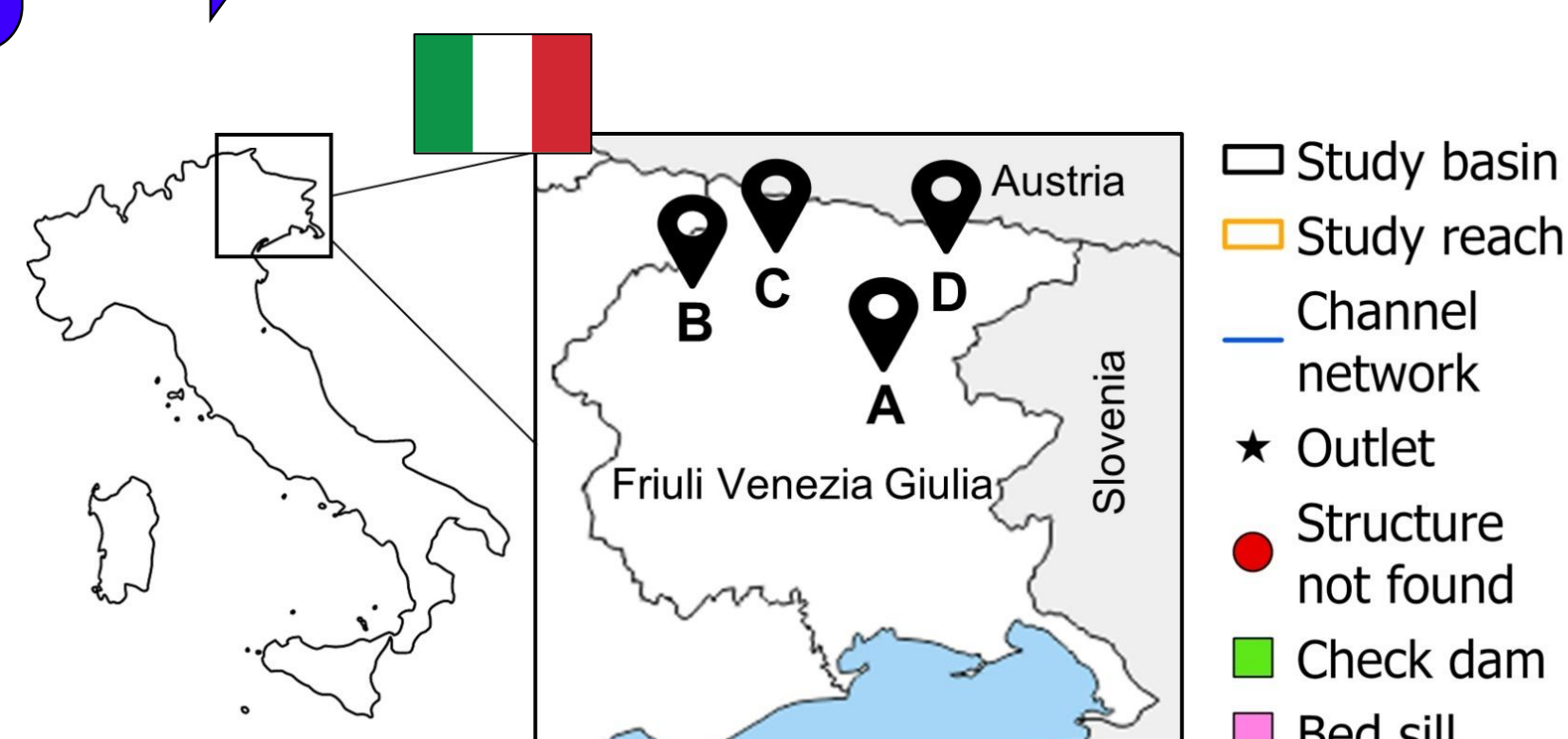
Aim of the research

Lack of information on the **status and functionality of existing structures**, and a priori in-depth study to analyse the **sediment morphology dynamics and the interaction with existing channel control works**

To introduce a **methodological approach** that integrates **sediment morphology dynamics data** over extended time spans in some mountain catchments **with the current efficiency of existing interventions**

