

# Long-term investigation of the Mendatica landslide through the integration of MT-InSAR measurements, building damage surveys, and ancillary data

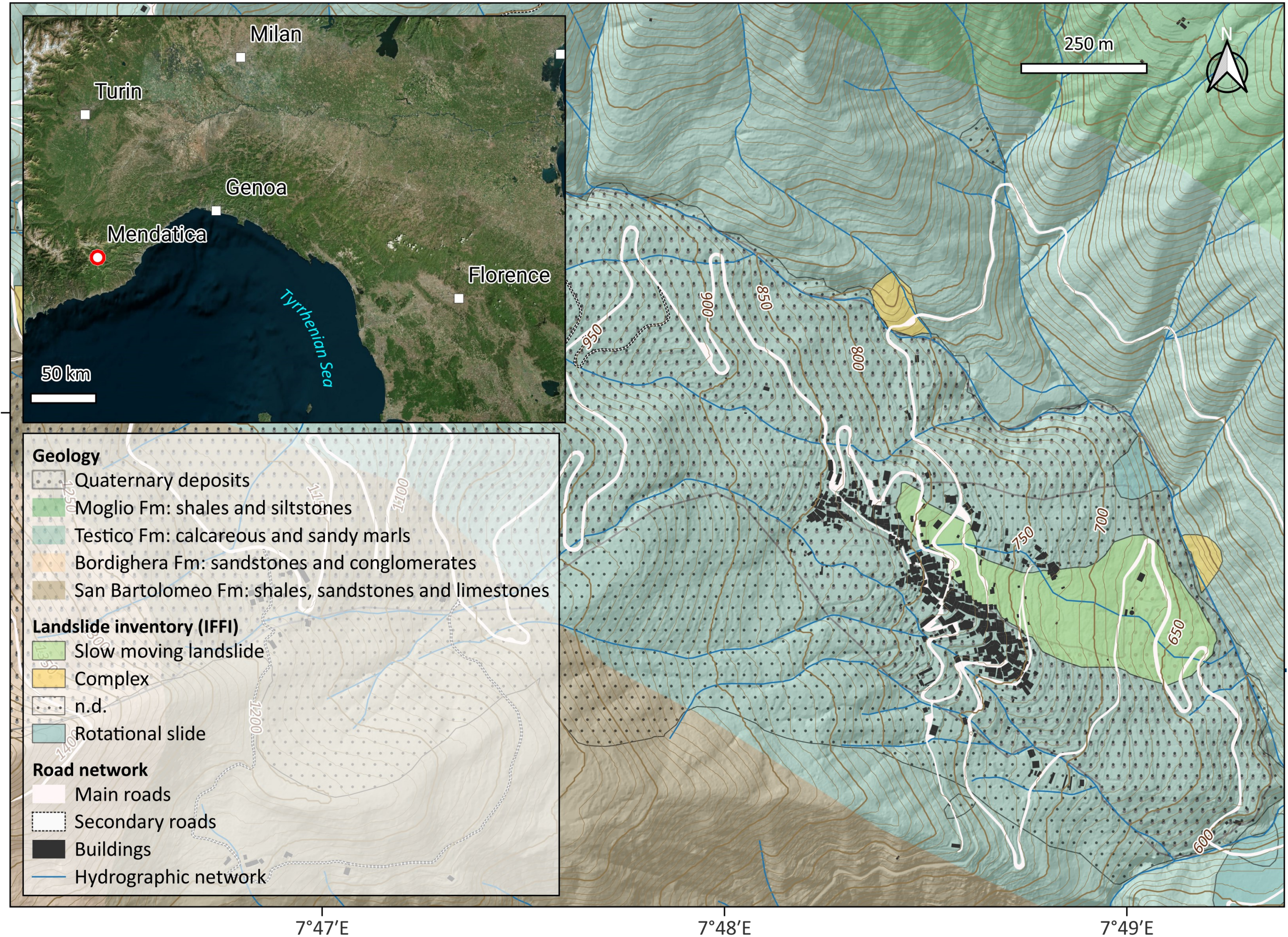
