

PERL: A MULTILEVEL STRATEGY FOR LIQUEFACTION HAZARD ASSESSEMENT IN COMPLEX STRATIGRAPHIC SUCCESSIONS

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Paolella L., Simionato M., Spacagna R., Razzano R.



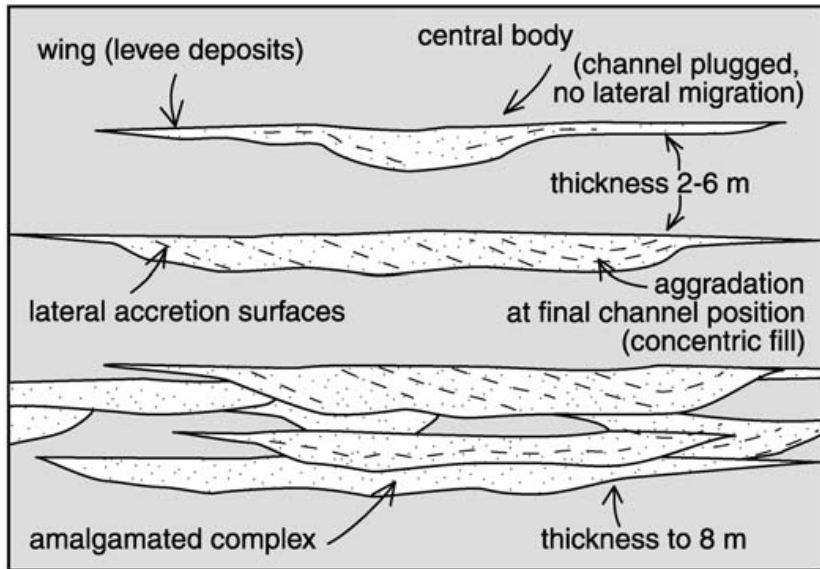
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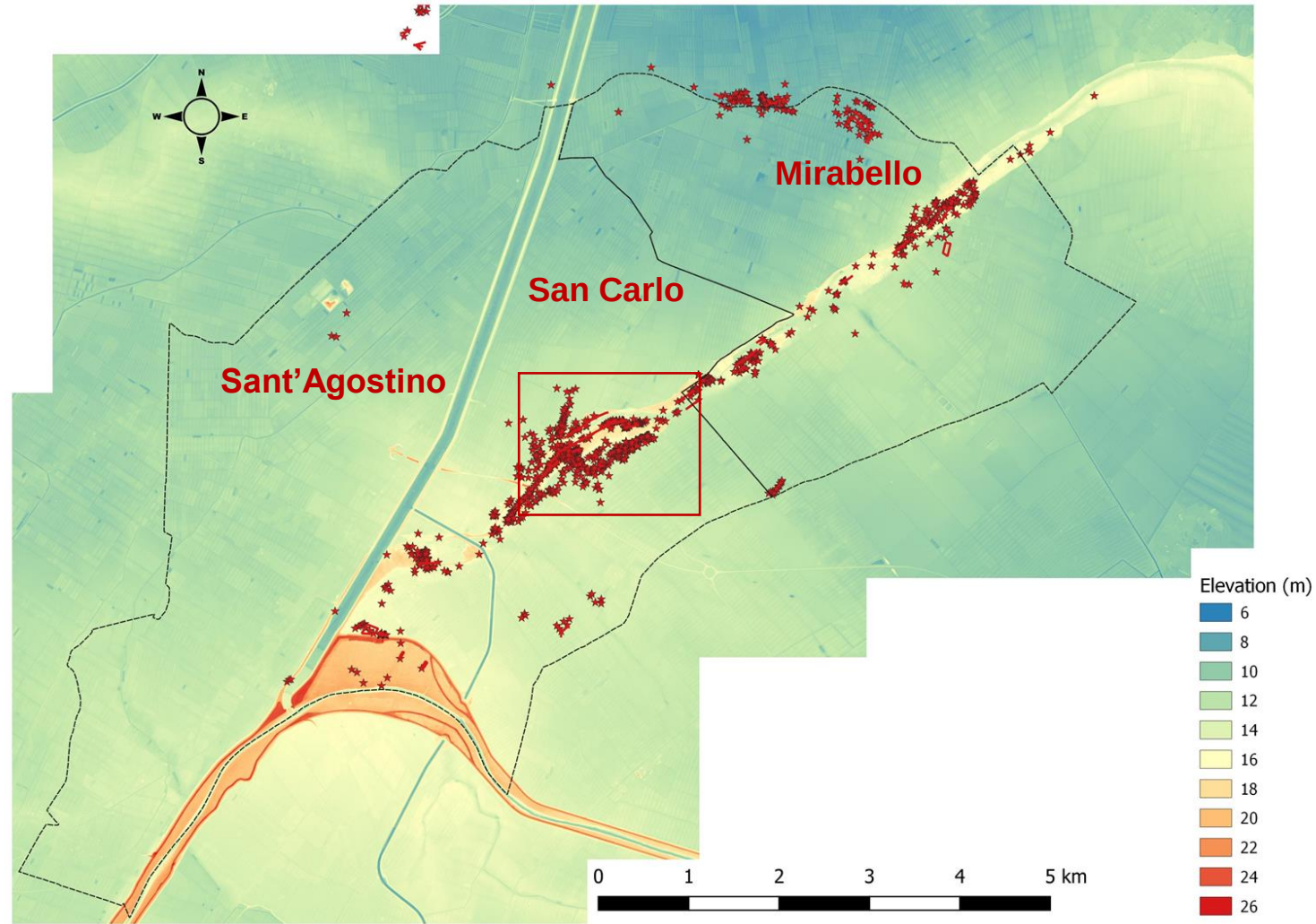
Define a methodology to assess liquefaction susceptibility in areas characterized by complex geo-stratigraphic conditions.

