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

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WHY ?

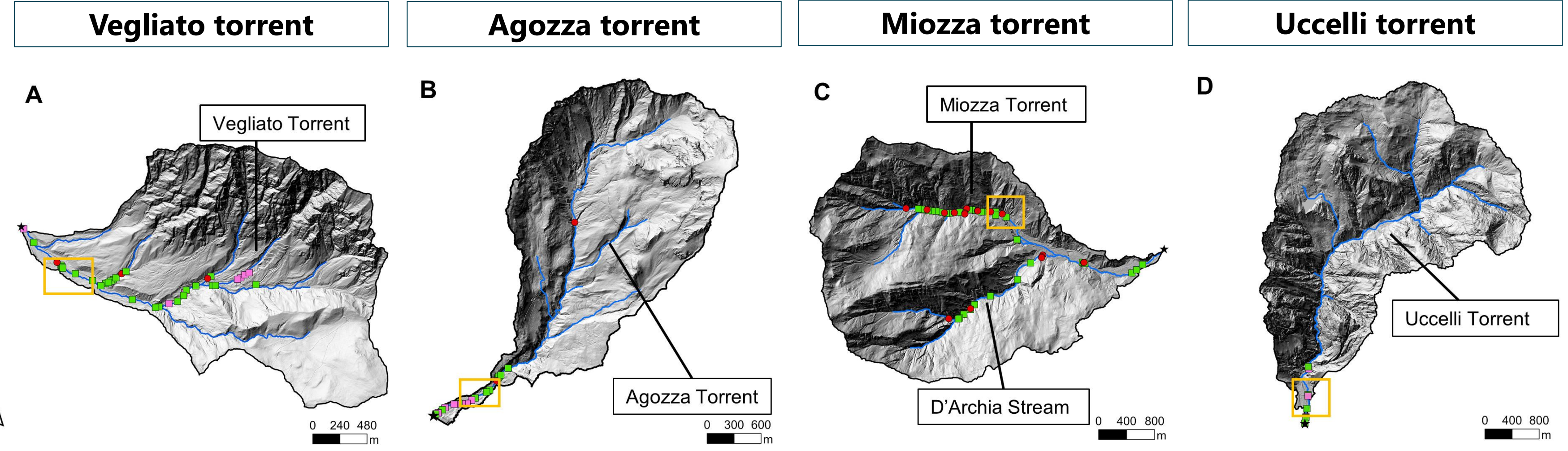
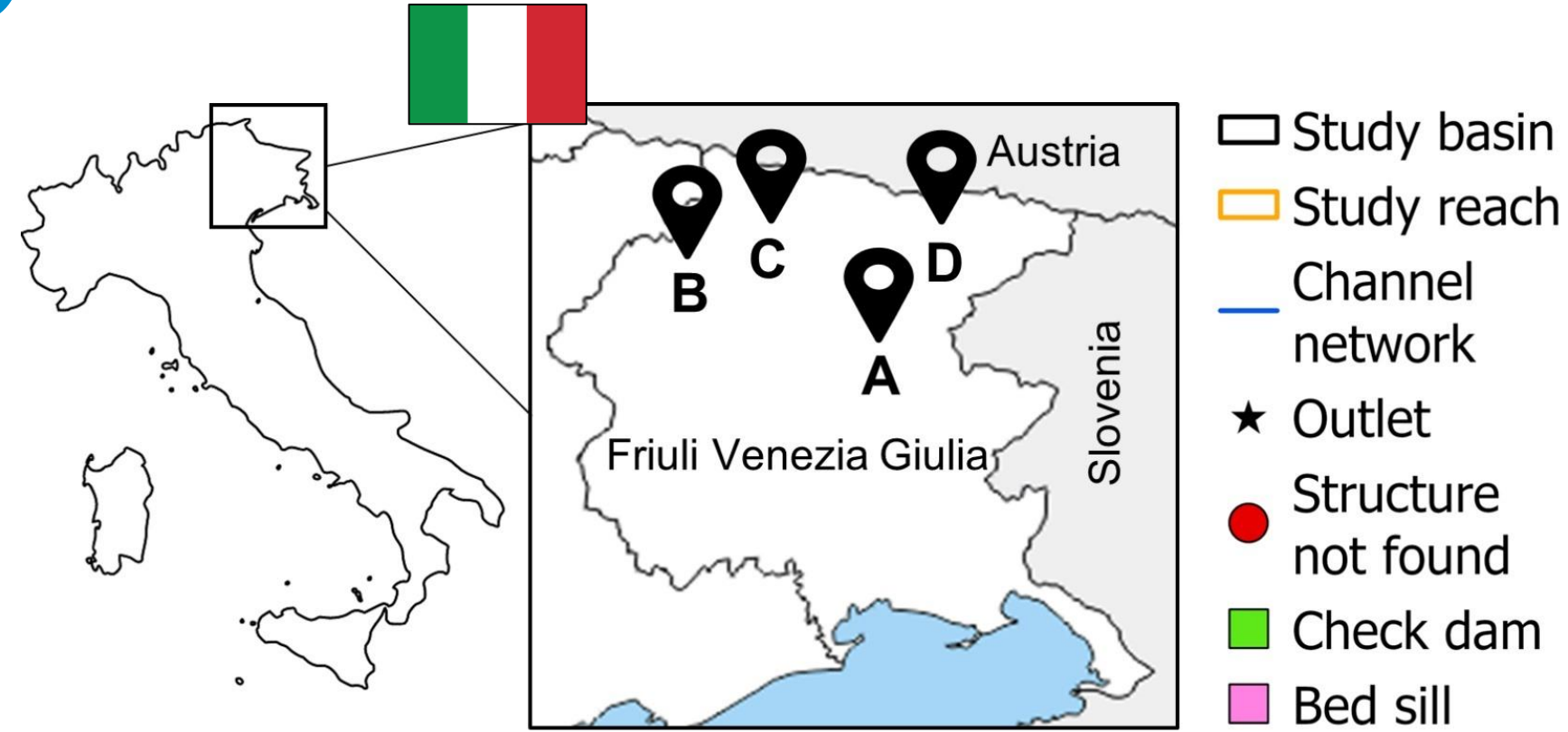
Background
Aim of the research

