Architectural Characterization of Turbidite Frontal Splays of the Miocene of Adana Basin, Southern Turkey

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ABSTRACT

Few studies have evaluated the formation, evolution and dimensions of the furthest regions of turbidite systems such as the distal lobes. Techniques used for this purpose include seismic image analysis, physical and numerical modelling, but detailed observation of the building blocks of lobes is more effective in direct outcrop studies. This work is based on exposure of two submarine fans forming part of a complete turbidite system, from the canyon cutting the shelf to distal parts on the basin floor. It focuses on the Cingöz Formation, on the northern margin of the Adana Basin (Lower/Middle Miocene), one of several foreland basins in southern Turkey, marking the closing of Neotethys Ocean. This formation is interpreted as two coeval submarine fans with distinct feeder systems, which combine in their distal portions to form a single large system of about 40 km in length. Here, we report on the eastern part of the Eastern Fan, in outcrops occurring along a N-S highway, cutting the system from the slope onlap zone to the distal fringe. Through log analysis, photomosaic and palaeocurrent measurements, the main characteristics observed were amalgamated thick sandstone packages up to 5 m in thickness; various stacking patterns could be observed. Many observations of the horizontal extent of the sandstone beds were made, and analysis in the onlap regions to better understand the potential reservoir geometry. These sandstone packages are separated by units of thin-bedded turbidites (TBTs). Some of the TBT outcrops are of excellent quality and vertical continuity. In one of these it was possible to take palaeocurrent measurements in several beds, showing that the flow direction remained to the E along 12 m (TBT thickness). These TBT units also have abundant in hybrid beds with range of styles, thickness and spatial and temporal distribution. There is a low abundance of mass transport deposits. There are rare thick beds of mud (50 cm thickness), whereas the more usual thickness maximum of mud layers is less than 5 cm. The deposit pattern is interpreted as a middle fan with the TBTs forming interlobe units. The system is inferred to have been very active, with frequent turbidity currents, but a low frequency of debris flows. These data help to characterise spatial changes in the architecture of turbidite lobes, including those system elements that can form stratigraphic traps, thus enabling a better understanding of the primary characteristics in a reservoir.