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

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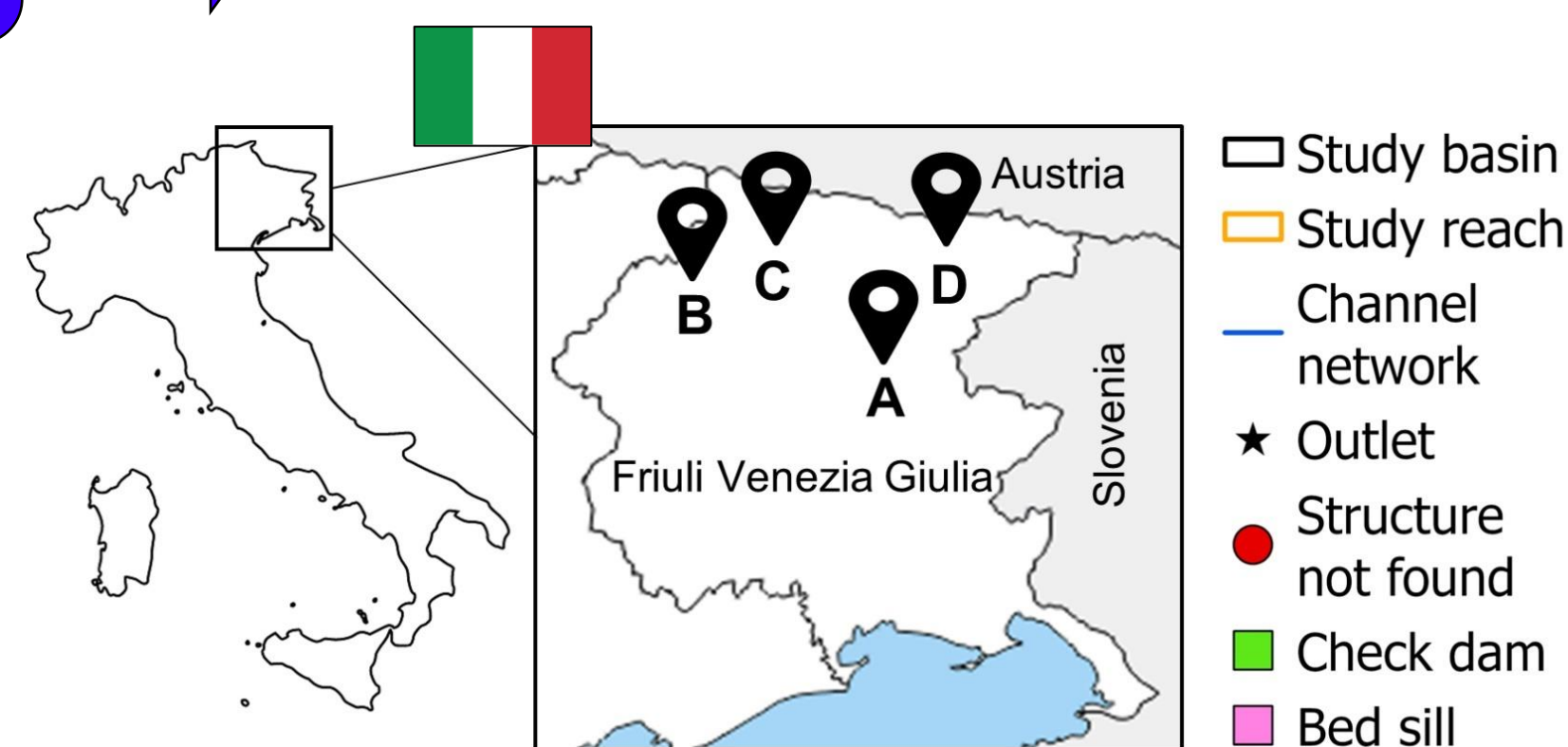
³ University of Udine, Polytechnic Department of Engineering and Architecture, Udine, Italy