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 status and functionality of existing interventions**

WHERE ?

4 mountain basins



HOW ?

Methodological workflow

Updating of channel control work database

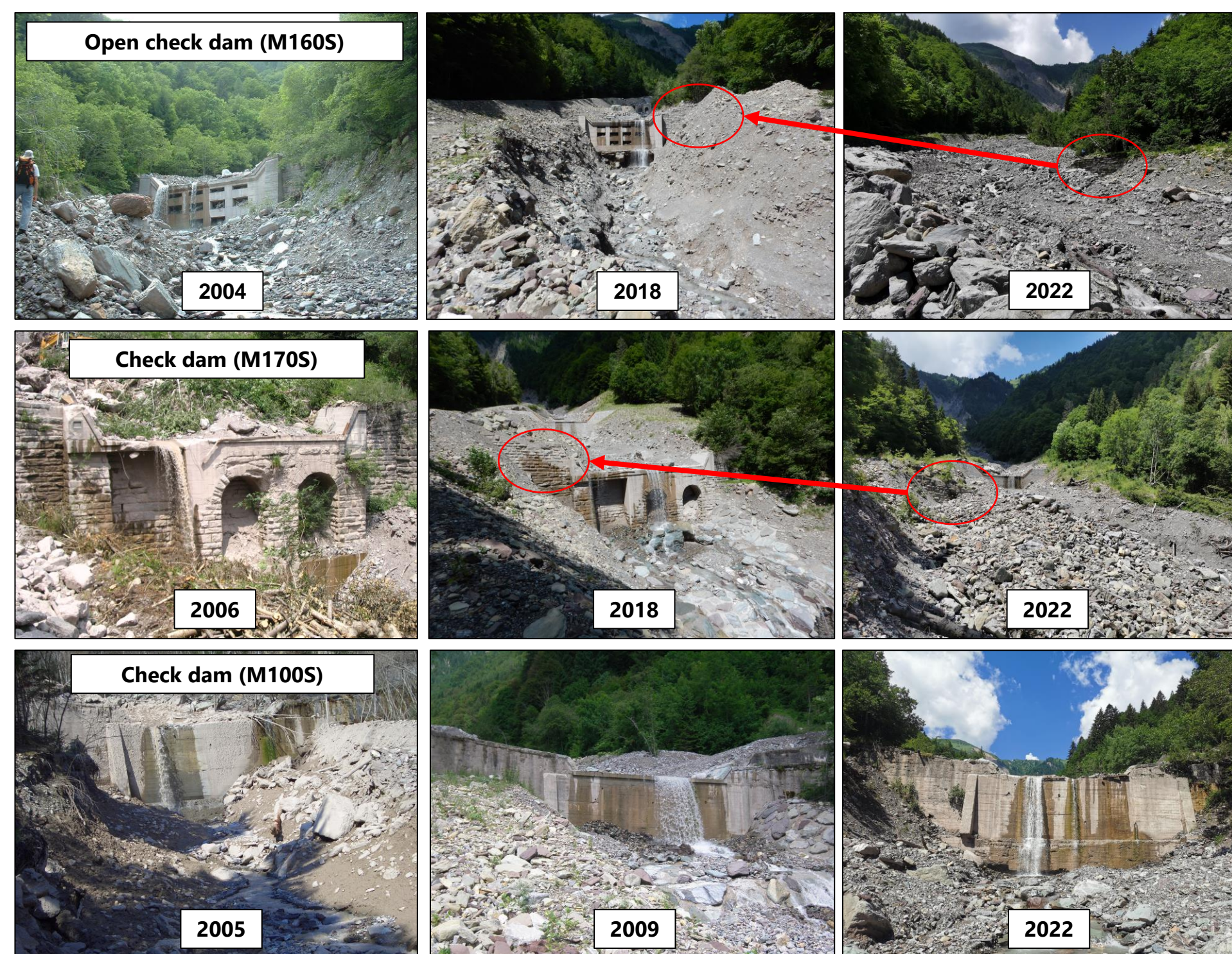
