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Permian Glacial and Fluvio-Deltaic Depositional Systems of the Dampier Sub-Basin (North West Shelf of Australia) Revealed by 3-D Seismic

New tools developed for the seismic interpretation and visualization are rapidly increasing the accuracy of the subsurface interpretation with the ability to image the continuity of sedimentary facies and stratigraphic features. Such techniques such as the seismic attribute classification are expending the amount of information to be extracted from 3-D seismic volumes and provide new insights into the development of depositional systems. A workflow combining 3-D seismic interpretation with seismic attribute classifications has been successfully applied to the analysis of the Permian sequences of the Dampier Sub-basin (NW Shelf of Australia). It represents an effective method to quickly and accurately interpret a large volume of seismic data and it has compensated for an average quality of the seismic data and for the deformation of the sequences, which complicated the spatial recognition of stratigraphic patterns.

Seismic attribute (VRS attributes, grid-, surface- and volume-based attributes) classifications, based on a set of geostatistical and neural network algorithms, enabled to refine the characterization of the nature and the geomorphology of the Permian glacially-related Lyons Group. Comparison with analogous seismic facies in the Swiss Alps, allowed to recognize a variety of facies ranging from infraglacial deposits to subglacial moraine. A similar procedure was applied to significantly refine the interpretation of the Artinskian fluvio-deltaic Wooramel Group prograding over the glacial sequences.

The improvement in the interpretation of the Permian sequences enabled to highlight a number of possible stratigraphic traps and also brought new constraints on the evolution of the NeoTethys rifting in the Eastern Gonwanan region.