WHY

Background
Aim of the research

WHERE

4 mountain basins

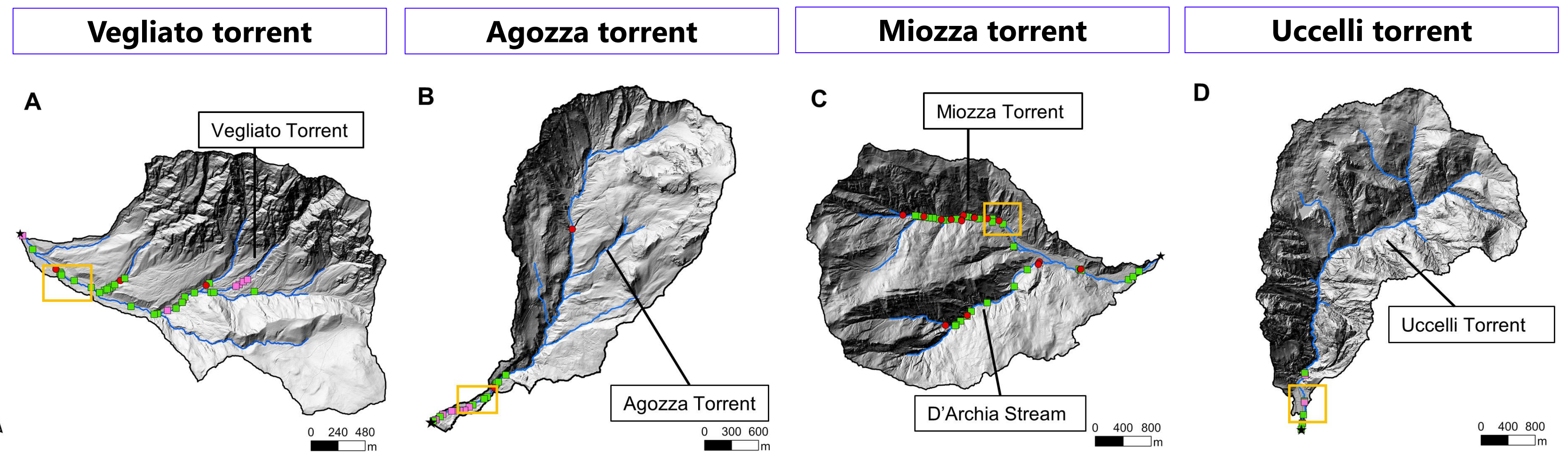


HOW

Methodological workflow

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**

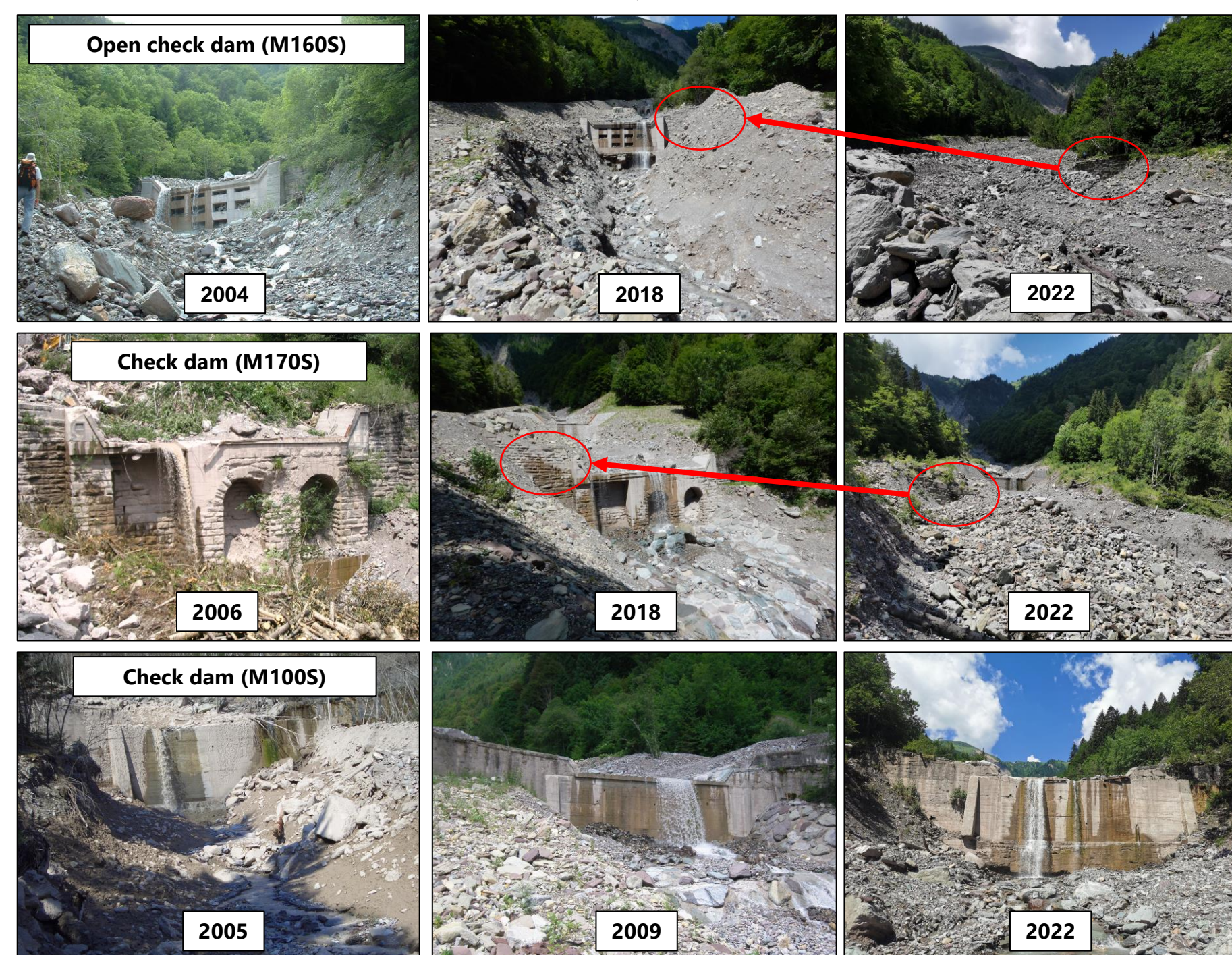