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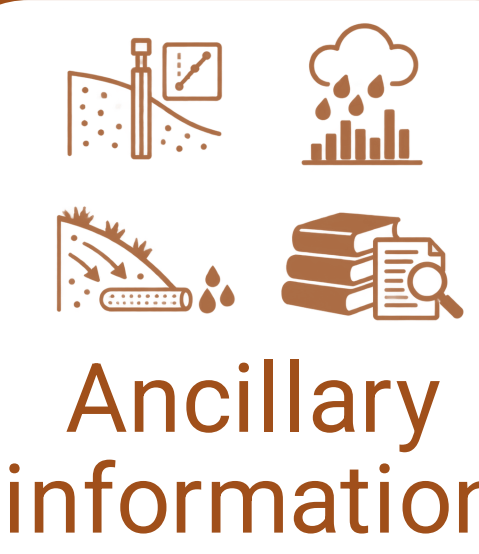
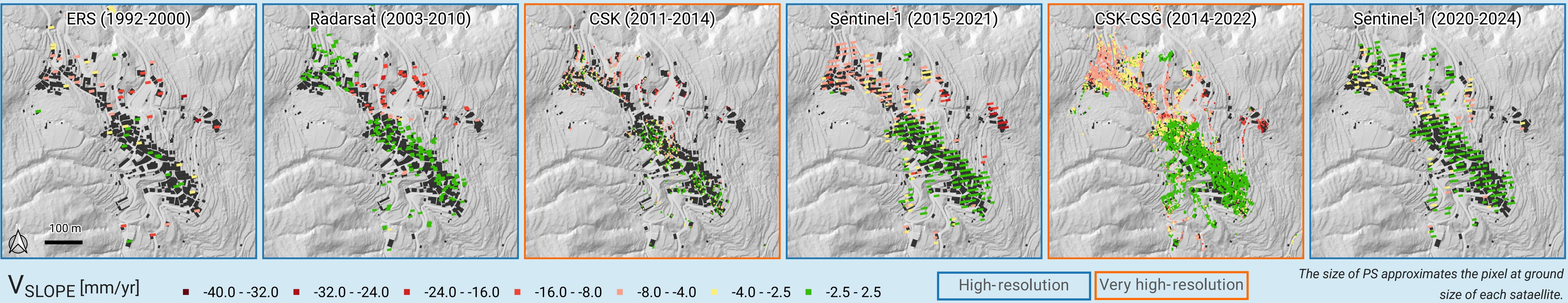


## Research Aim

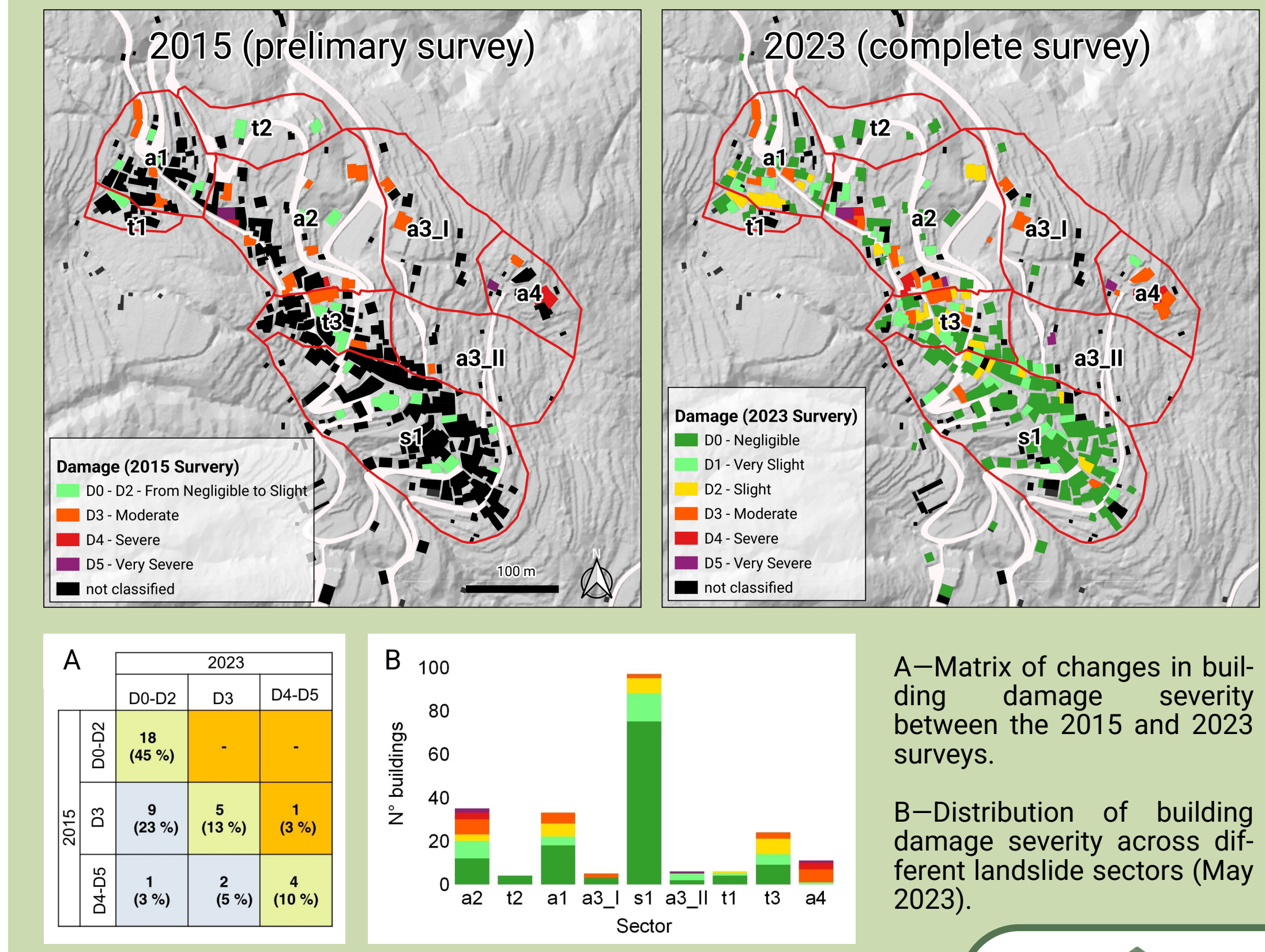
