

Luigi Capozzoli, Researcher, Institute of Methodologies for Environmental Analysis (IMAA), National Research Council (CNR)

EDUCATION

- 2010, M. Sc. in Civil Engineering
- 2015, Ph.D. in Environmental Engineering

RESEARCH FIELD

Luigi Capozzoli is a researcher of the Institute of Methodologies for Environmental Analysis at the National Research Council. His research activity is focused on the integration of electric and electromagnetic methods (shallow and deep geoelectrical techniques, ground penetrating radar and electromagnetic measurements) for engineering, hydrogeological and archaeological applications. He is involved on the study of non-conventional and noninvasive geophysical approaches for improving the imaging of the geophysical methodologies in the field of civil engineering, environmental monitoring and cultural heritage. Since the 2011, he is in charge of the Hydrogeosite Laboratory of CNR-IMAA where he has been involved in national and international projects addressed to the realization of electromagnetic and electric geophysical tests for the characterization and monitoring of natural and anthropic hazards.

ACTIVITIES AND RESPONSIBILITIES

To date his research activities are addressed at the development of:

- innovative systems for data acquisition and data integration of geophysical data obtained with ground penetrating radar, electrical resistivity analyses and magnetometric measurements;
- multi-sensor and multiscale approach for the identification of degradation phenomena related to the vulnerability of engineering structures;
- non-conventional strategies based on the use of non-destructive techniques for the health characterization and monitoring of the Archaeological and Cultural Heritage;
- advanced data analyses for the inversion of geophysical measurements.

In environmental applications, he is:

- Principal investigator of ICARUS (Multiscale integrated approach for the deterioration assessment of reinforced concrete structures) PRIN 2022 project. ICARUS aims at exploring the contribution that geophysical methodologies can give for detecting and monitoring the main degradation phenomena affecting RCS, considering both the concrete and the reinforcements deterioration. By adopting an innovative multiscale and multisensory based methodology empirical relationships between geophysical and mechanical parameters in different deterioration conditions will be assessed.
- Co-Principal investigator of SUBGEO (Submarine groundwater discharge analysis with an innovative and integrated Geophysical approach) project, PRIN 2022-PNRR. SUBGEO aims to fully develop an integrated multiscale and multiresolution geophysical investigation approach for the coastal underground freshwater reservoir non-invasive characterization and to gain useful tools for the optimal and sustainable management of the coastal areas and resources
- Scientific Coordinator for IMAA-CNR of IRPAC (Infrastruttura tecnologica e di ricerca per lo studio del passato umano, la conservazione e gestione del patrimonio culturale), an Infrastructural Upgrading

Project for creating a multidisciplinary and multisensor advanced laboratory for the monitoring of the cultural heritage and civil infrastructures.

SELECTED PUBLICATIONS (last five years)

