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Long-Distance High-Resolution Correlation Approach in Sheet Systems of the Hecho Group Eocene Turbidites (South-Pyrenean Foreland Basin)

Knowing how facies form and grade into one another (genetic approach) is a powerful tool to significantly improve predictive skills, which is directly applicable to risk reduction. Advancement of this understanding through modelling of outstanding outcrops encounters severe restrictions for turbidites because of the long distance in which some facies changes occur. The degree of confidence that a long-distance correlation has, linking time-equivalent beds or groups of beds between distant sections, becomes crucial to define reliable facies tracts. This work presents the results of a useful high-resolution correlation approach generated and tested in two examples of sheet systems that belong to the Gerbe-Cotefablo and Banastón turbidite systems. This correlation approach provides the real facies tracts of beds (in the sense of Campbell), revealing a physical continuum between sheetlike lobes and basin plain. It is based on a hierarchical decomposition of the vertical sections, defining progressively smaller time-equivalent packages of beds following three correlation orders. First-order correlation is based on physical (unequivocal) mapping of major megaturbidites, the MT-4 (Garde-Cotefablo) and MT-5 (Roncal-Fiscal) megaturbidites for Gerbe-Cotefablo and Banastón, respectively. Second-order correlation consists in matching a series of marker beds within first-order units, leading to the definition of operative units up to several meters thick. Finally, third-order correlation relies on matching serial features within second-order packages, like number, vertical arrangement, and facies features of beds, testing in a continuous re-examination of the coherence of the bed-by-bed facies evolution. As a result, the most detailed chronostratigraphic framework is obtained allowing the facies tracts definition.