

3D Characterization of the sedimentary heterogeneity in the Castissent Formation (Late Ypresian, Tremp-Graus Basin)



Josep Maria Puig López



Patricia Cabello López (University of Barcelona)

Pau Arbués Cazo (University of Barcelona)

John Howell (University of Aberdeen)

ABSTRACT

The fluvial deposits of the Castissent Formation (Late Ypresian) forms part of the Eocene infill of the Tremp-Graus piggy-back basin, located on top of the Montsec thrust sheet. The vertical succession of the Castissent Fm. has been subdivided into three complexes (A, B and C). This project focusses on the proximal deposits of the fluvial sandstone complex A in the Mas de Faro outcrop, located 5 km east from the Pont de Montanyana village (Huesca, Aragón). This outcrop exposes three amalgamated sheet sandstone channel fills along a succession 15 to 24 m thick that records the evolution of the fluvial system from braided to meandering styles. The aim of this project is to characterize the different types of sedimentary heterogeneities of the fluvial succession and to integrate this data in a set of 3D geocellular facies and petrophysical model. The methodology mainly consisted of: a) facies analysis and stratigraphic subdivision of the succession from 9 stratigraphic logs at 1:50 scale and up to 500 paleocurrents measurements; b) correlation of 12 different sedimentary bodies by using a 3D drone-based virtual outcrop; and c) 3D reconstruction and deterministic modelling of the Castissent Fm. that captures three hierarchical scales of heterogeneity : the stratigraphic subdivision in the three main sheet sandstones, the facies and grain size distribution. The results show a heterogeneous succession of three laterally continuous channel fills (A1,A2 and A3), evolving from a cyclic alternation of bars and dunes corresponding to braided deposits to point bar meandering deposits. 10 different facies were identified in the complex A, which is dominated by sandy linguoid bars (31.72%), dunes (27.14%) and gravel bars (17.95%). It also shows contrast between coarse grained intervals and a mud dominated zone, corresponding to a mudclast channel lag that breaks the vertical connectivity and compartmentalizes the succession.

Keywords: 3D modelling; channel fill; compartmentalization; facies; fluvial complex; sedimentary heterogeneity; sheet sandstone.