QUANTITATIVE INVESTIGATION OF THE RELATIVE ROLES OF CLIMATE, TECTONICS AND EUSTASY IN CONTROLLING THE SEDIMENTARY ARCHITECTURE OF FLUVIAL SYSTEMS: TREMP – GRAUS BASIN (SPAIN)

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Abstract

The preserved sedimentary record of a fluvial system is governed by the interaction of three main allogenic factors: tectonics, climate and eustasy. These factors are interdependent, and their effects in many cases can be superimposed; therefore, discriminating their relative roles is not straightforward. In recent deposits, the implementation of different radiometric, isotopic and paleontological tools to constrain climatic, sea-level and tectonic changes often facilitates the evaluation of the influence of allogenic factors. However in ancient deposits, where the accessible information can be limited, this task is more complex. The approach here proposed involves sedimentological description and interpretation by means of quantitative analysis of genetic units (depositional elements, architectural elements and facies units) from synorogenic fluvial deposits of the Tremp Group (Maastrichitian – lower Eocene, Southern Pyrenees, Spain). This well-exposed unit was accumulated in a foreland basin setting and variations in allogenic controls during its deposition can be anticipated thanks to the availability of geological constraints about geochronological frame, paleoclimatic conditions and uplift timing. The performed quantitative analysis will permit the comparison of the studied unit with other fluvial successions by means of the FAKTS database (developed by the Fluvial Research Group at the University of Leeds), to identify recurrent patterns of strata configuration in relation to variable tectonic, climatic and eustatic factors. This holistic and quantitative approach to the characterization of the sedimentary record of a fluvial system constitutes a suitable tool to predict architectural geometry in areas where data is more limited, including subsurface reservoir successions.

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