Efficiency index for each channel control work

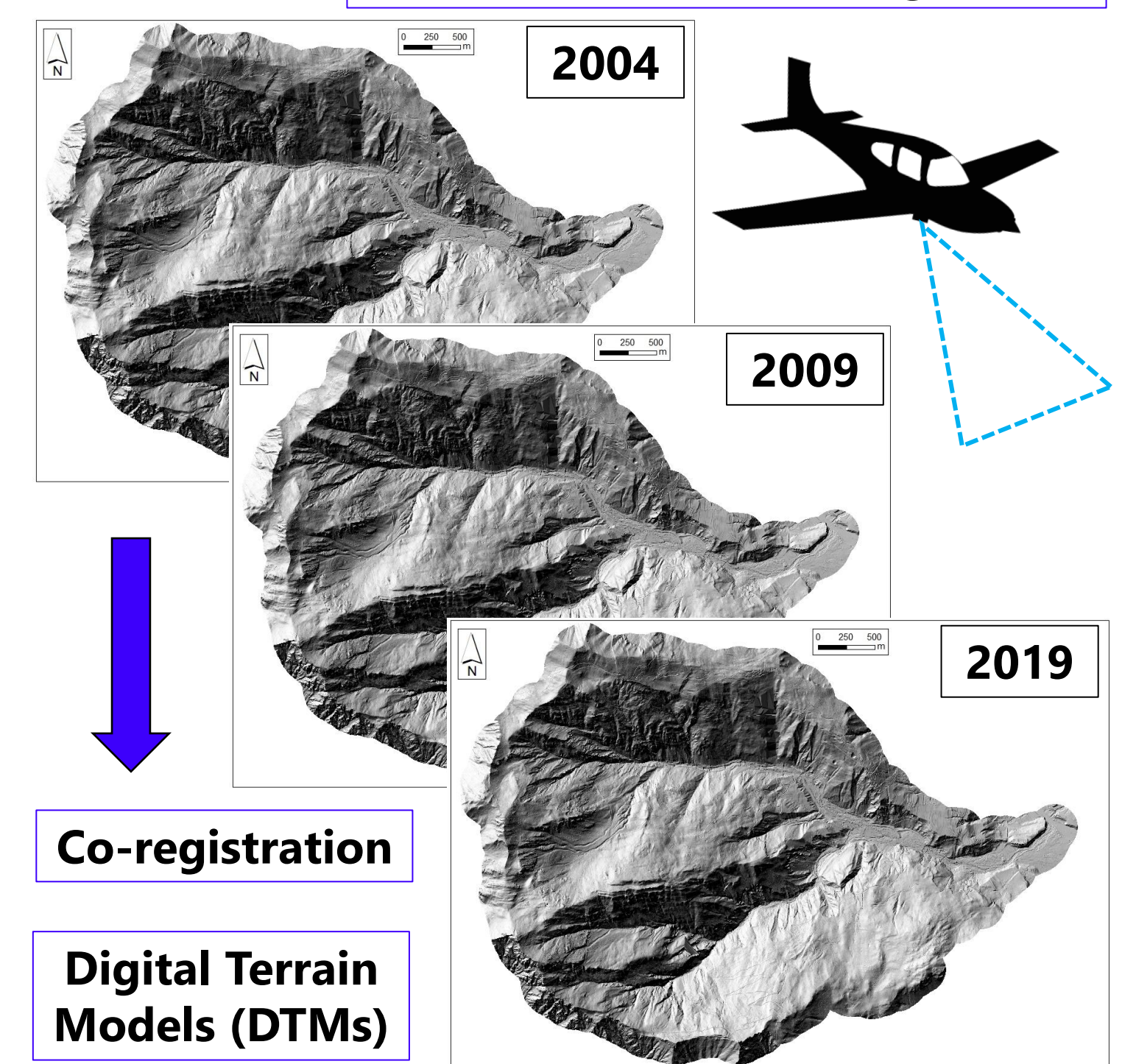
Functionality	Score	Status				
		Destroyed	Damaged			Good
			High	Medium	Low	
None	0	0	0	0	0	0
Reduced	50	0	12.5	25	37.5	50
Operative	100	0	25	50	75	100