Improve with the benchmark of advanced numerical analyses the performance of semi-empirical methods introduced by the “Land use guidelines for areas affected by liquefaction (LQ)” in the framework of Seismic Microzonation studies in areas characterized by a 2D geological model.

WHY TERRE DEL RENO?



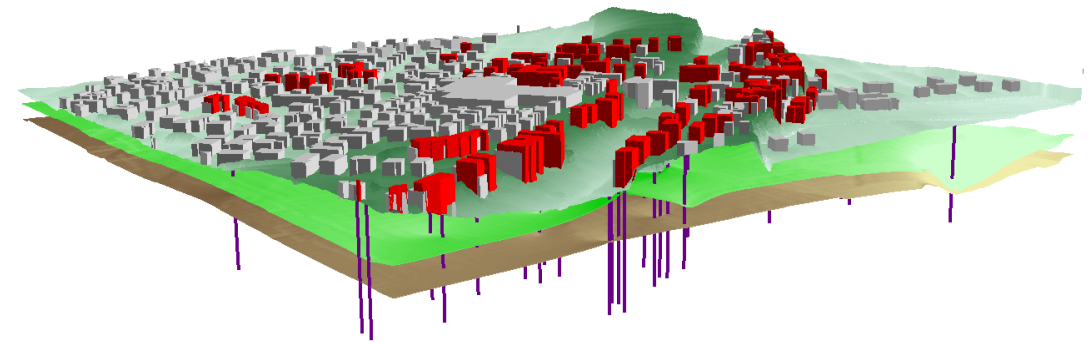
Gibling (2006)



