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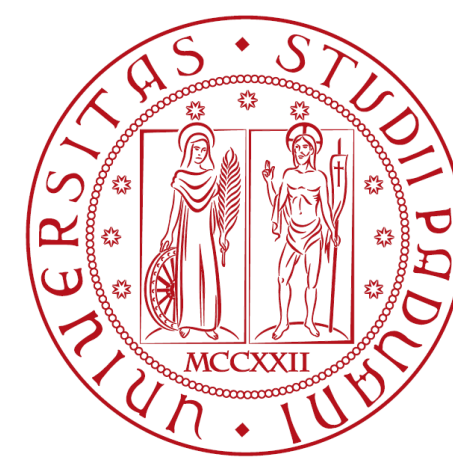
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The effectiveness of channel control works: how multi-temporal sediment dynamics analysis could support watershed management

Sara Cucchiaro^{1*}, Lorenzo Martini², Federico Cazorzi¹, Lorenzo Picco²

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

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



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WHY ?

Background

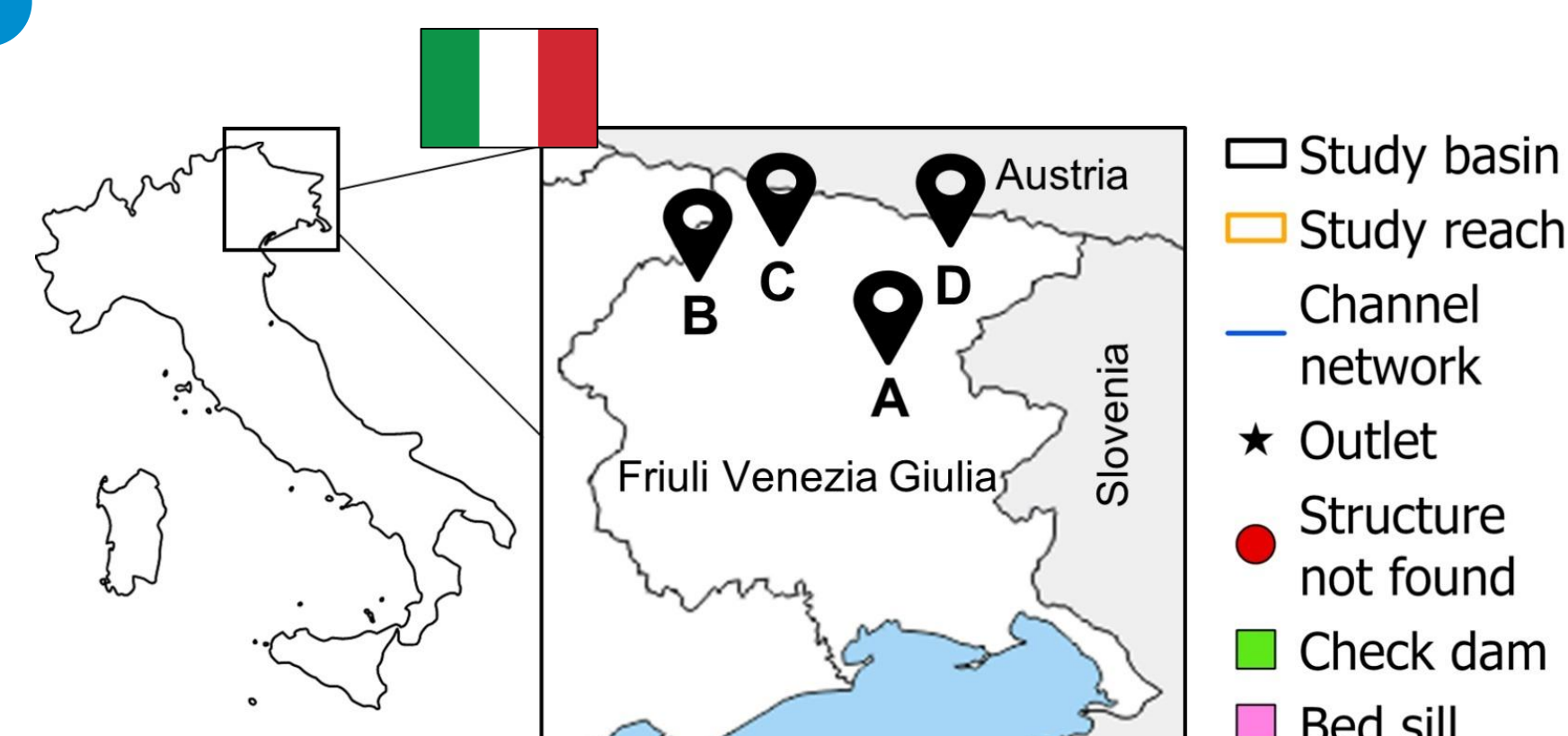
Lack of information on the **status and functionality of existing structures**, and a priori in-depth study to analyse **the sediment morphology dynamics and the interaction with existing channel control works**