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

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)

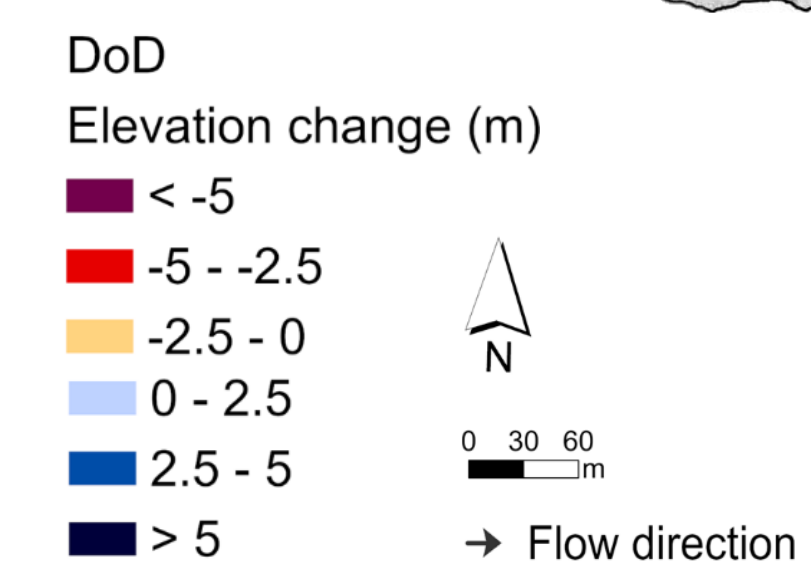
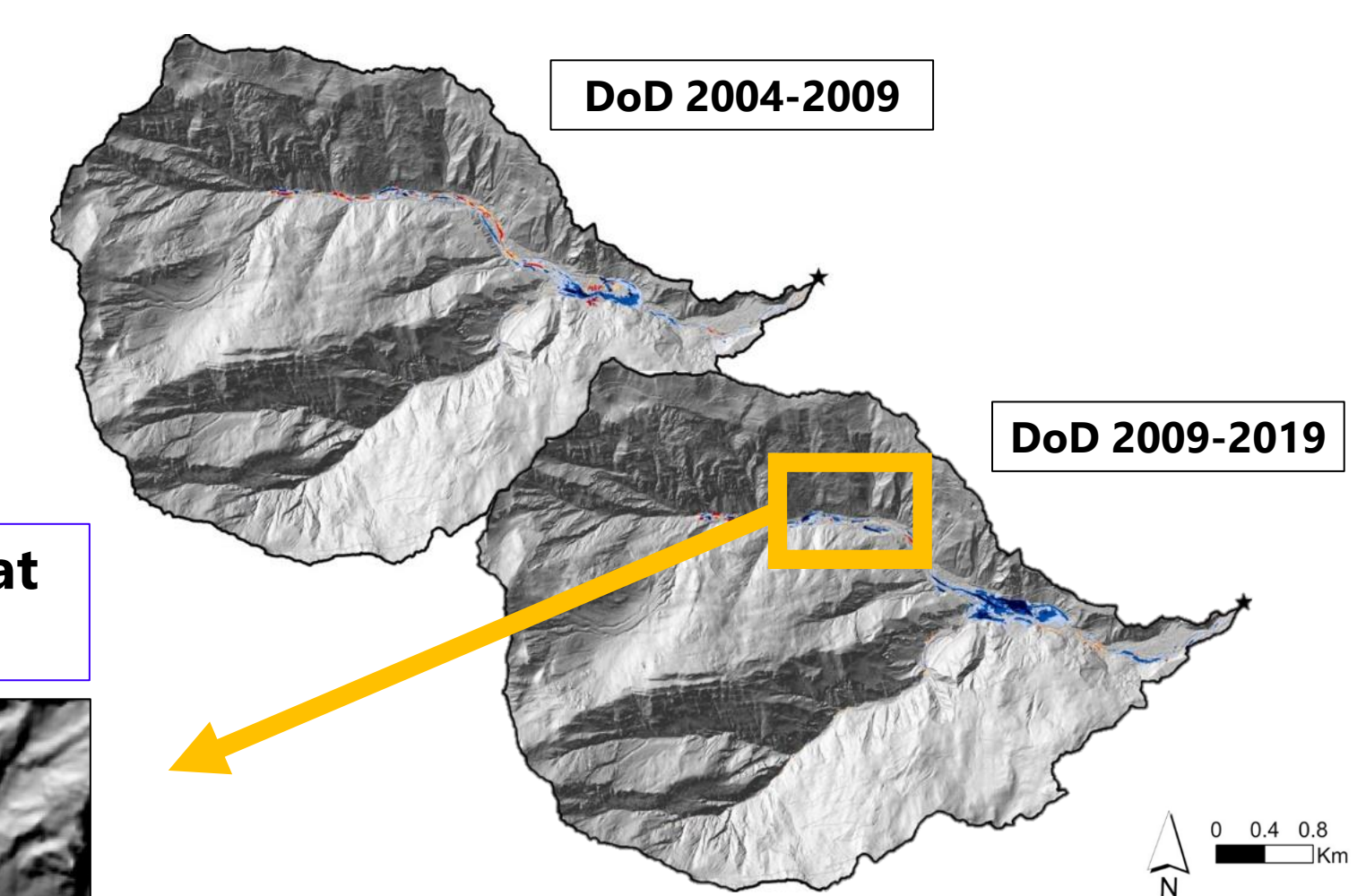


