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## COST ACTION OFF-SOURCE: MARINE GEOPHYSICAL EXPLORATION OF OFFSHORE FRESHENED GROUNDWATER: CHALLENGES AND INNOVATIONS

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## ABSTRACT

The exploration of offshore freshened groundwater (OFG) has become an emerging field for marine geophysical methods in recent years. OFG is considered as a water body with a salinity less than seawater stored in near coastal sub-seafloor aquifers. OFG bodies may have formed under lowstand conditions, during one of the several middle-to-upper Pleistocene glacial periods when sea levels were up to 130 m below today's and fluvial systems flowed across continental shelves, causing the formation of offshore aquifers' systems. OFG may represent a substantial alternative water resource for water-stressed coastal regions. However, the global potential of OFG is highly unconstrained due to missing geophysical data. Hydroacoustic, seismic and electromagnetic methods have demonstrated their efficiency to delineate the volume and extent of OFG bodies in a number of case studies. The resistivity distribution derived from electromagnetic and electrical resistivity tomography methods can be related to pore water salinity, and aquifer geometries can be confined using high resolution seismic methods.

As part of the European Cooperation in Science and Technology (COST) Action OFF-SOURCE, we are working to identify the most practical and effective tools and methods for detecting and evaluating OFG. Drawing on published case studies and the group's expertise, we aim to address challenges and recommend improvements in instrumentation, data acquisition, and interpretation, with the goal of providing practical guidelines for OFG exploration strategies for both stakeholders and the scientific community.

**Keywords:** (*offshore freshened groundwater, marine seismic, marine electromagnetics, COST Action OFF-SOURCE*)