Aim of the research

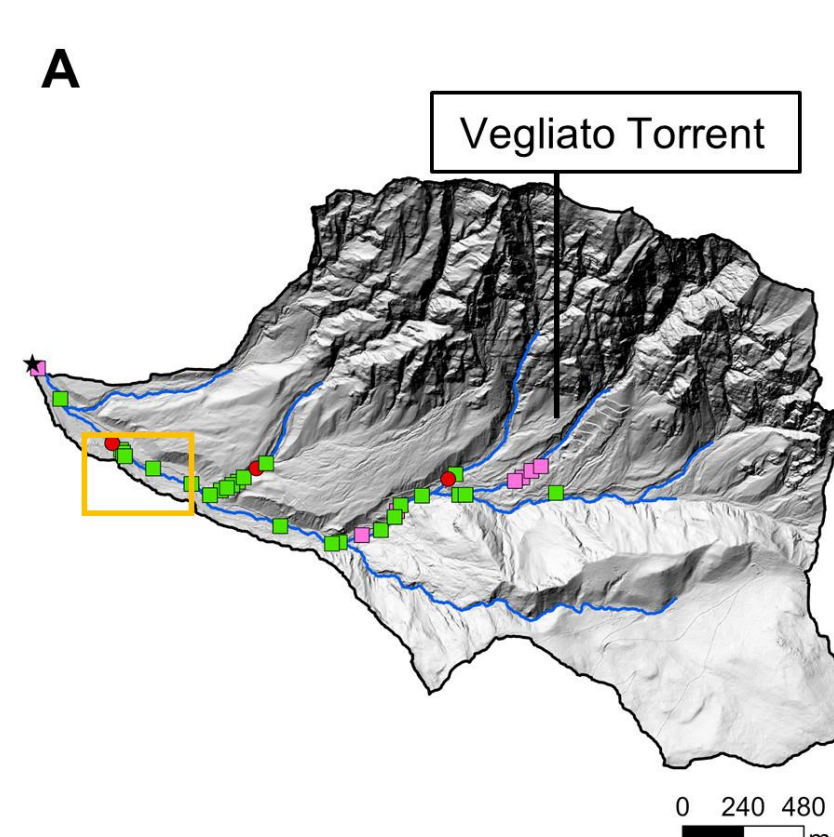
To introduce a **methodological approach** that integrates **sediment morphology dynamics data** over extended time spans in some mountain catchments **with the current status and functionality of existing interventions**

WHERE ?