Multi-temporal topographic surveys

Maintenance Priority index (MPi) for each channel control work

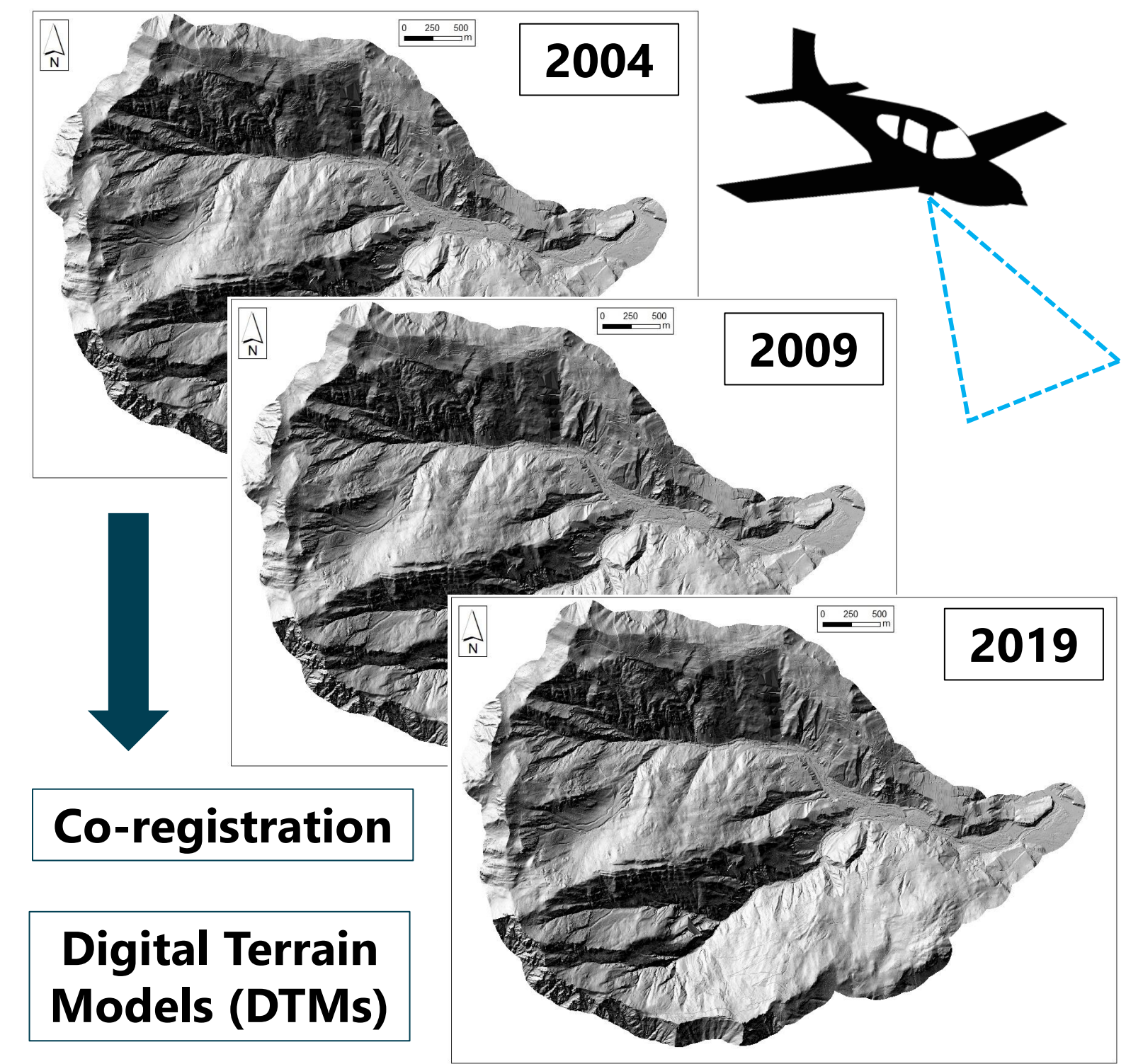
Functionality	Score	Status		
		Destroyed	Damaged	Good
Low	0	1	0.88	0.50
Medium	0.5	1	0.75	0.25
High	1	1	0.63	0