WHERE

4 mountain basins

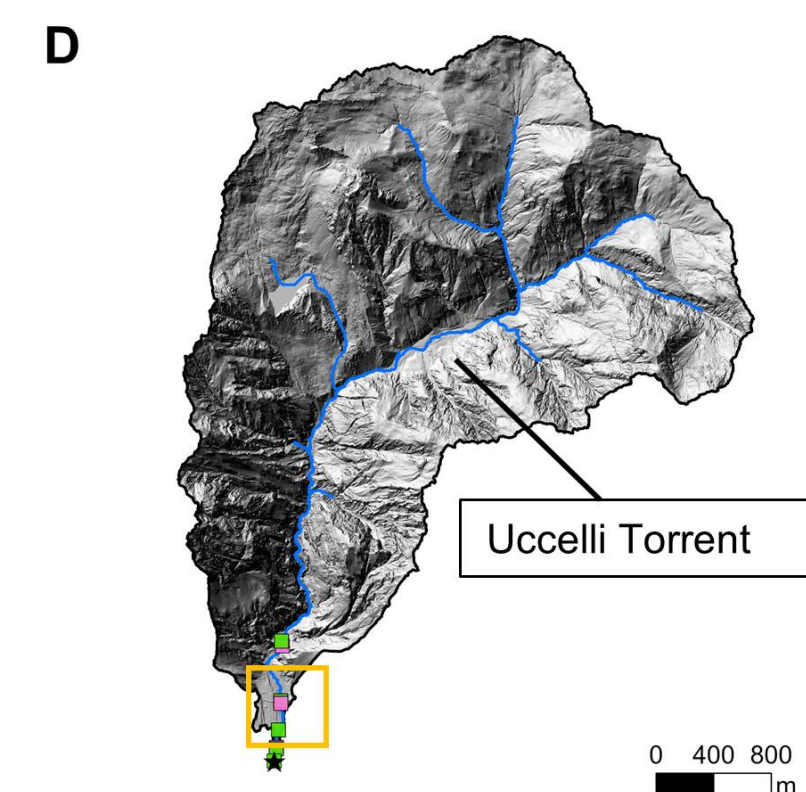
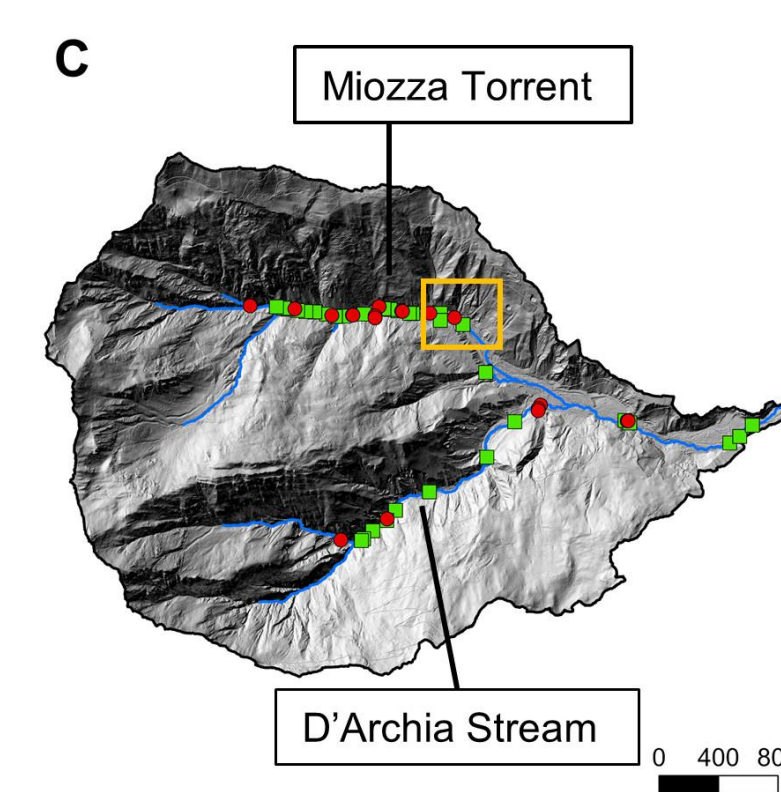
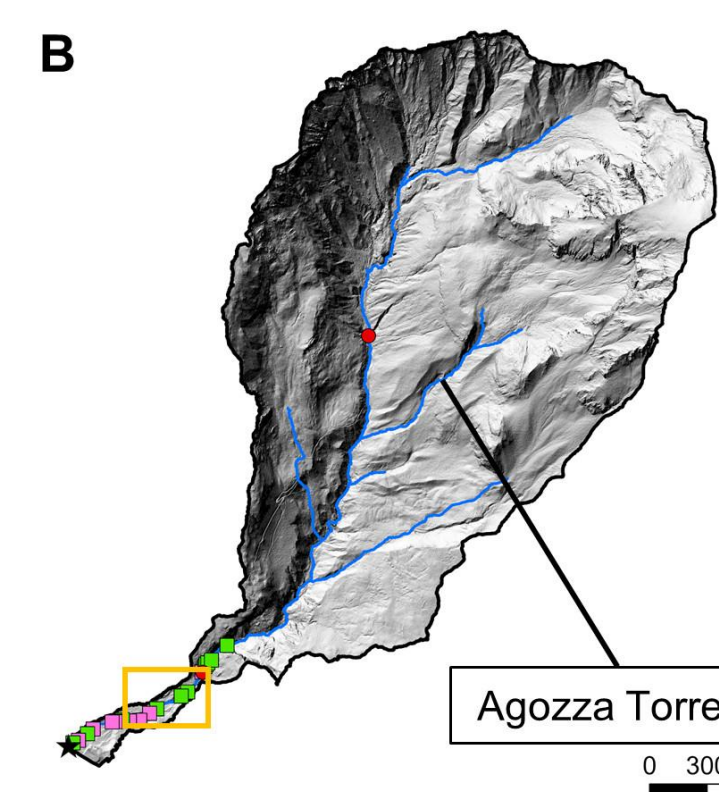
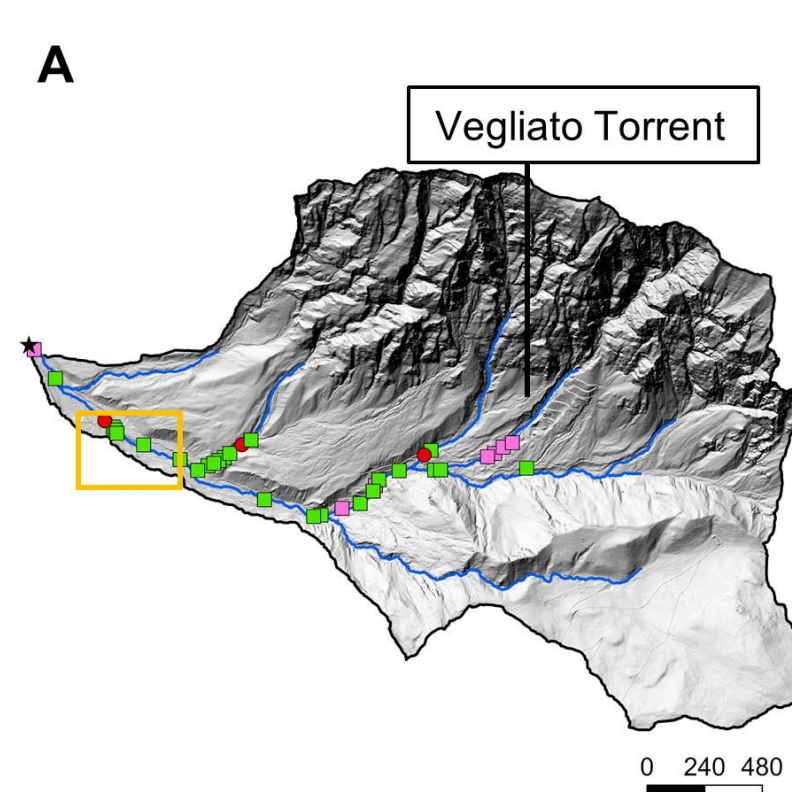


