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Potential Water Resources in the North-Eastern Adriatic Sea

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Increasing demand for freshwater requires the identification of additional and less-conventional water resources. Amongst these, offshore freshened groundwater is considered a new opportunity to face increasing water demand and has been studied in different parts of the world. Here we focus on the north-eastern Adriatic Sea, where offshore aquifers could be present as a continuation of onshore aquifers. Geophysical data, especially offshore seismic data, as well as onshore and offshore well data were integrated and interpreted to characterize the hydrogeological setting via the interpretation of seismo-stratigraphic sequences. Two areas located in the proximity of the Tagliamento and Isonzo deltas were studied. Well and seismic data suggest that Quaternary sediments, extending from onshore to offshore areas, represent the most promising from an offshore freshwater resources point of view. Firstly, onshore well data confirm the presence of freshwater aquifer systems in proximity to the coastline, supporting the hypothesis of their continuation offshore. Secondly, during the glacial periods, a drop in sea level (about -120 m with respect to today during the Last Glacial Maximum), provided the total emergence of the northern Adriatic Sea, that represented a fluvial plain, allowing the storage of freshwater. Moreover, a lower sea level position could lead to a higher groundwater gradients towards offshore areas. On the contrary, during the interglacial ones, the sea level was some meters higher than the present one (about +8 m during the last transgression in the Middle/Late Pleistocene), with mainly starved conditions. During the deglaciation phases, the fluvial drainage fed by melting glaciers produced the deposition of sediment above the plain. Below these sediments, the several kilometres thick pre-Quaternary carbonate and terrigenous sequences seem to host mainly salty waters.