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

Type, location and measures of structures
Status and functionality of structures

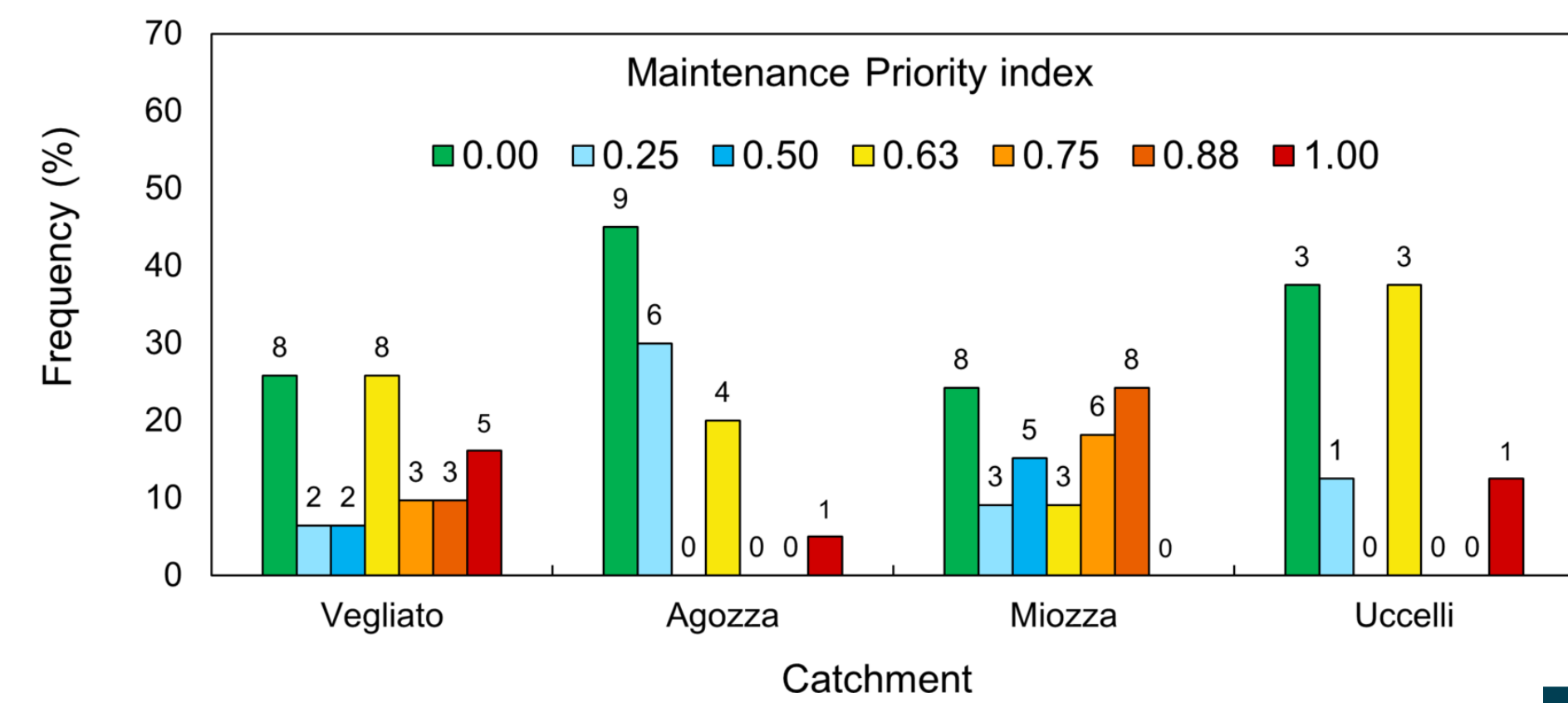


Airborne Laser Scanning (ALS)