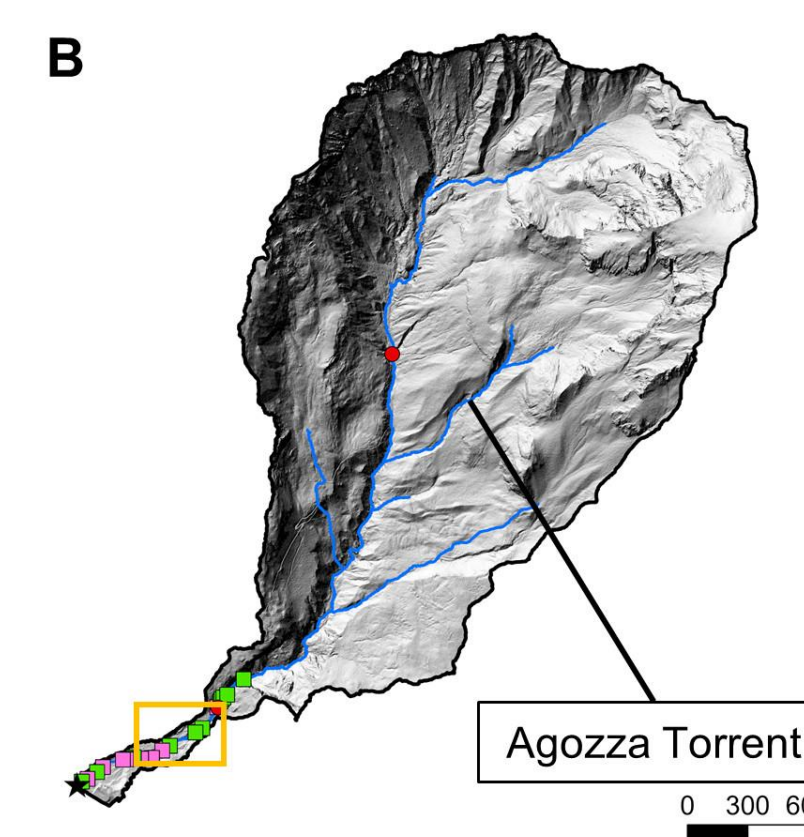
4 mountain basins



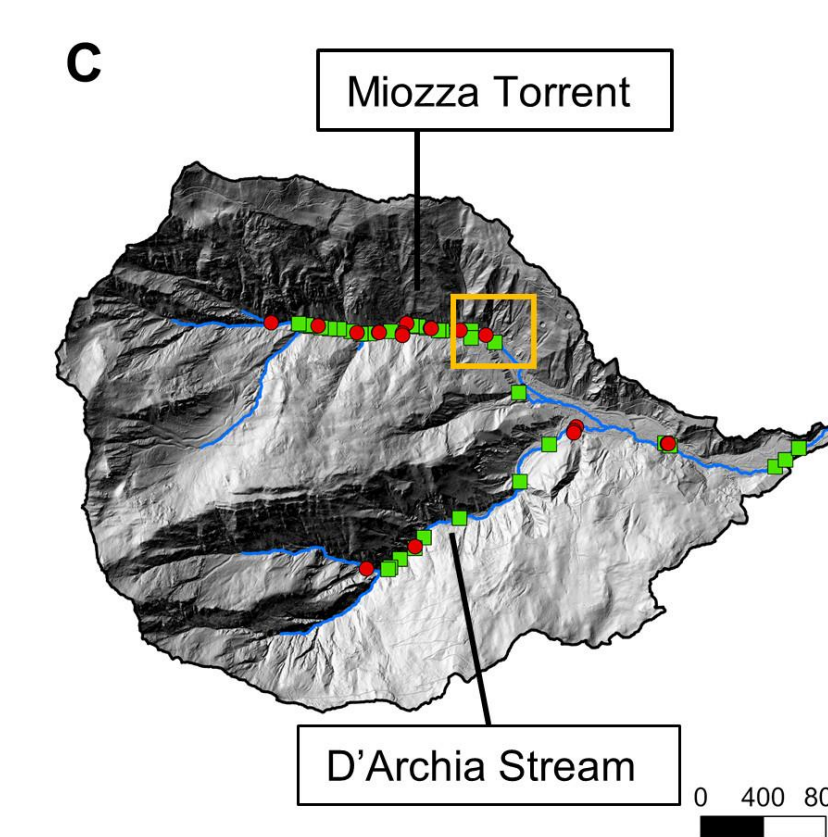
Vegliato torrent



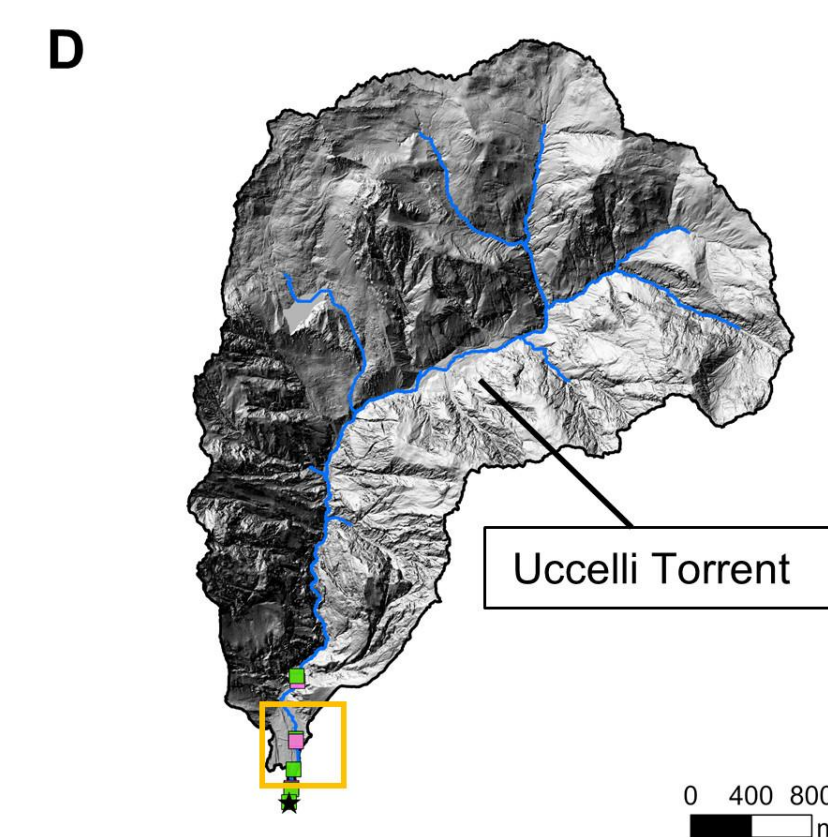