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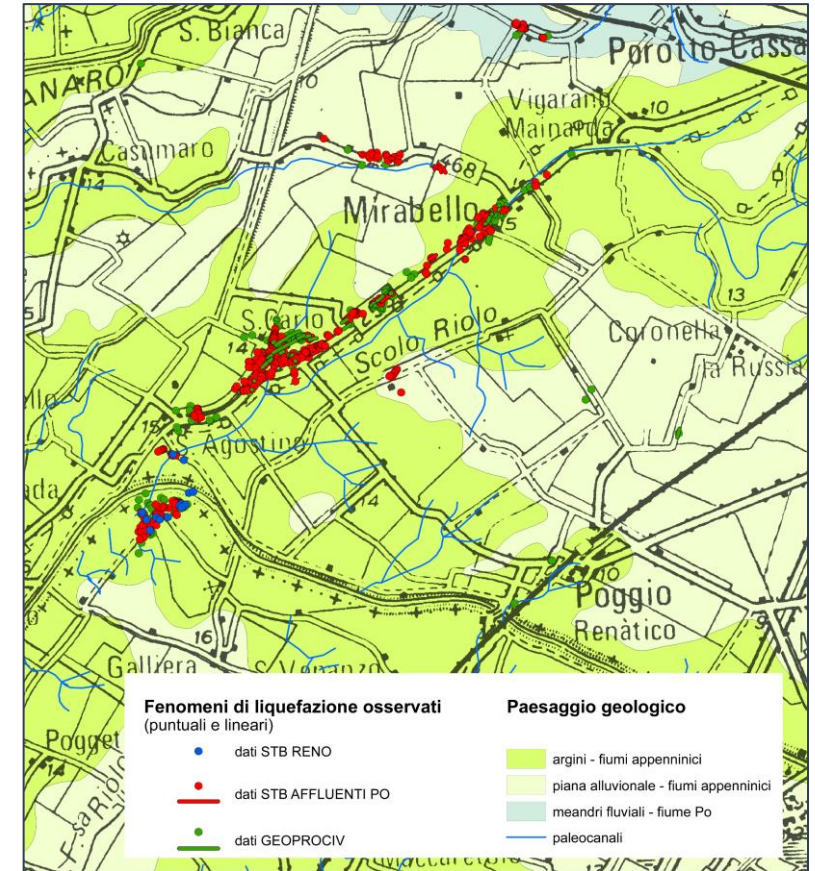
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- Build high resolution 2D and 3D stratigraphic models.
- Identify with coupled numerical analyses the mechanism of pore pressure generation and liquefaction triggering in 2D topographic and stratigraphic conditions.
- Assess the role of different variables on the liquefaction phenomenon - triggering and soil deformation - and identify the paramount ones to predict liquefaction effects.



VALIDATION

- Apply the procedure to an area of Terre del Reno characterized by a low level of information.
- Compare simulation with the liquefaction evidences seen in 2012 and derive statistical criteria to quantify reliability of prediction.

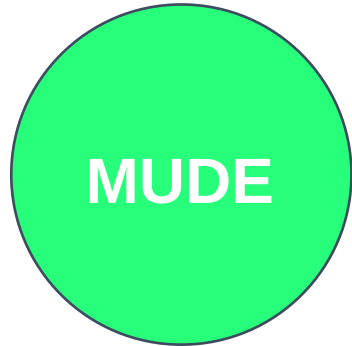


Emilia Romagna Region (2012)

Simplified models and a minimum set of parameters able to model the occurrence of liquefaction effects could be used to define some additional indicators at local scale specifically defined for 2D geologically complex condition such as those characterizing the riverbanks.



These indicators could contribute to update the “Land use guidelines for areas affected by liquefaction (LQ)” for Seismic Microzonation studies.



