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Supercritical-flow bedforms and their distribution in a proximal (Ainsa Basin) to a distal (Jaca Basin) environments, Middle Eocene, Spanish Pyrenees.

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Many sandy submarine fans should contain an abundance of evidence for deposition and/or erosion beneath supercritical-flow, because it has been postulated that turbidity currents are supercritical for a slope >0.6[U+F0B0], with the formation of an hydraulic jump at the break-of-slope, e.g., the transition from submarine canyon to basin floor (Walker, 1967; Komar, 1971). Until now, researchers have focused on the recognition criteria of supercritical-flow deposits (SFDs) and on the different flow parameters to create supercritical bedforms using numerical modelling (Kostic & Parker, 2006), flume-tank experiments (Garcia & Parker, 1989; Cartigny et al., 2011, 2014) or from direct observations on the seafloor on presently active deep-marine slope systems (Hughes Clarkes et al., 2012).
An extensive field study was conducted in the Middle Eocene, Ainsa and Jaca basins, Spanish Pyrenees, preserving proximal canyon-channel and related deposits and distal lobe and related deposits, respectively. This study analysed the recognition criteria of SFDs and their distribution in ancient deep-water systems.
SFDs are classified in two groups of facies associations: erosional supercritical bedforms (hydraulic jump and cyclic steps deposits) and depositional supercritical bedforms (antidune and upper-plane beds). The SFD distribution was analysed in two directions: (i) an axial direction, from a channel axis to the channel margin, and (ii) in a longitudinal direction, from the proximal depositional environments (Ainsa Basin) to the distal depositional environments where lobes and related deposits are observed (Jaca Basin); and shows systematic spatial changes in the proportion of the various SFDs. The results of this study will help in the understanding of the flow dynamics during deposition within an ancient deep-water system.

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