Agozza torrent



Miozza torrent



Uccelli torrent



HOW ?

Methodological workflow

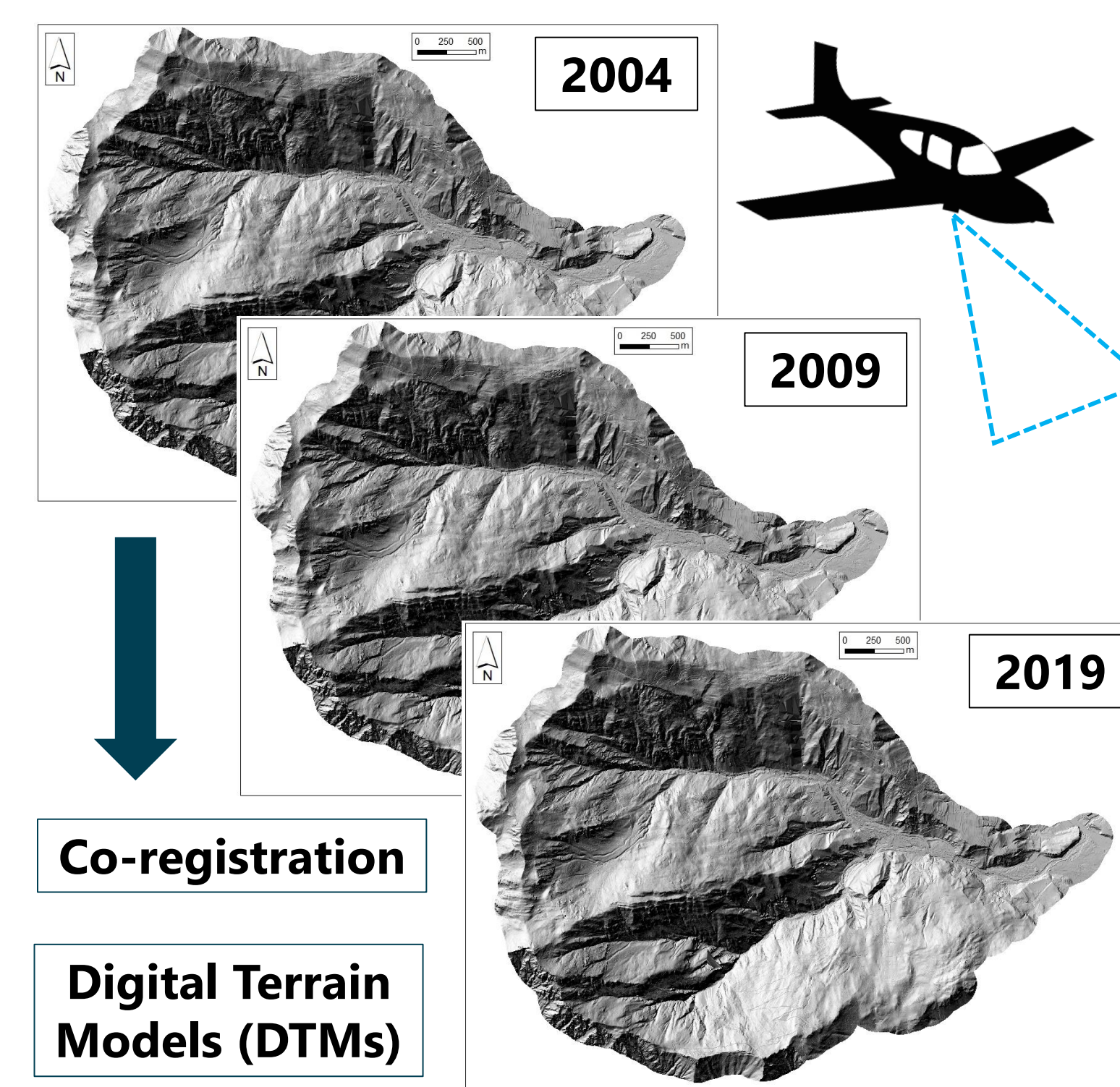
Updating of channel control work database

