Theme 7. Deep-marine clastic depositional systems

General Session

Oral presentation

Sedimentary architecture of turbidite channel–levee deposits: the Tachrift Project (Tachrift System, Taza–Guercif Basin, Late Tortonian, NE Morocco)

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For over 50 years, turbidite channel–levée complexes have been studied in various modern and ancient deep-water turbidite systems. Despite recent advancements in high-resolution 3D seismic imaging, their internal facies complexity remains elusive. Well-exposed outcrops are crucial in bridging this gap, as they offer insight into fine-scale facies heterogeneity. This contribution reports on the ongoing 'Tachrift Project', which aims to study unexplored spectacular outcrops of multiple superimposed channel–levée complexes in the Tachrift turbidite system of the Taza–Guercif Basin in NE Morocco (late Tortonian). The Tachrift Project has three main goals: (i) to study and understand the depositional architecture of deep-water channel–levée complexes, encompassing a range of channel-fill and levée elements; (ii) to provide a comprehensive overview of the evolution of channel–levée complexes, tracing their development from inception to their deactivation, and (iii) to establish a model for stratigraphic geometries and facies relationships in levéed-channel complexes. These aims are achieved through the following steps: i) 1:5000-scale geological mapping of 9 channel–levée turbidite complexes; ii) reconstruction of internal architecture and facies distribution by means of closely spaced detailed sedimentological logs, bed-by-bed physical correlation and interpreted 2D and 3D profiles; iii) statistical analysis to identify patterns and relationships; iv) creating 3D digital outcrop models of selected outcrops through photogrammetric data analysis obtained from UAVs. So far, the study has focused on complexes 4–7, aiming at completing the whole system by 2025. The preliminary results provided valuable information regarding the facies and geometry of channel-fills and correlative levees over a significant area of roughly 150 metres in thickness and 4 km in width. This transect runs largely oblique to the palaeoflow direction and gives a comprehensive understanding of the sedimentary heterogeneity and stratigraphic evolution of the turbidite channel belt. The findings from this research can be used to enhance existing models, also useful for the understanding of subsurface analogues, particularly about their variable architectures at different hierarchical scales.