Co-registration

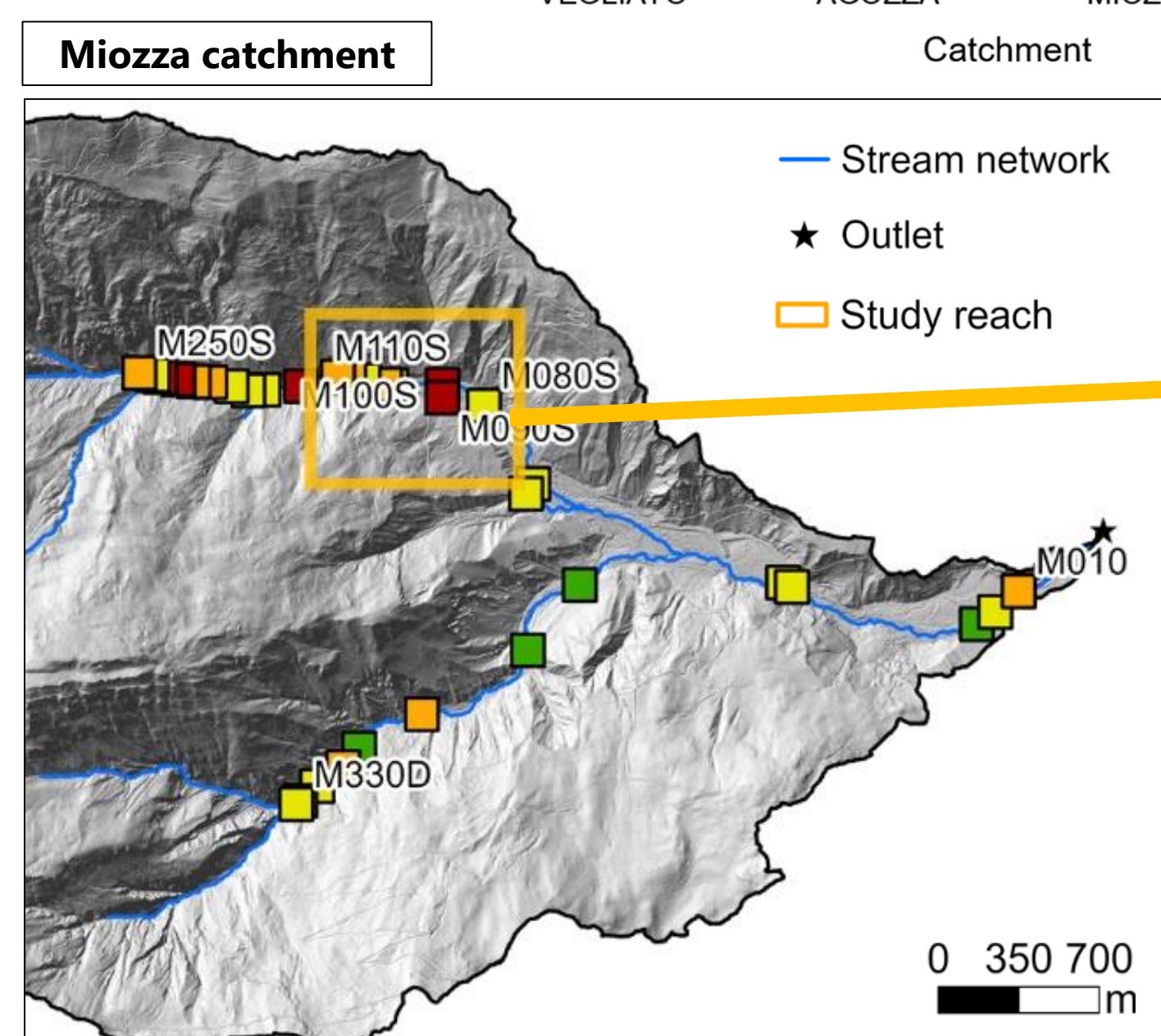