Type, location and measures of structures

Status and functionality of structures

Multi-temporal topographic surveys

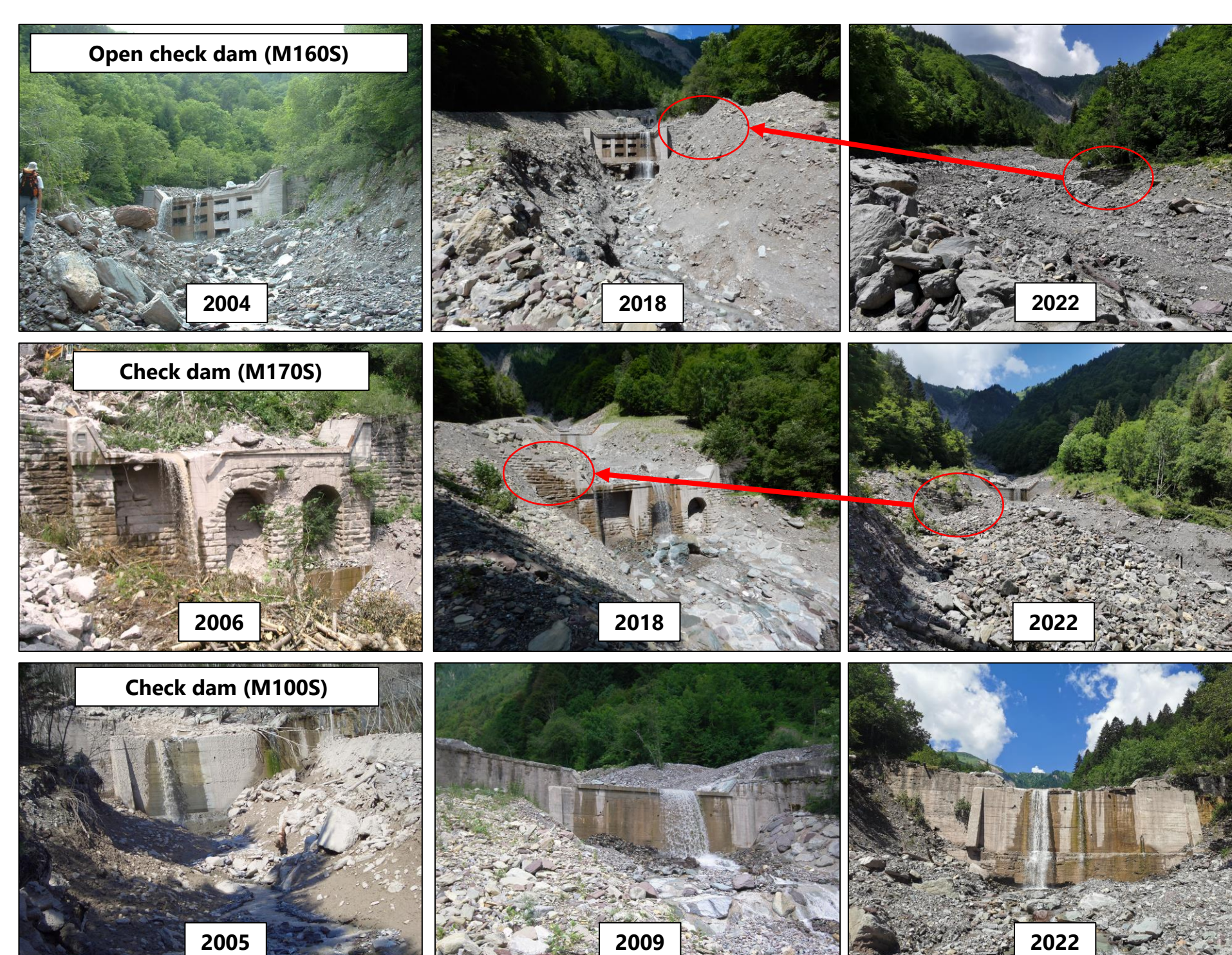
Airborne Laser Scanning (ALS)



