

3D reconstruction of an integrated onshore/offshore geological model: the example of geological sheet 628 Sciacca (Southwestern Sicily)

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The CARG project allowed to collect new useful multidisciplinary data for the reconstruction of subsurface geological model. For the Sciacca area (Sheet 628) data from geological survey (collected through advanced digital tools and processed through FieldMOVE) were used to reconstruct the geological map at 1:50,000 scale from which the geological sections of the onshore sector were reconstructed. The obtained data were integrated with those derived from seismo-stratigraphic and structural interpretation of 2D seismic reflection profiles, collected from both from public and non-databases of submarine regions, calibrated with stratigraphic well-logs provided by ISPRA. By working in a combined 2D/3D environment, data as surfaces and lines (from 2D seismic interpretation) were cross-checked with dedicated software to ensure that all interpretations were consistent. Depth conversion have been performed using velocities derived from sonic well-logs and literature data to identify the correct geometries and thicknesses of the layers in depth (m) interpreted in time domain (TWT).

The integration of multidisciplinary data was challenging to obtain a continuous interpretation from onshore to offshore sector. The major stratigraphic levels and the tectonic surfaces affecting them were represented in a 3D view with the aim of determining the large-scale structural framework, joining the onshore and offshore sectors interpretation. The combined onshore/offshore geological reconstruction was also used to depicts the isolines of the main stratigraphic/structural layers derived from 3D surfaces.

Field data restitution and 3D map visualizations are essential for understanding the development of the geometries of fundamental structures in depth. Such data are a key tool for proper geological information restitution that ensures both development and environmental sustainability at the same time. A well-defined subsurface geological model, guided by geological reasoning, provides the key tools to identify, characterize and manage georisks and georesources.