Vegliato torrent

Agozza torrent

Miozza torrent

Uccelli torrent



HOW

Methodological workflow

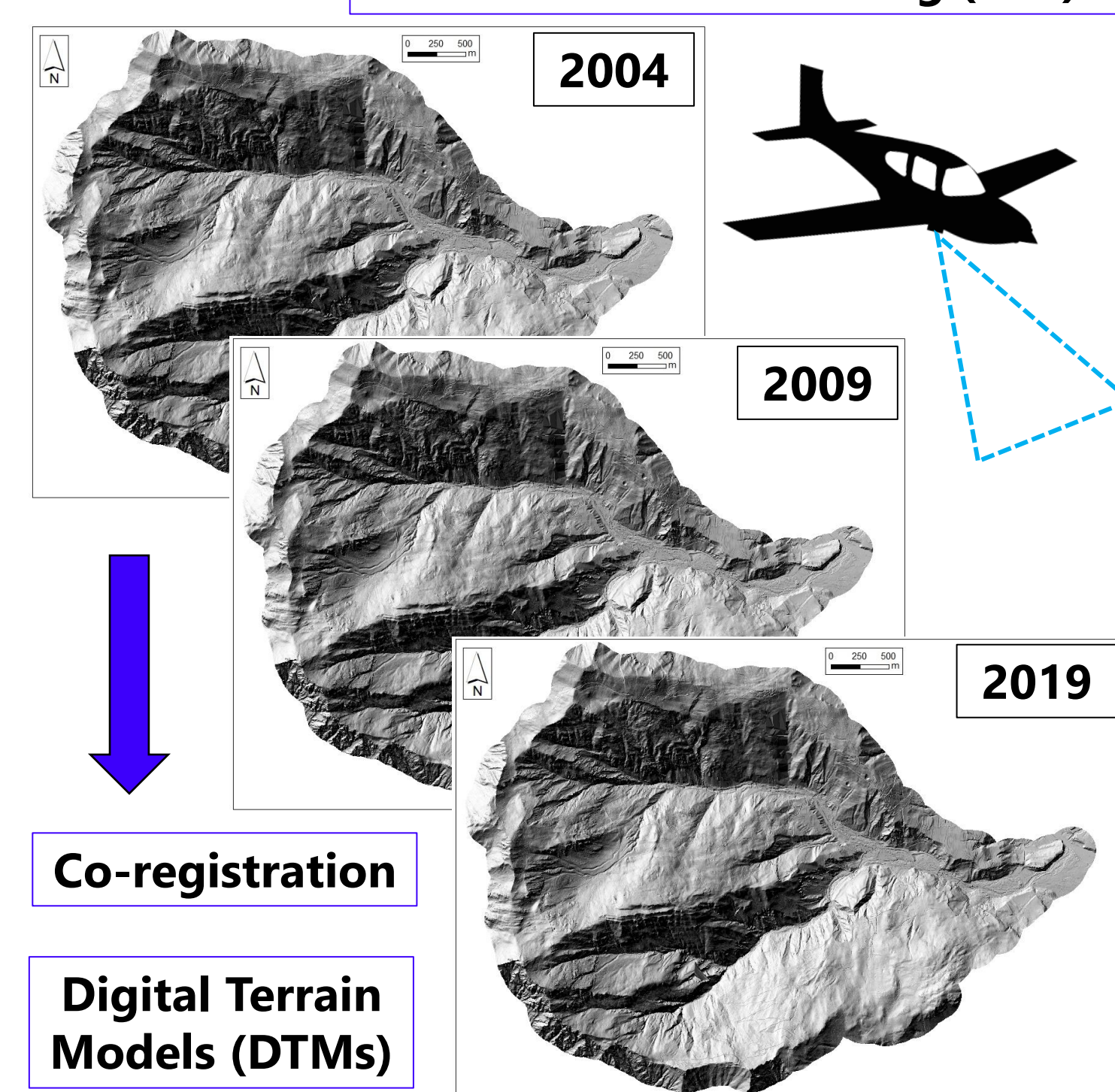
Updating of channel control work cadastre

