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Remote sensing and in situ geophysical techniques for the hydrogeological hazard assessmnet in urban area: the Gorgoglione (Basilicata region, Southern Italy) case study.

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The vulnerability to landslides of the Basilicata territory (southern Italy) depends on different causes such as the outcropping lithologies, the morphology of the reliefs, neotectonics, seismicity, etc. Currently all 131 municipalities in this region are involved by landslides (IFFI Project 2020) that very often have affected the continuous and discontinuous urban fabric as well as industrial or commercial areas. In many cases, as for example in the Gorgoglione test site, the state of emergency has been declared with evacuation orders for residential buildings and commercial activities (Perrone et al., 2021; Calamita et al., 2023).

Traditional direct techniques, such as geotechnical boreholes, offer point-specific information but can be highly invasive, leading to potential damage to economic and cultural resources such as archaeological sites and underground utilities in the upper layers of the subsoil. In the context of investigating landslides in urban areas, alternative approaches may be more suitable. A significant contribution can be achieved through the combined utilization of remote sensing and in situ geophysical techniques. (Perrone et al., 2006).

In this work, satellite and ground based SAR interferometry, electrical resistivity tomography (ERT) and single-station seismic ambient noise measurements (HVSR) have been integrated for investigating the phenomenon affecting the Gorgoglione urban area (Fig.1), located in the south-western part of Matera Province (Basilicata Region). SAR interferometry results provided information on the activity status of the phenomenon. The ERT and the HVSR allowed the reconstruction of the subsoil geological setting, the identification of physical discontinuities correlated with lithological boundaries and sliding surfaces and the location of high water content areas. This information was used to assess the landslide residual risk, to plan and implement the risk mitigation actions and to correctly design the remediation works.

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