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A new multiscale and multisensory strategy for the characterization of groundwater discharge in coastal areas – the SUBGEO project

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The monitoring of groundwater resources and the identification of energy resources play a crucial role in the sustainable development and management of coastal areas. This is a fundamental aspect considering the climate changes occurring in areas particularly exposed to physical hazards resulting from extreme weather events and higher are the risks of coastal erosion, groundwater salinization, flooding and other hazards in low-elevation coastal zones (Oppenheimer et al., 2019). Currently, 2.15 billion people live in the near-coastal zone and 898 million in the low-elevation coastal zone globally (Reiman and al, 2023). Moreover, coastal freshwater reservoirs can represent a fundamental resource to address water shortages. The hydro-geological potential and economic factors linked to the submarine groundwater are the starting point of the two-year Italian Research Project of National Relevance (PRIN-2022) SUBGEO where the University of Bari (UNIBA) and the two Institutes (IMAA and IRPI) of the National Research Council are involved. The project is focused on the submarine groundwater discharge analysis with an innovative and integrated geophysical approach based on the use of electric and electromagnetic methods for the twofold targets of coastal underground freshwater reservoir non-invasive characterization and to gain useful tools for the optimal and sustainable management of the coastal areas and resources.

Subgeo will develop an innovative geophysical approach to provide spatially continuous and high-resolution information on the subsoil structure from the offshore areas, where the outward fluxes mix with the seawater, to the onshore ones including the urban areas.

The proposed strategy will be tuned by small-scale laboratory experiments and by numerical simulations to define the best acquisition procedures and check the sensitivity of the strategy for different subsurface conditions. The final goal of the project consists of reproducing a high-resolution and detailed hydrogeophysical model for managing the water resources in coastal areas.

References

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