Type, location and measures of structures

Status and functionality of structures

Multi-temporal topographic surveys

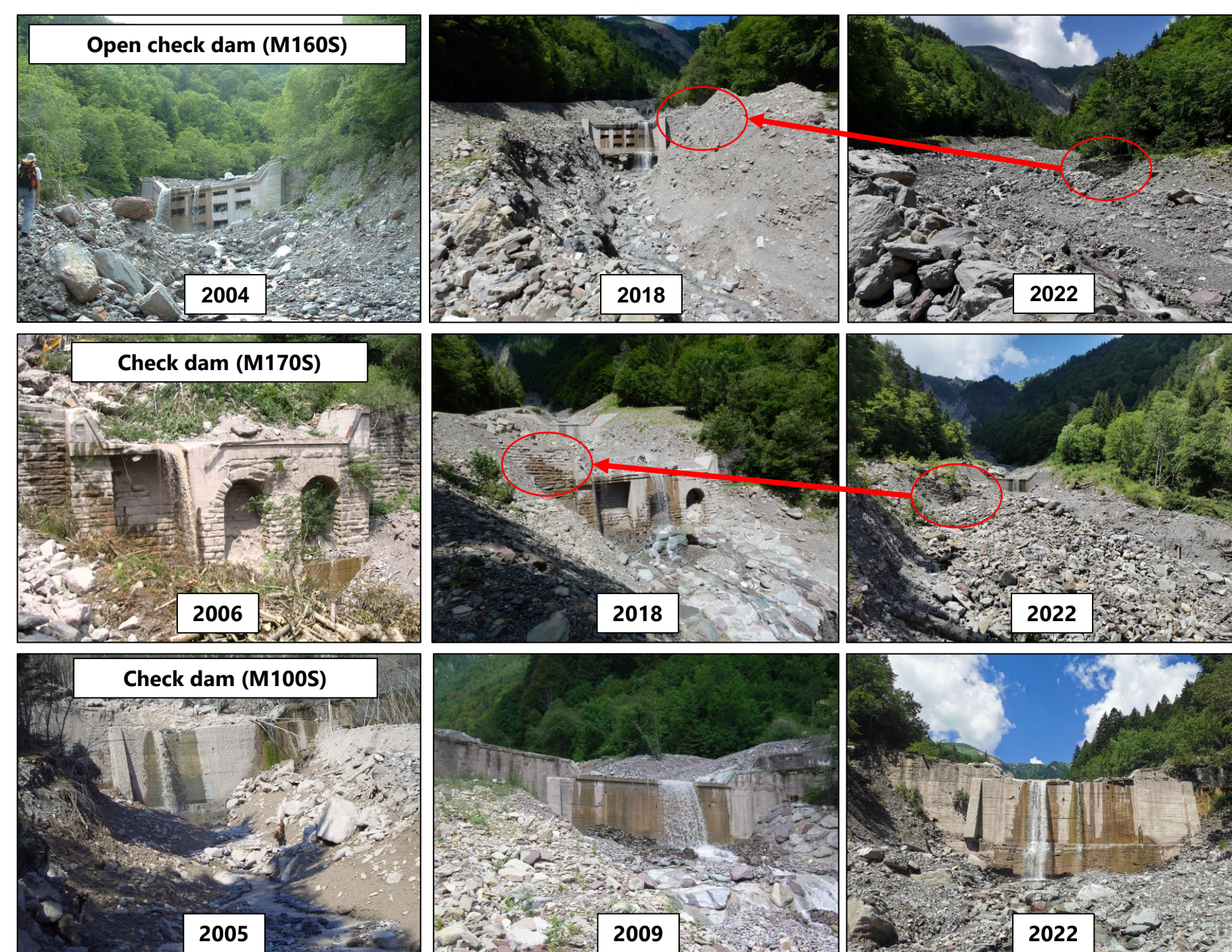
Airborne Laser Scanning (ALS)



