

“Geological characteristics of a potential CO₂ storage site in the Gela offshore (southern Sicily) and the role of a Mass Transport Complex (MTC)”

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In a context where European policies force countries to reduce CO₂ emissions of 55% by 2050, the possibility of achieving this objective through Carbon Capture and Storage (CCS) processes shall be considered.

Identifying existing and new potential sites in offshore southern Sicily is important to contribute to this objective. The facilities in the depleted reservoirs, close to high CO₂ emissions rates sites (industrial plants), constitute a solid basis for thinking about CCS implementation in the area. The presence of exploited hydrocarbon plays provided and provides fundamental information on the stratigraphic and structural setting of offshore southern Sicily.

It is known that southeastern Sicily is rich in petroleum traps related to the carbonate buildups formed in the subsiding Streppenosa intraplateau basin (es. Ragusa, Gela, Irminio, Mila, and possibly Perla) that could be re-used for CCS scopes. However, the potential of Plio-Pleistocene deposits in the area for CCS purposes has never been investigated. The Gela offshore sector is occupied for a large part by the Gela Thrust System (GTS) and its associated Gela Foredeep that comprises the greater thickness of the Plio-Pleistocene sandy sediments of the Sicily Channel.

Our workflow includes the interpretation of key horizons along a dense grid of 2D seismic lines, the well-to-seismic tie, and the generation of a refined velocity model. The results of the study reveal information regarding the distribution of reservoir and seal levels within the Plio-Pleistocene succession constituting the infill of the Gela Foredeep basin.

While the reservoir and the primary seal are in stratigraphic relationships within the basin, the shallowest seal consists of a Mass Transport Complex (MTC) complex distributed throughout the overall area. Analysis of its extent, age, and relations to the GTS provides a crucial tool for identifying relationships between tectonics and sedimentation that could generate potentially suitable sealing layers for CCS purposes. This study, therefore, presents new data in the area regarding the presence of reservoirs and seals potentially suitable for CCS purposes at the regional scale.