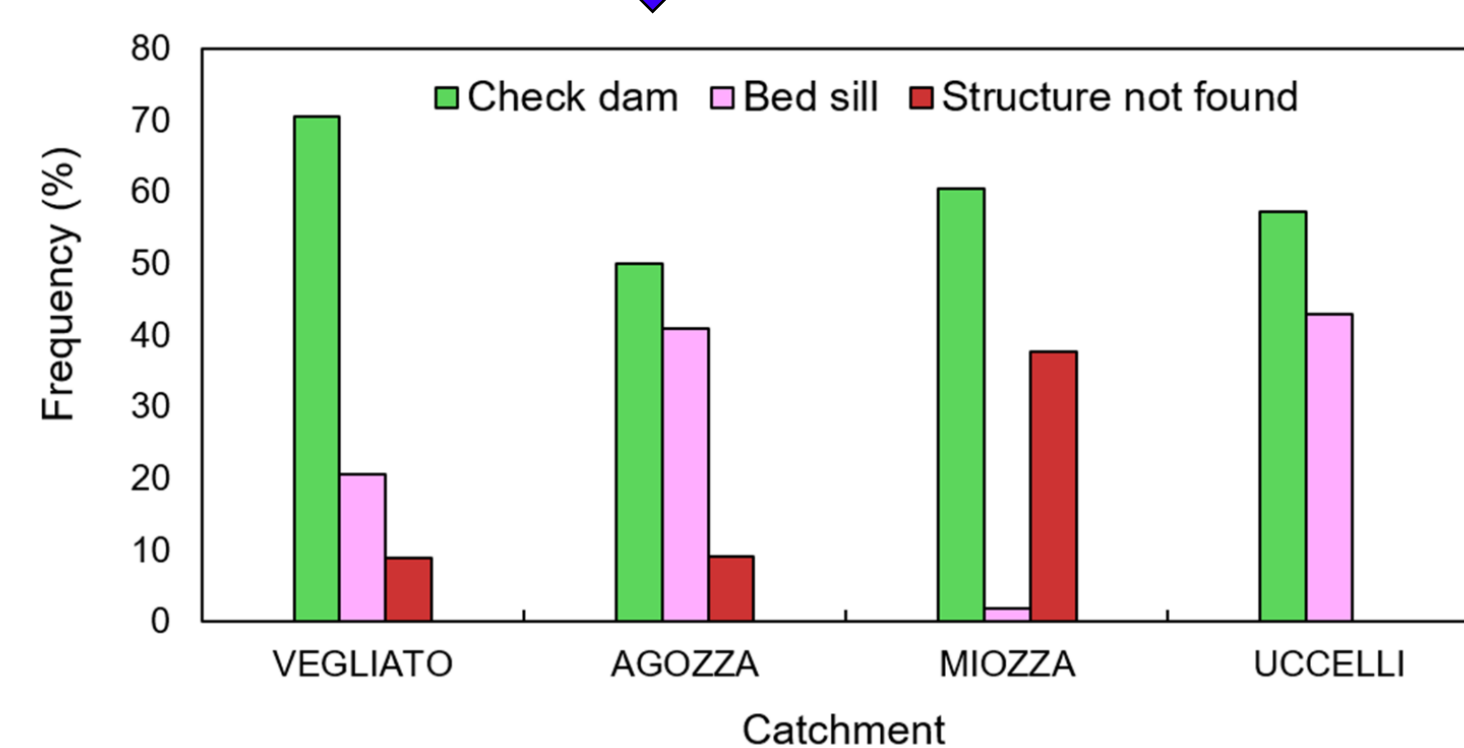