Efficiency index for each channel control work

Functionality		Score	Status				
			Destroyed	Damaged			Good
				High	Medium	Low	
	None	0	0	0	0	0	0
	Reduced	50	0	12.5	25	37.5	50
	Operative	100	0	25	50	75	100

$$\text{Efficiency index} = \frac{(\text{Score}_{\text{status}} \times \text{Score}_{\text{functionality}})}{100}$$

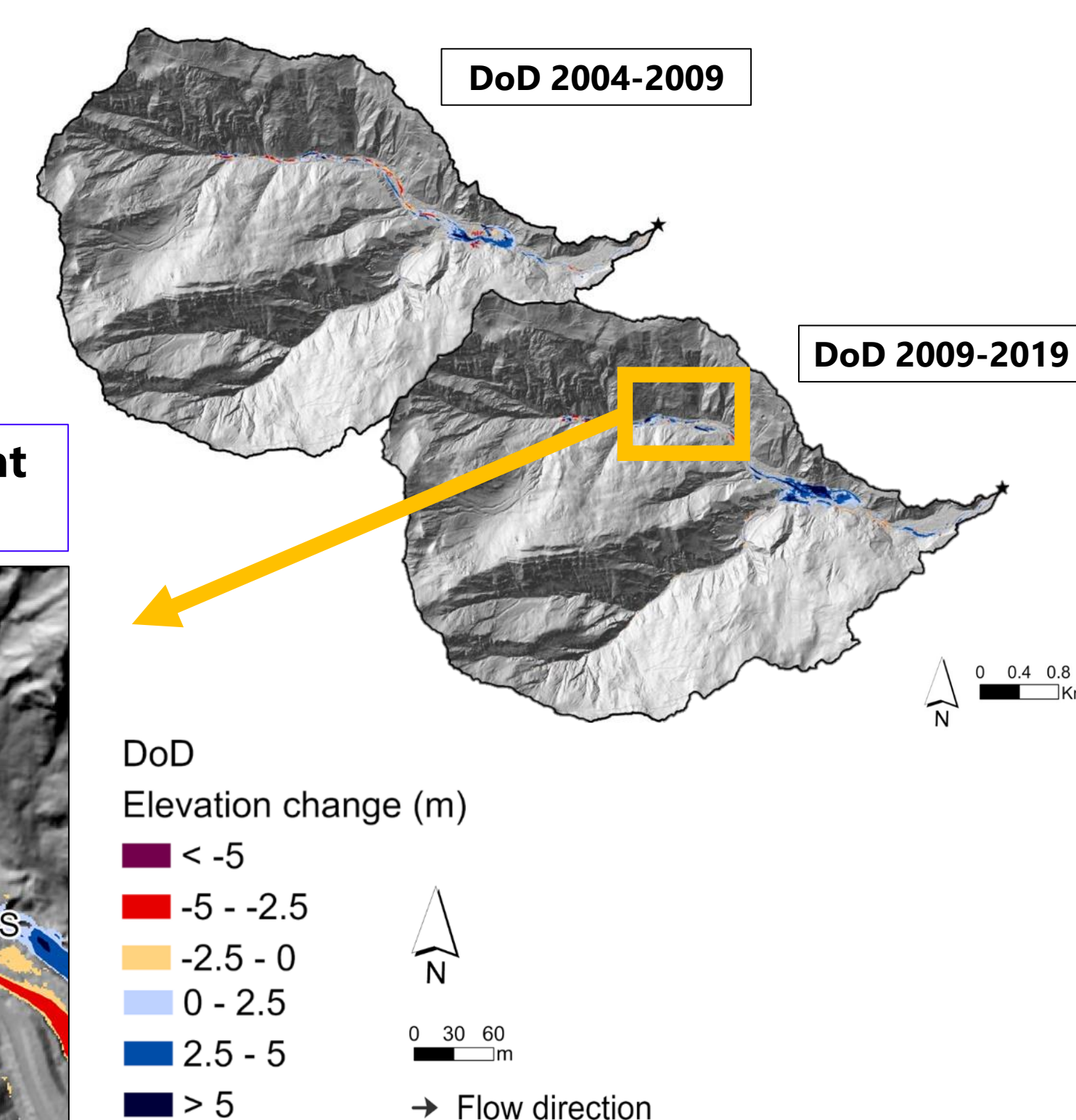


Co-registration

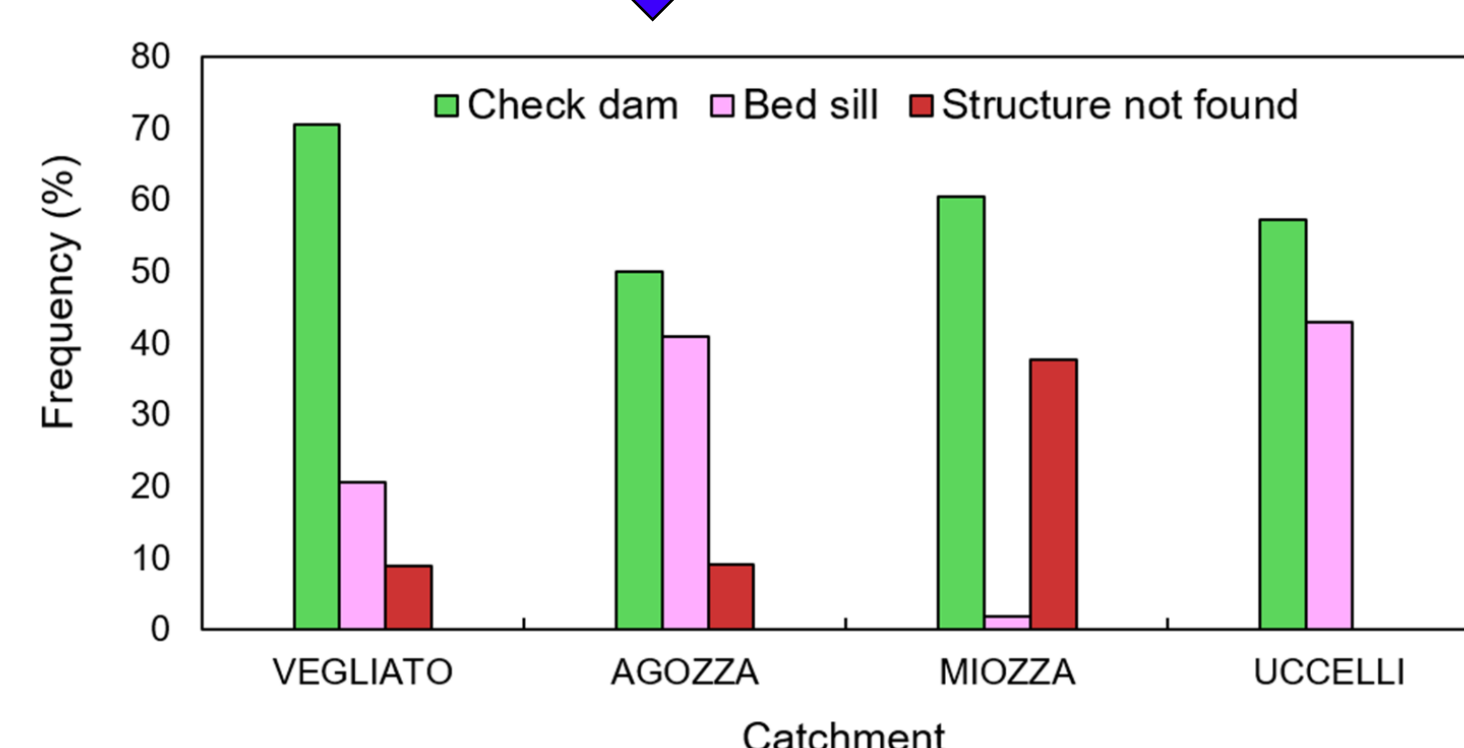
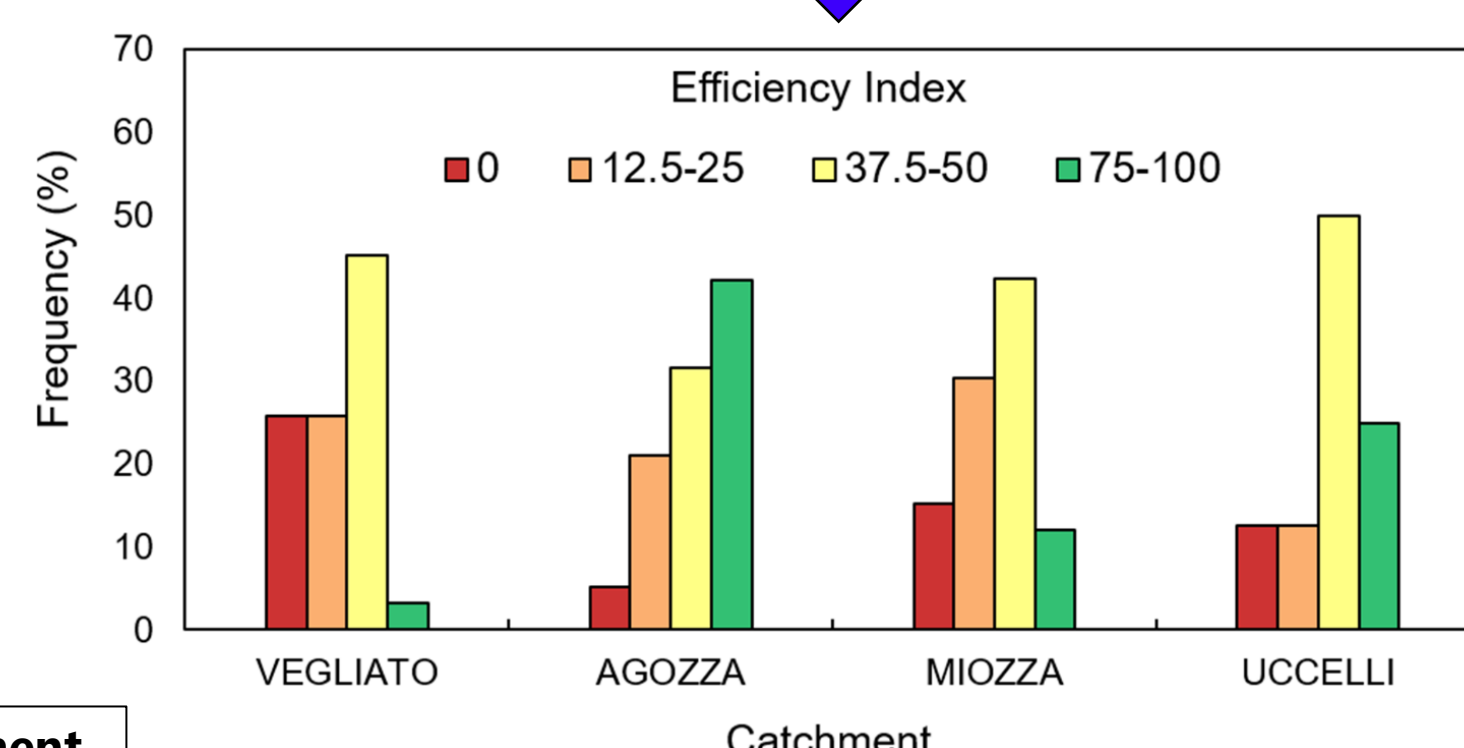
Digital Terrain Models (DTMs)