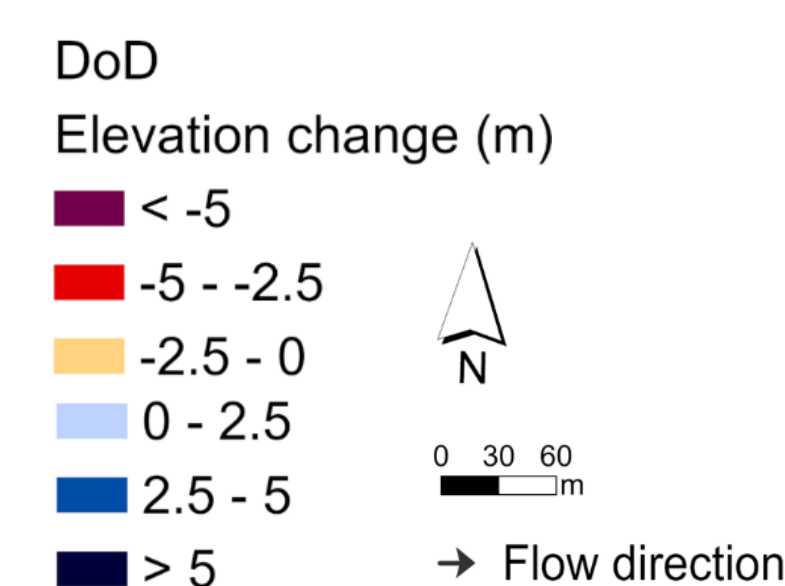
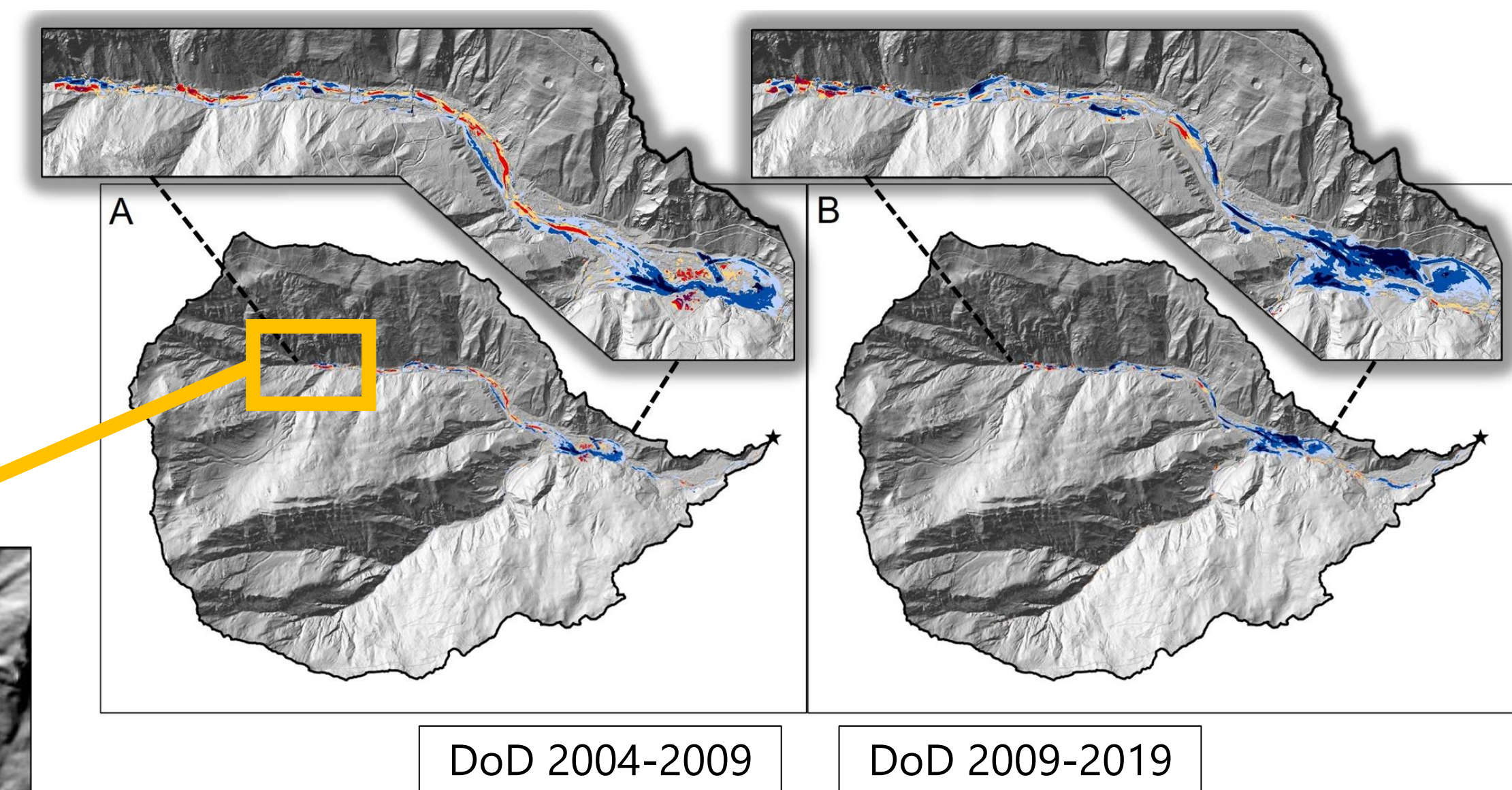