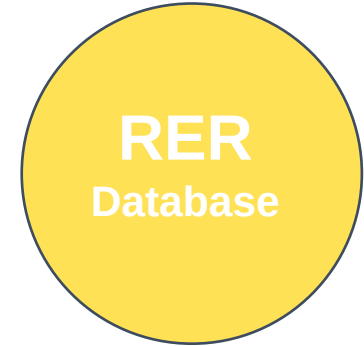
245 sites

385 investigations



Seismic microzonation

1386 investigations



906 investigations

MUDE

MS3
Sant'Agostino

MS3
Mirabello

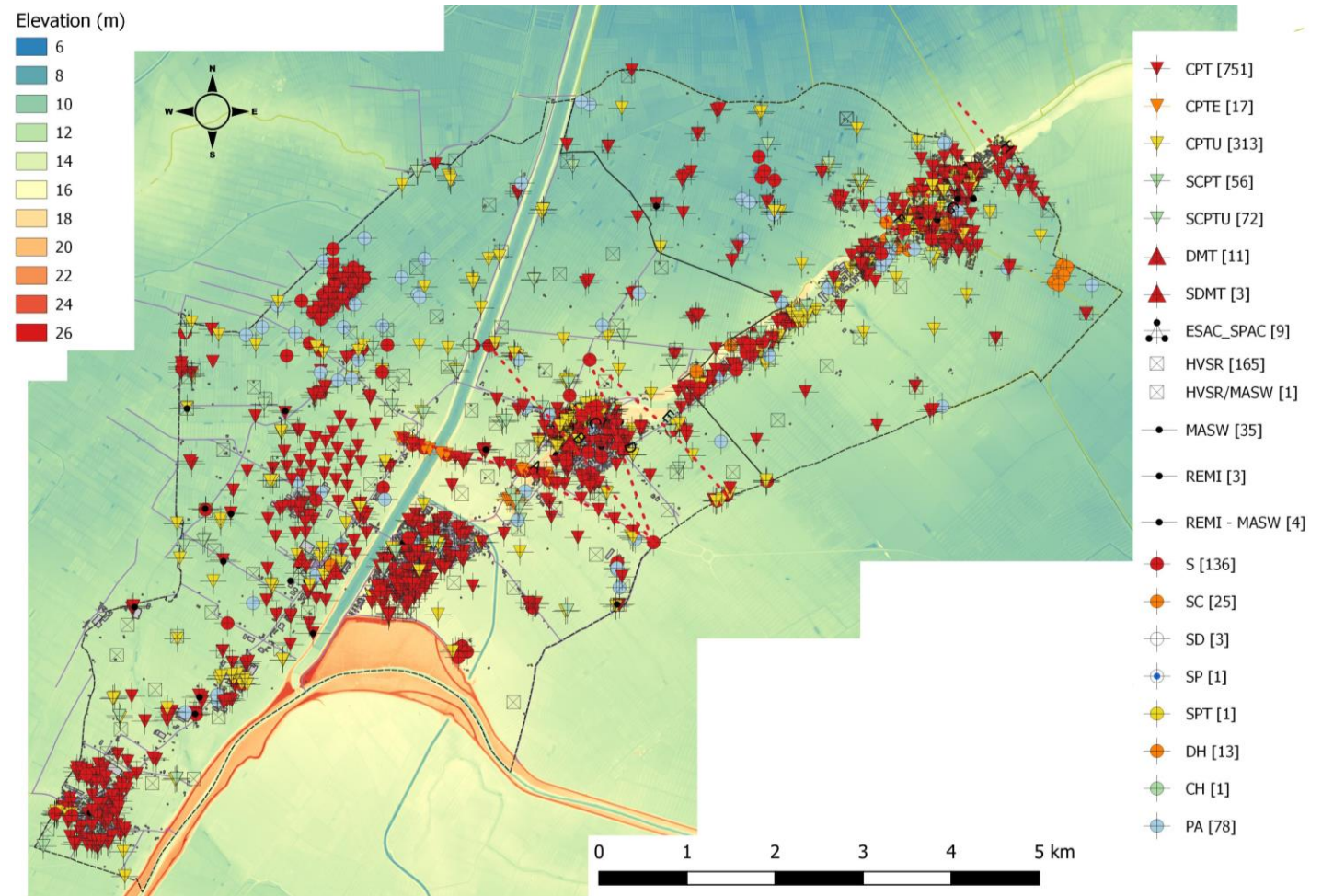
RER
Database