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2. Romano, G.; Capozzoli, L.; Abate, N.; De Girolamo, M.; Liso, I.S.; Patella, D.; Parise, M. An Integrated Geophysical and Unmanned Aerial Systems Surveys for Multi-Sensory, Multi-Scale and Multi-Resolution Cave Detection: The Gravaglione Site (Canale di Pirro Polje, Apulia). *Remote Sens.* 2023, 15, 3820. <https://doi.org/10.3390/rs15153820>;
3. Piroddi, L.; Abu Zeid, N.; Calcina, S.V.; Capizzi, P.; Capozzoli, L.; Catapano, I.; Cozzolino, M.; D'Amico, S.; Lasaponara, R.; Tapete, D. Imaging Cultural Heritage at Different Scales: Part I, the Micro-Scale (Manufacts). *Remote Sens.* 2023, 15, 2586. <https://doi.org/10.3390/rs15102586>
4. Fornasari G, Capozzoli L, Rizzo E. Combined GPR and Self-Potential Techniques for Monitoring Steel Rebar Corrosion in Reinforced Concrete Structures: A Laboratory Study. *Remote Sensing.* 2023; 15(8):2206. <https://doi.org/10.3390/rs15082206>
5. Olita, F.; Giampaolo, V.; Rizzo, E.; Palladino, G.; Capozzoli, L.; De Martino, G.; Prosser, G. Investigation of the Geological Structure of the Tramutola Area (Agri Valley): Inferences for the Presence of Geofluids at Shallow Crustal Levels. *Geosciences* 2023, 13, 83. <https://doi.org/10.3390/geosciences13030083>
6. Rizzo, E.; Dubbini, R.; Clementi, J.; Capozzoli, L.; De Martino, G.; Fornasari, G.; Fiano, F.R.; Lombardi, M. Geomagnetic and FDEM Methods in the Roman Archaeological Site of Bocca Delle Menate (Comacchio, Italy). *Heritage* 2023, 6, 1698-1712. <https://doi.org/10.3390/heritage6020090>
7. Lapietra, I.; Lisco, S.; Capozzoli, L.; De Giosa, F.; Mastronuzzi, G.; Mele, D.; Milli, S.; Romano, G.; Sabatier, F.; Scardino, G.; Moretti, M. A Potential Beach Monitoring Based on Integrated Methods. *J. Mar. Sci. Eng.* 2022, 10, 1949. <https://doi.org/10.3390/jmse10121949>
8. Rizzo E., Giampaolo V., Capozzoli L., De Martino G., Romano G., Santilano A., & Manzella, A. (2022). 3D deep geoelectrical exploration in the Larderello geothermal sites (Italy). *Physics of the Earth and Planetary Interiors*, 329, 106906
9. Giampaolo V., Dell'Aversana P., Capozzoli L., De Martino G., & Rizzo E. (2022). Optimization of Aquifer Monitoring through Time-Lapse Electrical Resistivity Tomography Integrated with Machine-Learning and Predictive Algorithms. *Applied Sciences*, 12(18), 9121
10. Capozzoli L., Giampaolo V., De Martino G., Goma M. M., & Rizzo E. (2022). Geoelectrical Measurements to Monitor a Hydrocarbon Leakage in the Aquifer: Simulation Experiment in the Lab. *Geosciences*, 12(10), 360.
11. Noviello C., Gennarelli G., Esposito G., Ludeno G., Fasano G., Capozzoli L., F. Soldovieri & Catapano, I. (2022). An Overview on Down-Looking UAV-Based GPR Systems. *Remote Sensing*, 14(14), 3245
12. Micallef A., Saadatkhan N., Spiteri J., Rizzo E., Capozzoli L., De Martino G., ... & Gupta, S. (2022). Groundwater seepage is a key driver of theater-headed valley formation in limestone. *Geology*, 50
13. Capozzoli, L.; Giampaolo, V.; Martino, G.D.; Perciante, F.; Lapenna, V.; Rizzo, E. ERT and GPR Prospecting Applied to Unsaturated and Subwater Analogue Archaeological Site in a Full-Scale Laboratory. *Appl. Sci.* 2022, 12, 1126. <https://doi.org/10.3390/app12031126>
14. Capozzoli L, Fornasari G., Giampaolo V., De Martino G., Rizzo E. Multi-Sensors Geophysical Monitoring for Reinforced Concrete Engineering Structures: A Laboratory Test. *Sensors.* 2021; 21(16):5565. <https://doi.org/10.3390/s21165565>
15. R. Nappi, V. Paoletti, D. D'Antonio, F. Soldovieri, L. Capozzoli, G. Ludeno, S. Porfido, A. M. Michetti, Joint Interpretation of Geophysical Results and Geological Observations for Detecting Buried Active Faults: The Case of the "Il Lago" Plain (Pettoranello del Molise, Italy), *Remote Sens.* 2021, 13, 1555. <https://doi.org/10.3390/rs13081555>
16. Muzzillo, R.; Zuffianò, L.E.; Rizzo, E.; Canora, F.; Capozzoli, L.; Giampaolo, V.; De Giorgio, G.; Sdao, F.; Polemio, M. Seawater Intrusion Proneness and Geophysical Investigations in the Metaponto Coastal Plain (Basilicata, Italy). *Water* 2021, 13, 53

17. Capozzoli, L.; Catapano, I.; De Martino, G.; Gennarelli, G.; Ludeno, G.; Rizzo, E.; Soldovieri, F.; Uliano Scelza, F.; Zuchtriegel, G. The Discovery of a Buried Temple in Paestum: The Advantages of the Geophysical Multi-Sensor Application. *Remote Sens.* 2020, 12, 2711
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19. M. Guerriero, L. Capozzoli, G. De Martino, V. Giampaolo, E. Rizzo, F. Canora and F. Sdao, Geophysical techniques for monitoring carbonate karstic rocks (2019), *Italian Journal of Engineering Geology and Environment*, DOI: 10.4408/IJEGE.2019-01.S-10; Project: Landslide Risk Assessment along roads (LaRIS), Special Issue 1 (2019) Sapienza Università Editrice
20. Capozzoli L., De Martino G., Polemio M. et E. Rizzo, Surveys in Geophysics 2019, Geophysical techniques for monitoring settlement phenomena occurring in reinforced concrete buildings, *Surveys in Geophysics*, DOI: 10.1007/s10712-019-09554-8
21. E. Rizzo, L. Capozzoli, G. De Martino, S. Grimaldi, Urban Geophysical approach to characterize the subsoil of the main square in San Benedetto del Tronto town (Italy), *Journal of Engineering Geology*, Elsevier 2019, <https://doi.org/10.1016/j.enggeo.2019.05.010>
22. E. Rizzo, V. Giampaolo, L. Capozzoli, S. Grimaldi, Deep Electrical Resistivity Tomography for the hydrogeological setting of Muro Lucano Mounts aquifer (Basilicata, Southern Italy), Volume 2019, Article ID 6594983, 11 pages, Hindawi, *Geofluids* <https://doi.org/10.1155/2019/6594983>

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