DTMs uncertainties

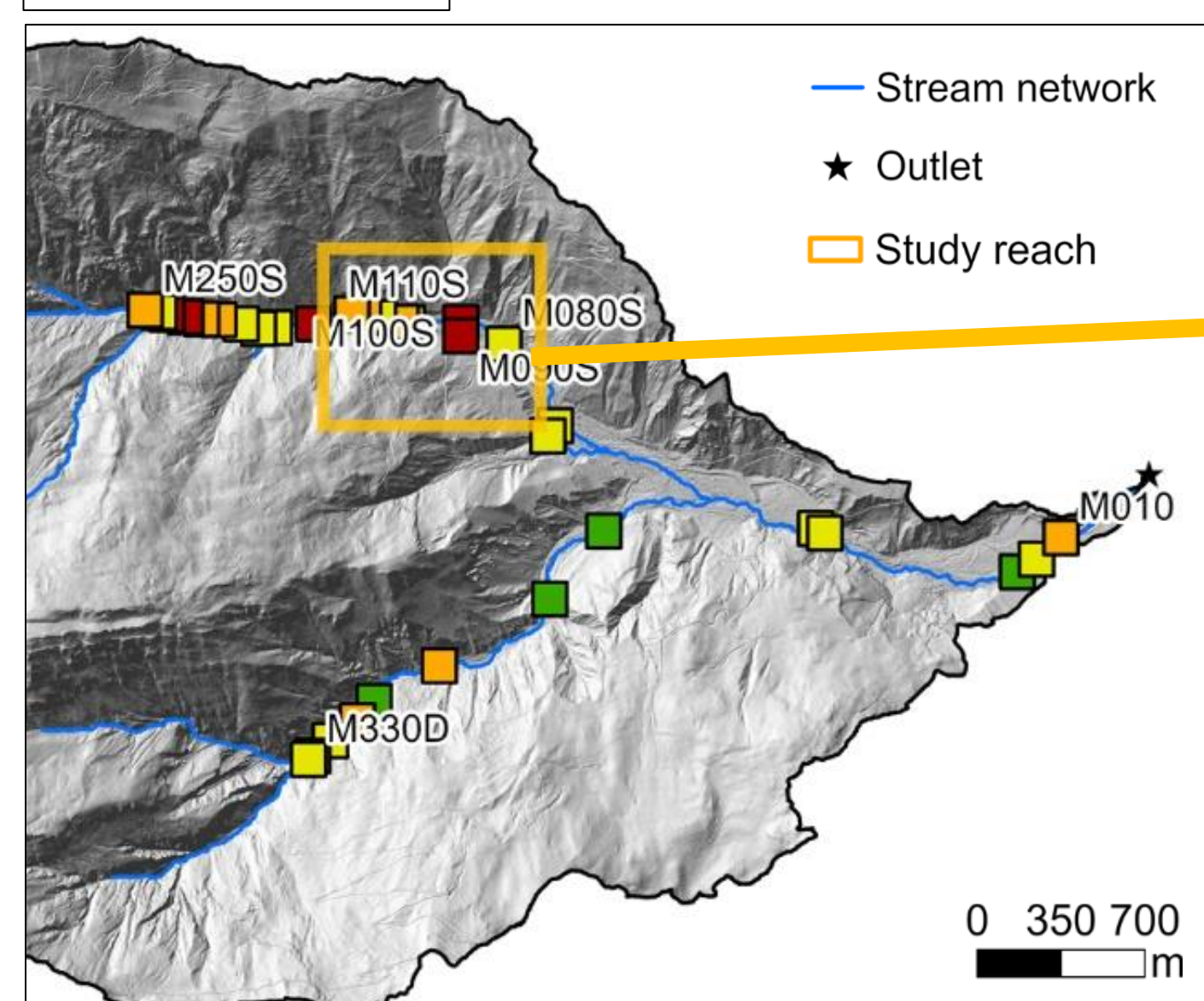
DTMs of Difference (DoDs)