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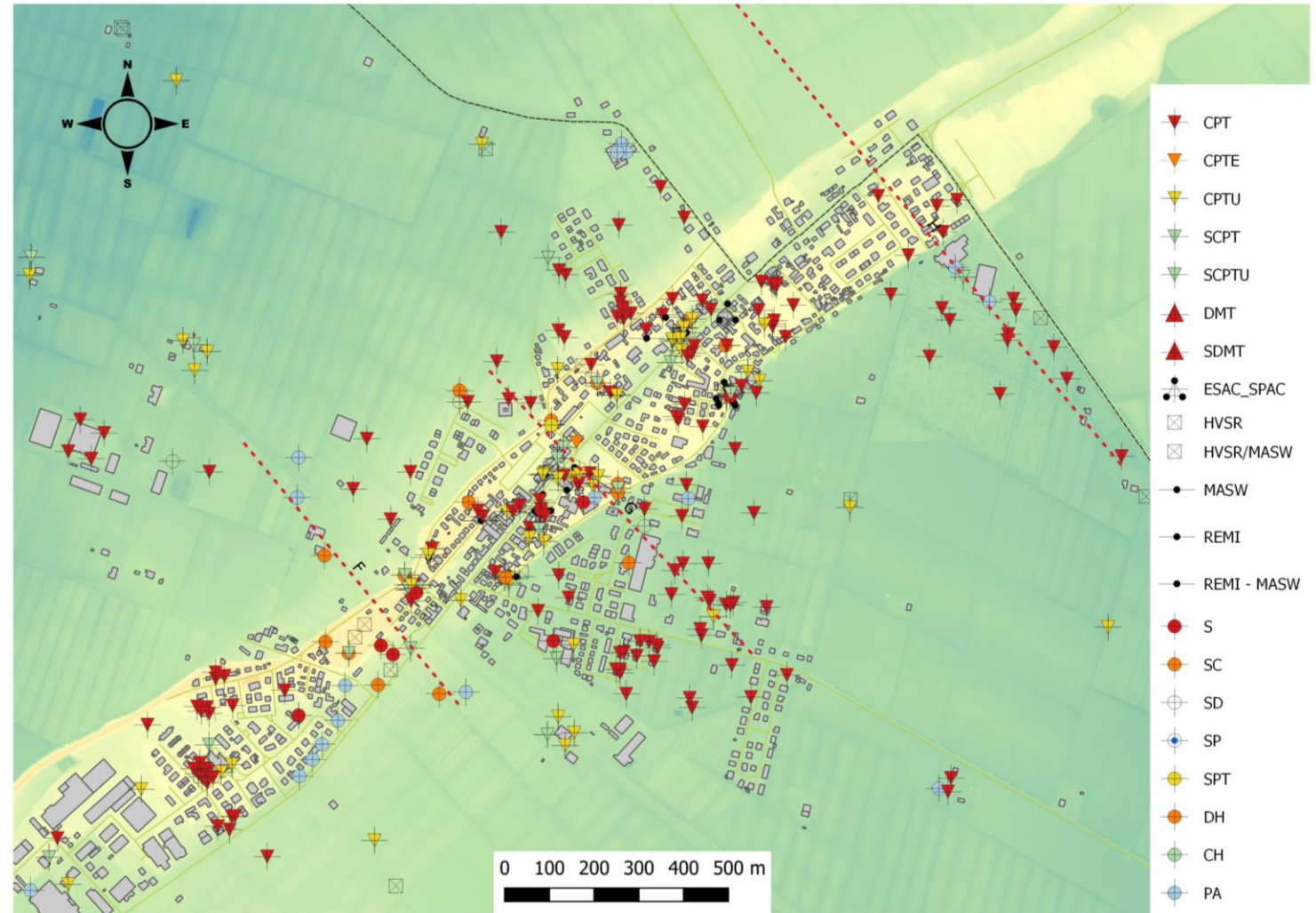
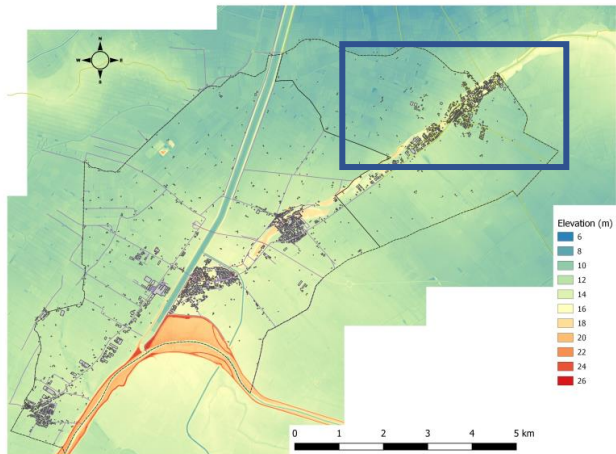
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Database created
with existing investigations