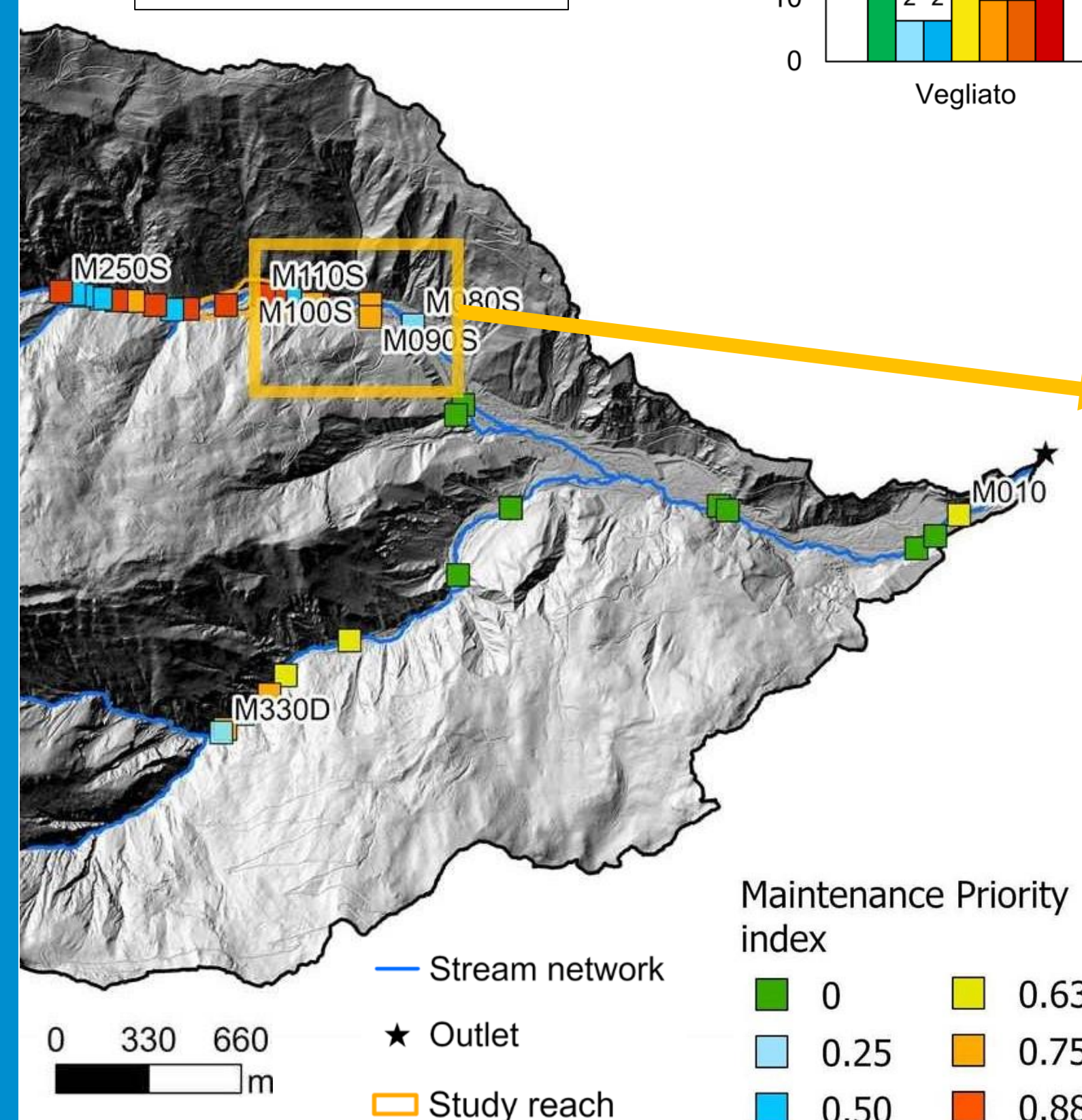
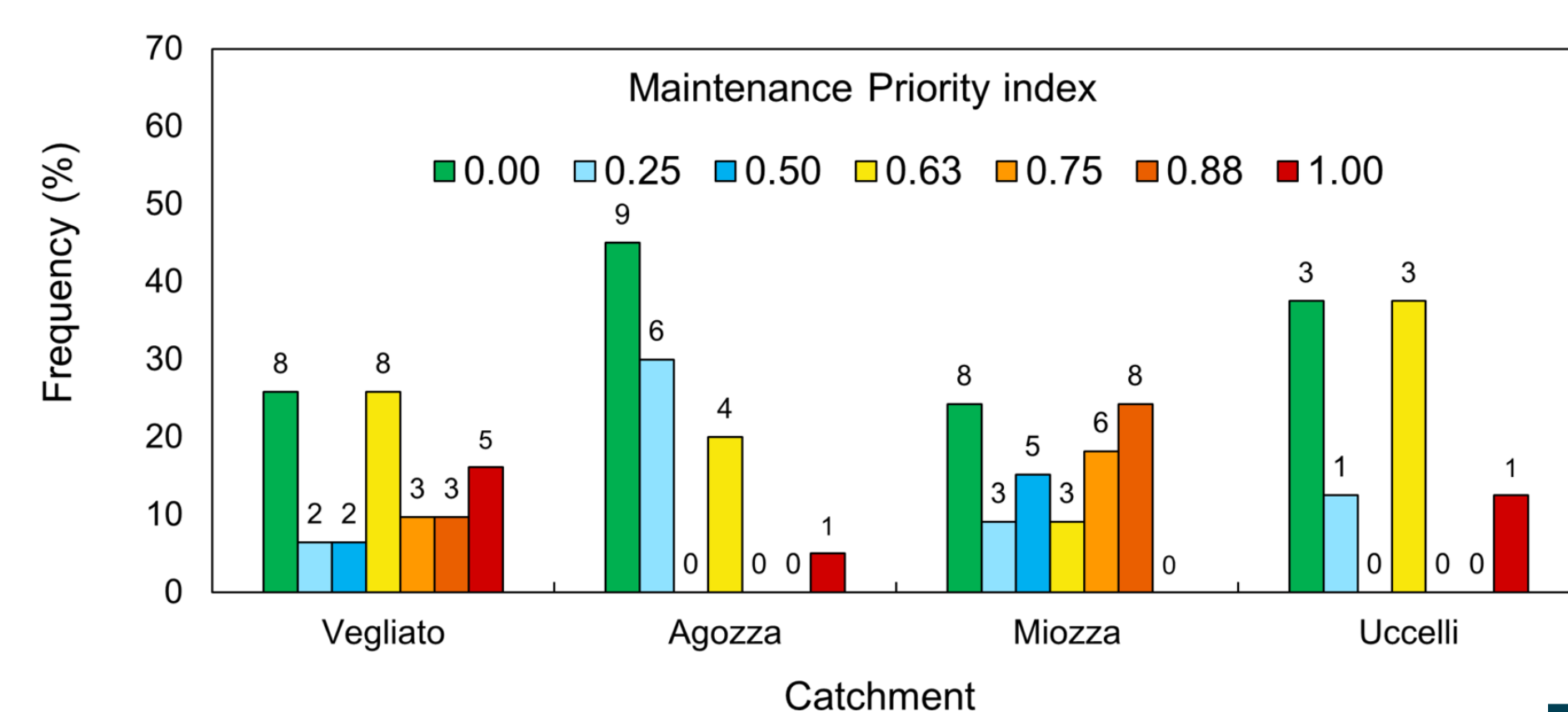
Maintenance Priority index (MPi)
for each channel control work