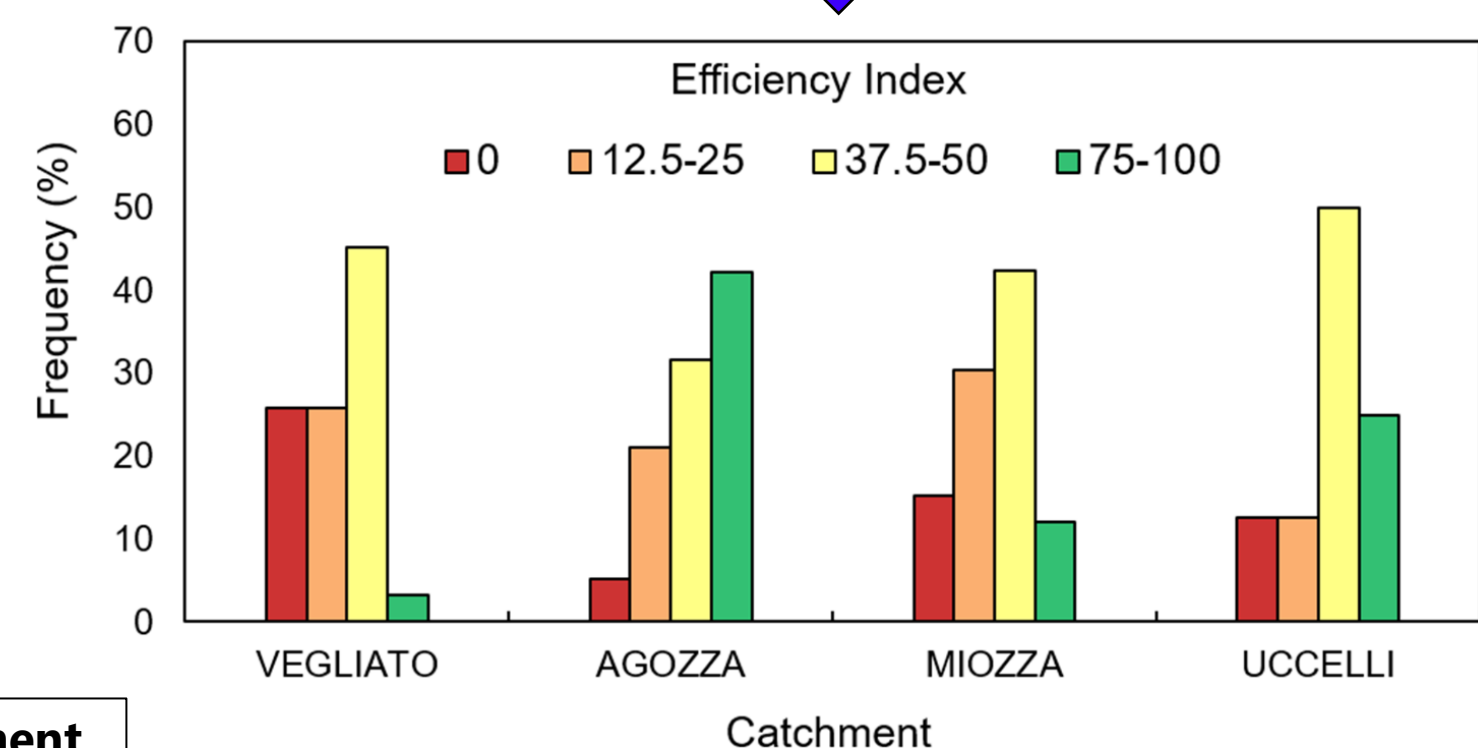
Digital Terrain Models (DTMs)