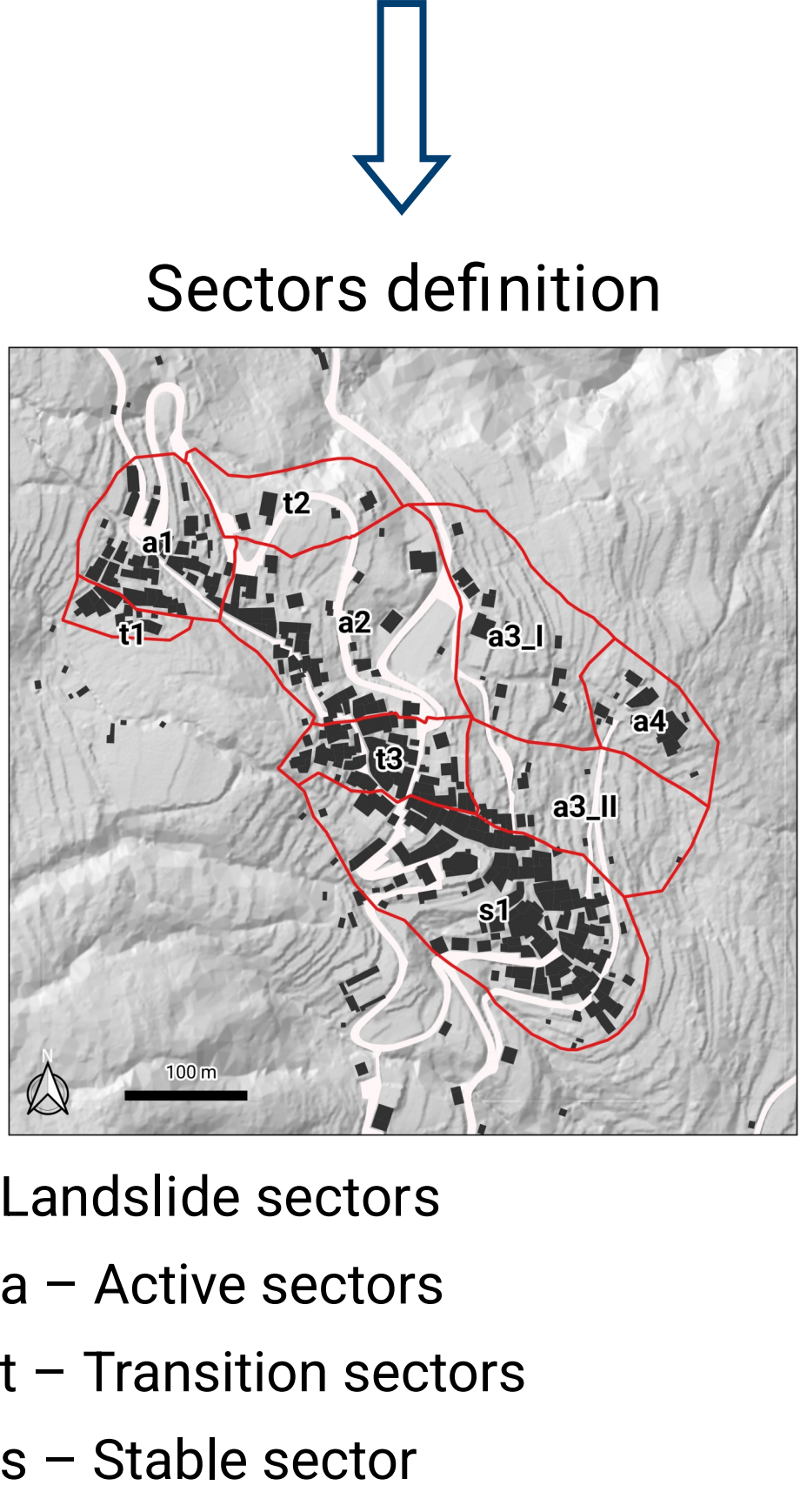
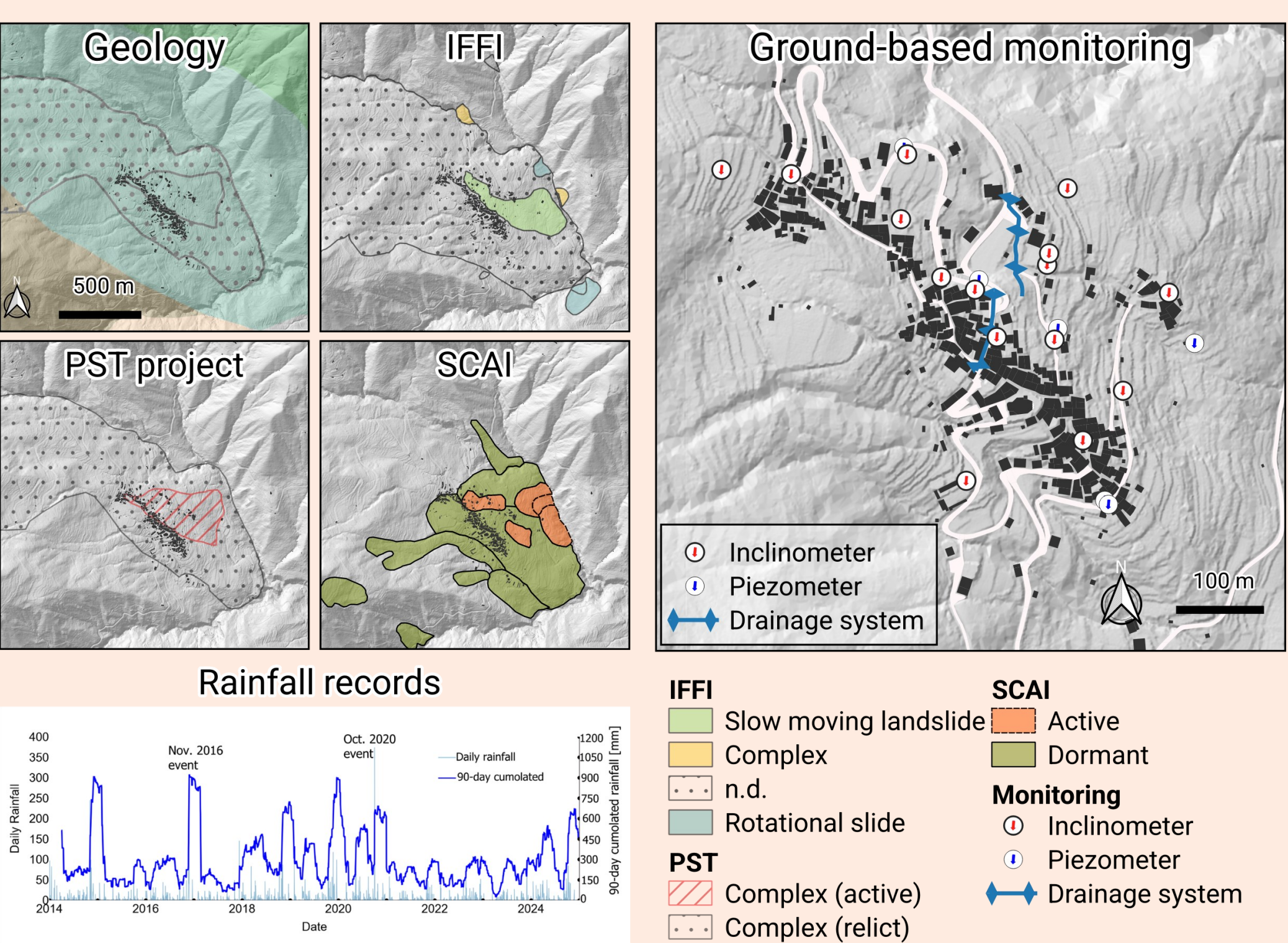
Slow-moving landslides affecting urban areas can cause progressive damage to buildings, but linking ground deformation to damage severity remains challenging. This study investigates the Mendatica landslide (NW Italy) by integrating ~30 years of multi-sensor MT-InSAR data, ground-based observations and multi-temporal building damage surveys to reconstruct slope evolution and explore the relationship between ground deformation and building damage.