Functionality	Score	Status		
		Destroyed	Damaged	Good
Low	0	1	0.88	0.50
Medium	0.5	1	0.75	0.25
High	1	1	0.63	0

$$MPi = 1 - \left(Score_{status} \times \left(\frac{Score_{status} + Score_{functionality}}{2} \right) \right)$$

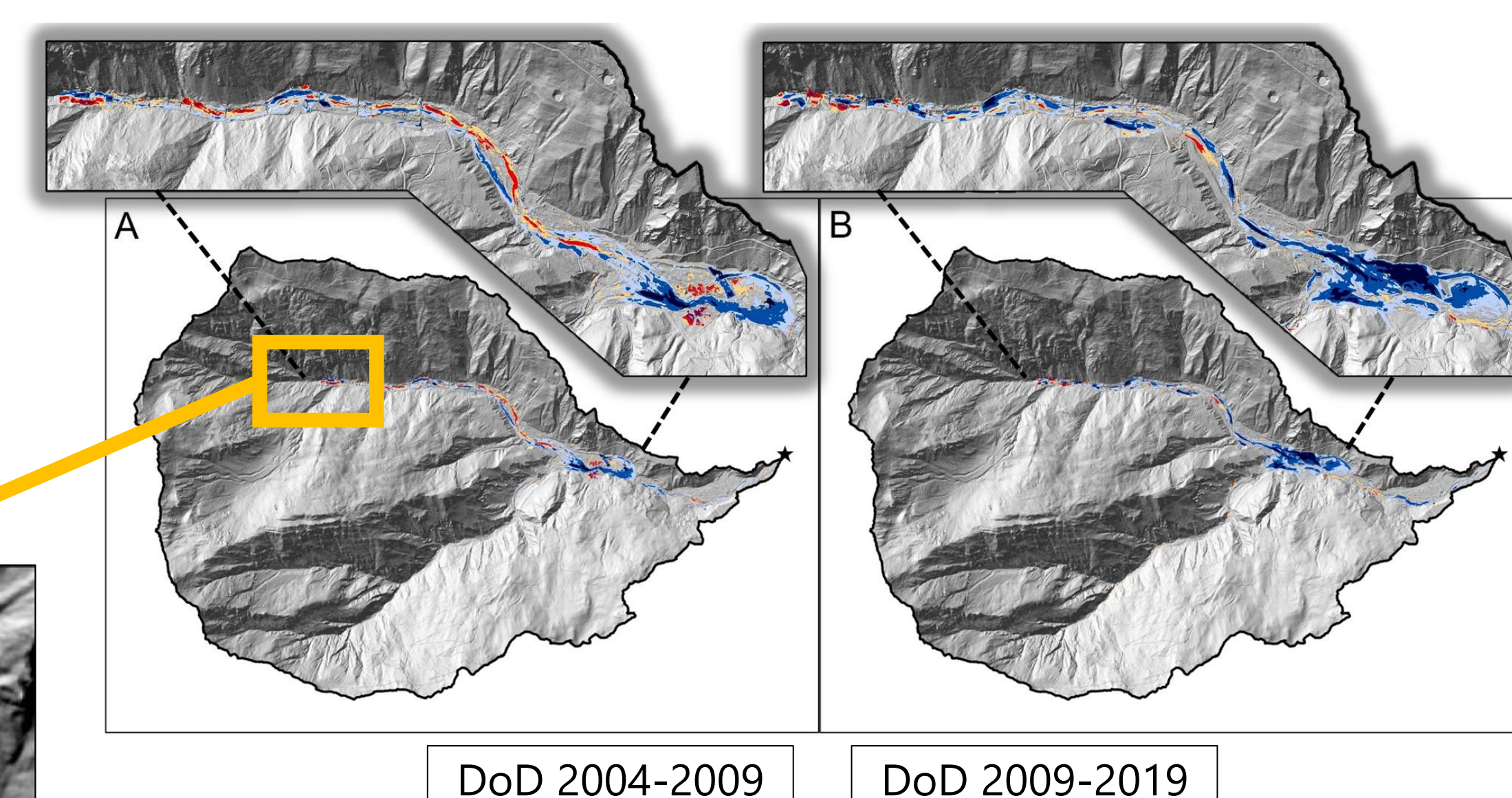


Results



Very simple, quick, and user-friendly MP index of channel control structures

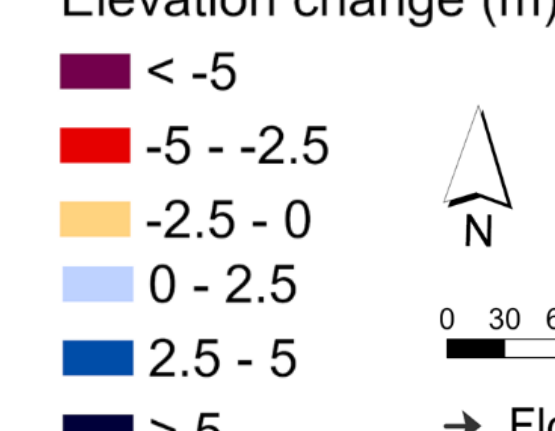
DTMs of Difference (DoDs)



DoD 2004-2009

DoD 2009-2019

DoD
Elevation change (m)



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., 2024 (CATENA)



Acknowledgments

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