DTMs uncertainties

DTMs of Difference (DoDs)

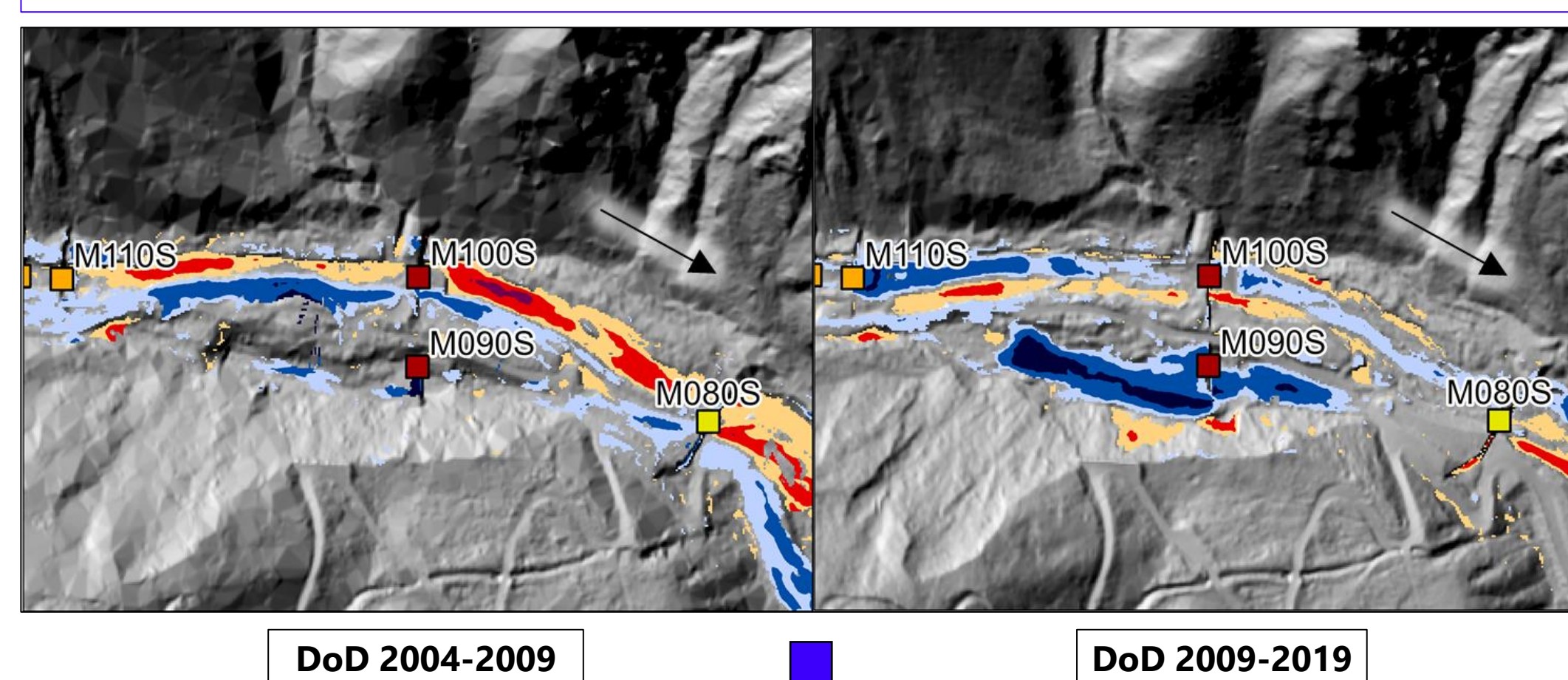


Results



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