Database created
with existing investigations

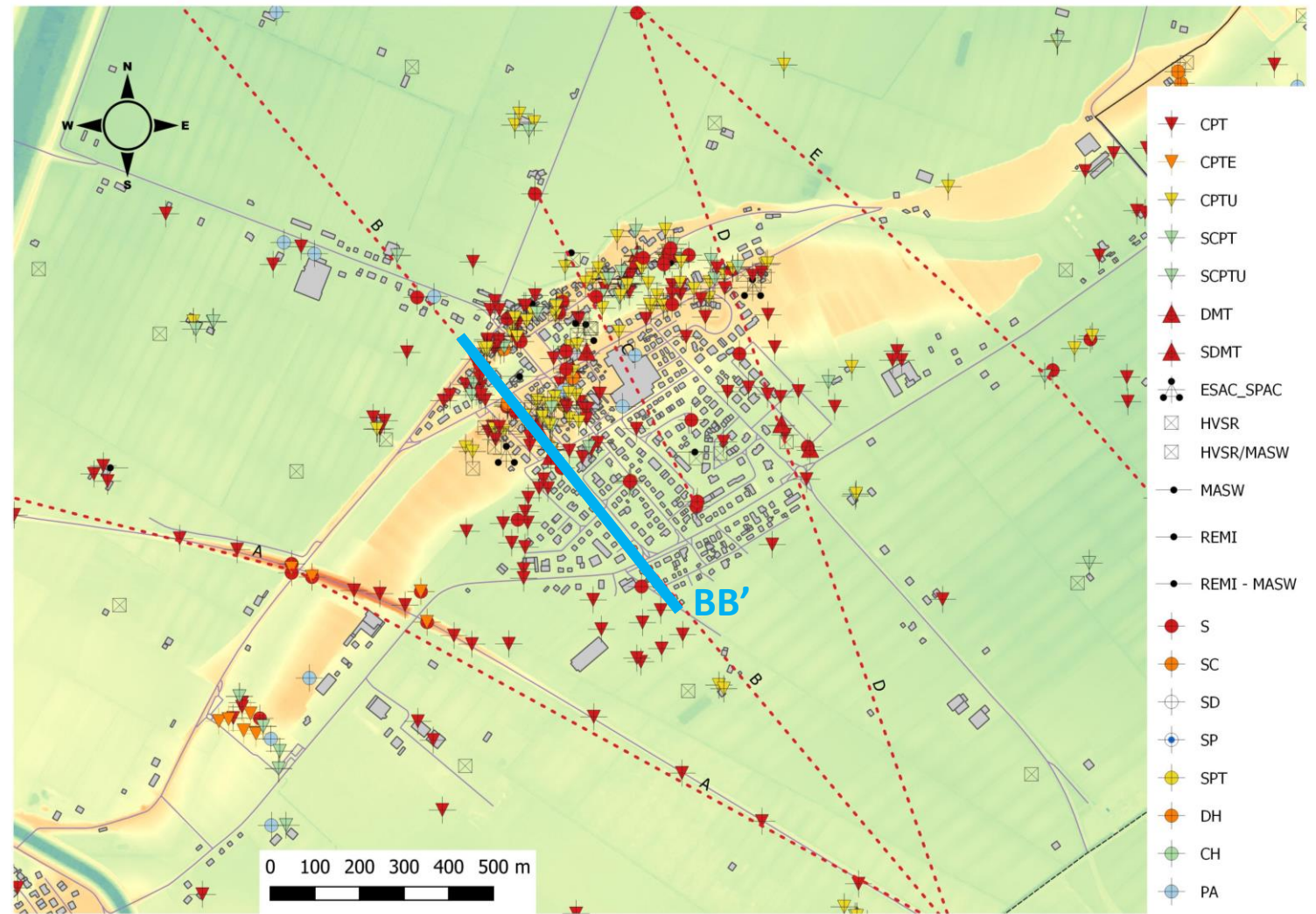
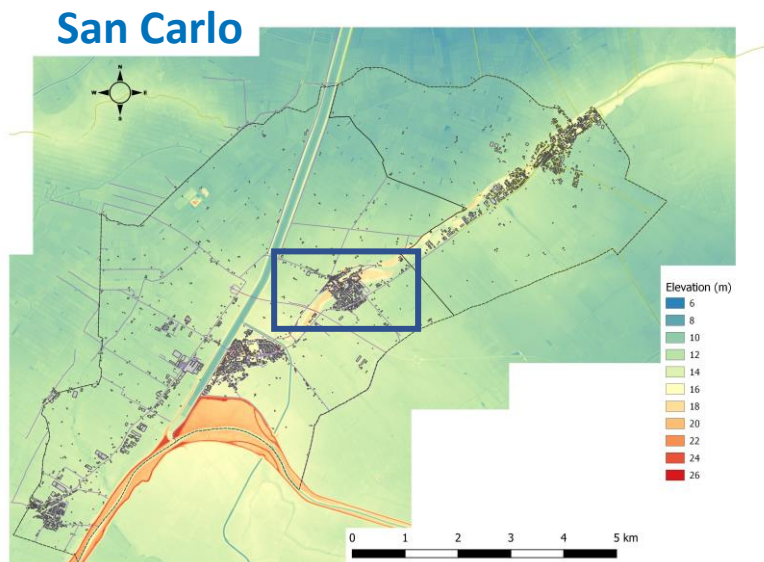
Mirabello