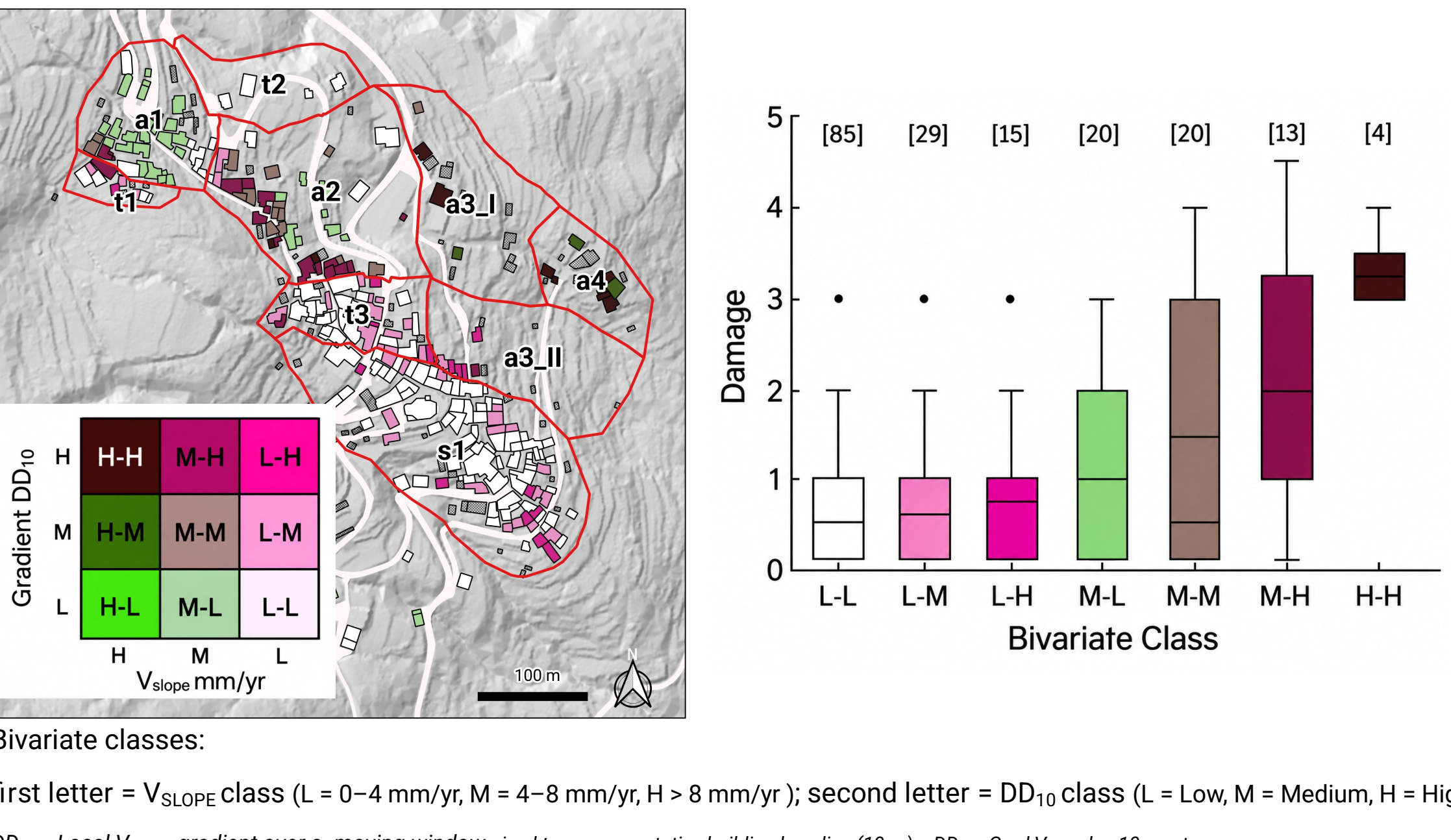
Multi-temporal InSAR datasets from ERS, Radarsat-1, COSMO-SkyMed/CSG and Sentinel-1 were integrated to reconstruct about 30 years of slope deformation (1992–2024). Velocities were projected along the slope ( $V_{slope}$ ) to compare data acquired with different satellite geometries, while the high-resolution CSK-CSG dataset was used for detailed building-scale deformation analysis.



Geological and geomorphological information, landslide inventories, rainfall records, and ground-based monitoring data were integrated with MT-InSAR observations to define the main landslide sectors and support the interpretation of their evolution.



Field surveys conducted in 2015 and 2023 classified building damage into six severity levels (D0–D5), providing a multi-temporal assessment of damage evolution.



## Cause-effect relationship

A clear relationship emerges between ground deformation and building damage: higher slope velocities and differential displacements are generally associated with increasing damage severity. Local discrepancies highlight the influence of landslide kinematics, building characteristics, and MT-InSAR limitations.