Results

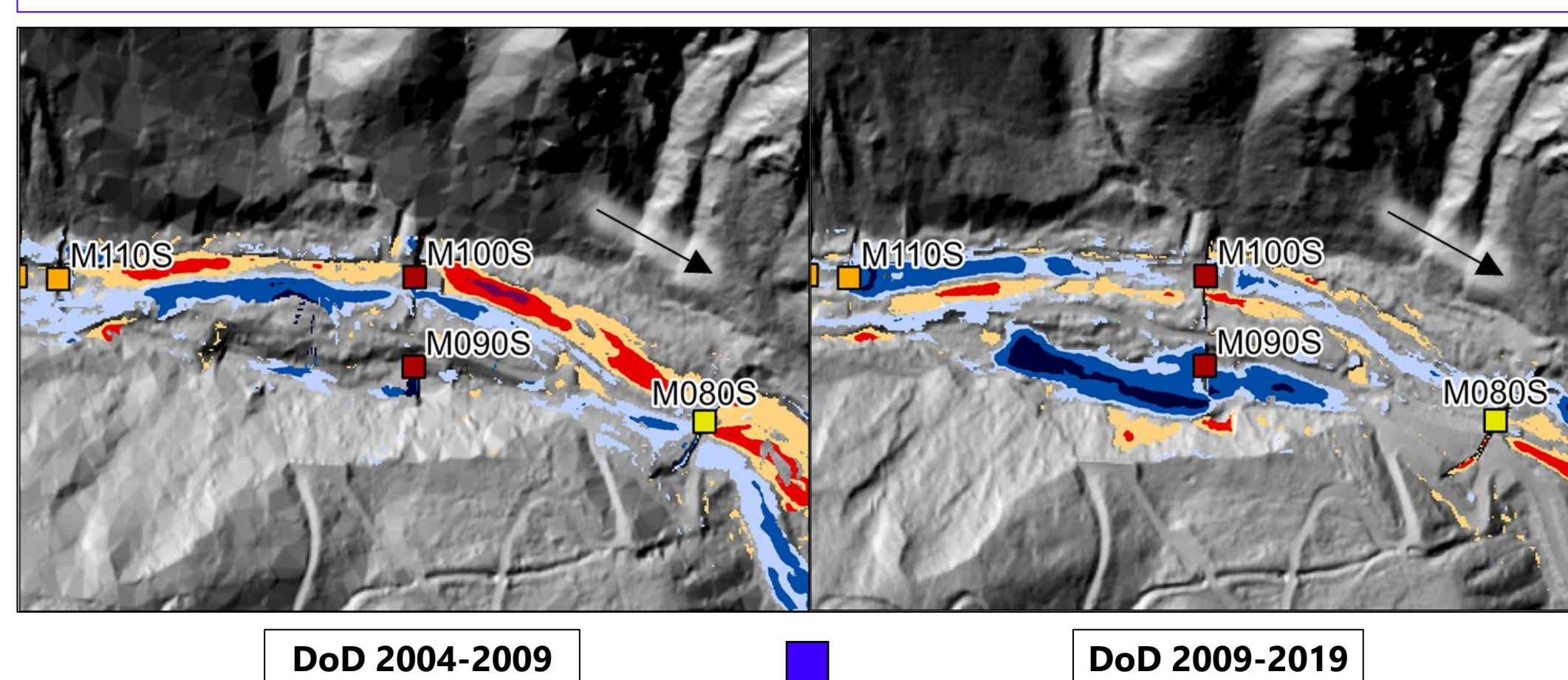


Miozza catchment



Very simple, quick, and user-friendly efficiency index of channel control works

Multi-temporal DoDs to analyse sediment morphology dynamics at catchment and reach scale



- More complete information, than in the past, by exploiting field surveys and remote sensing data
- A starting point for further analysis or provide numerical data for prediction models of the life-cycle of channel control works in risk management processes
- A support for the development of watershed management strategies, assess afterward the effectiveness of existing structures, and foster a more complete decision-making chain

References:

Cucchiaro et al., 2023.
Under review in CATENA

Acknowledgments

This study was carried out within the Interconnected Nord-Est Innovation Ecosystem (iNEST) and received funding from the European Union Next-GenerationEU (PIANO NAZIONALE DI RIPRESA E RESILIENZA (PNRR) – MISSIONE 4 COMPONENTE 2, INVESTIMENTO 1.5 – D.D. 1058 23/06/2022, ECS00000043). This manuscript reflects only the authors' views and opinions, neither the European Union nor the European Commission can be considered responsible for them.

Finanziato dall'Unione europea
NextGenerationEU

Ministero dell'Università e della Ricerca

Italiani al lavoro
ITALIADOMANI

iNEST