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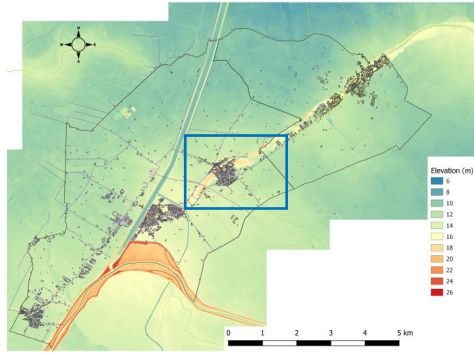
San Carlo
Riverbank



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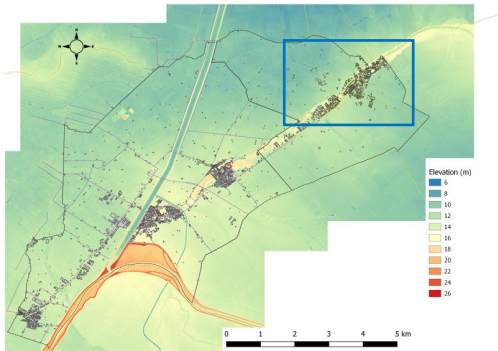
New geophysical, geotechnical and geological surveys

San Carlo



- Field Geological and Geotechnical Boreholes
- Cross-hole geophysical tomography (CH)
- Seismic Piezocone Penetrometer Test (SCPTu)
- Piezocone Penetrometer Test (CPTU)
- Seismic noise measurements
- Active and passive seismic arrays
- P-waves seismic tomography

Mirabello



GeALab: “Geophysics applied to the environmental geology, the heritage and the earthquake engineering lab”

“Laboratory of applied geophysics”

- Elaborate a novel strategy for the geological investigation aimed at defining different scale geotechnical models.
- Identify geometry and mechanical properties of the seismic bedrock.
- Reconstruct the most accurate 2D and 3D subsoil models (lithological, sedimentary, stratigraphic, geotechnical etc.).
- Select the seismic input for the numerical simulation.
- Implement numerical models



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&
LET'S MEET AT #vEGU2021!