Co-registration
Digital Terrain Models (DTMs)
DTMs uncertainties

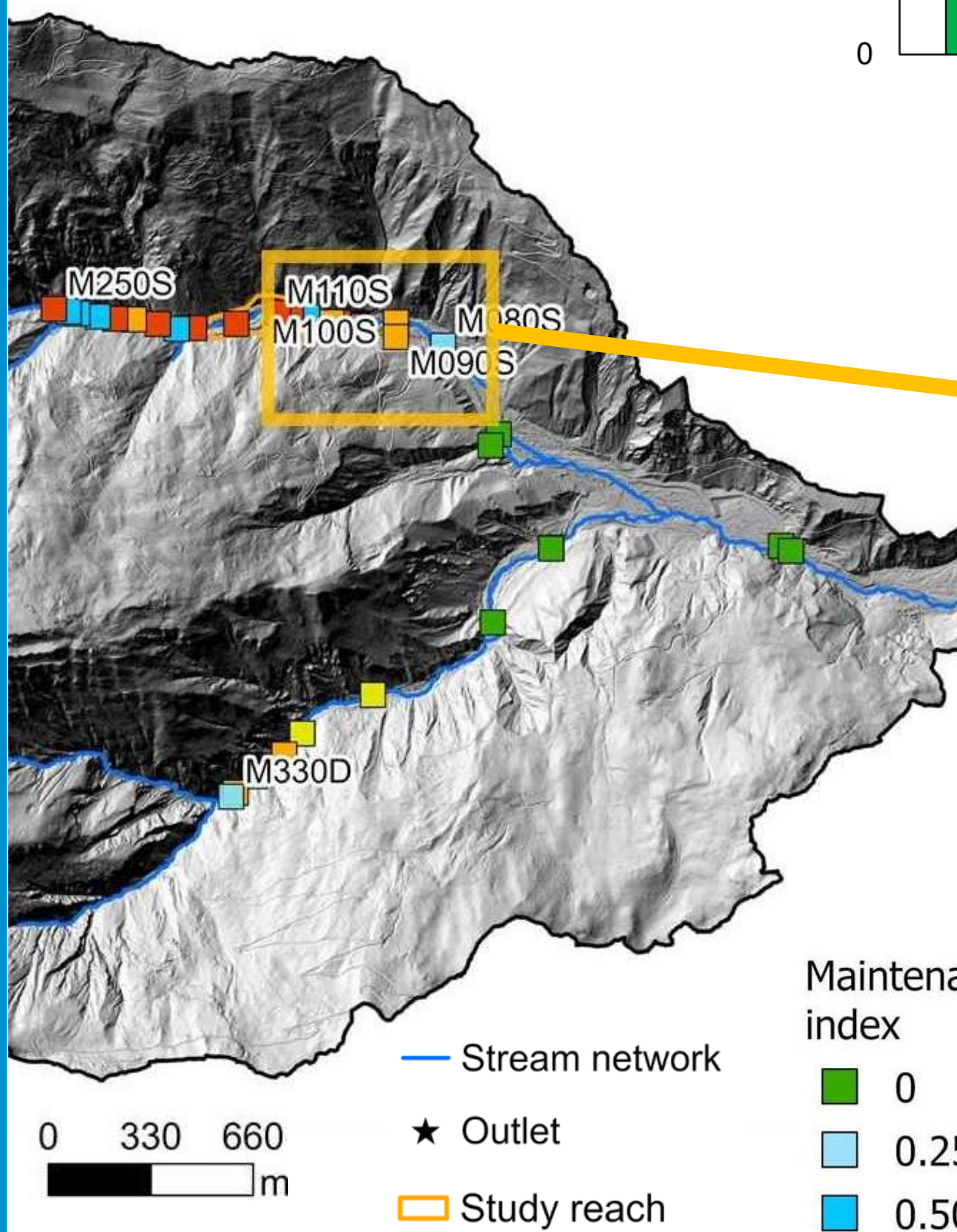
Results



DTMs of Difference (DoDs)



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



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

DoD 2004-2009 DoD 2009-2019

- 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

