



## **The Sabiñánigo Sandstone Succession of the Jaca Basin, Southern Pyrenees, NE-Spain, a depositional model**

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The Eocene Sabiñánigo Sandstone Succession (SSt-Succession) forms part of the sedimentary infill of the Jaca Basin, which evolved as a piggyback basin in front of the emerging Pyrenean orogeny. The SSt-Succession is exposed within two distinct ridges, showing excellent outcrop conditions, with lateral and vertical stratigraphic surfaces, that can be traced physically and optically over large distances. As the successions are lacking any marker horizon between both ridges that enables to easily link-up both exposure sites, the sediments of the SSt-Succession have been processed in detail to construct a time-calibrated framework. This in turn allows connecting both exposure sites and developing a depositional model of the entire SSt-Succession.

Different techniques were applied within this study to characterize the sedimentary succession of the Sabiñánigo Sandstones. It considers gamma ray logs together with standard lithological profiles. In addition, to constrain the previous sedimentary overburden, covering the SSt-Succession, low-temperature thermochronology has been applied. Spectral gamma ray analyses were used to refine standard facies analysis and to support sequence stratigraphic correlation within the SSt-Succession. Detailed facies analyses and gamma ray spectrometry studies were combined, revealing a pattern of returning facies types, large-scale facies associations and related vertical stacking patterns. On the basis of the generated data set a scheme of facies types and corresponding facies associations was established, comprising various lithologies, ranging from argillaceous siltstones rich in *Nummulites* up to coarse-grained sandstones and

conglomerates. This allowed to deduce the depositional setting of the SSt-Succession, reaching from transitional offshore to delta plain environments, and enabled to characterize the sedimentary evolution of the Sabiñánigo Delta system, and thus, to elucidate driving mechanisms controlling the depositional processes.

Two progradational sequences can be deduced reflecting an under- and an overfilled basin stages, influenced by changing exhumation conditions in the hinterland. During the first (underfilled) basin stage the moving piggyback basin was partly filled from direction of the emerging Boltaña Anticline in the east. During the second (overfilled) basin stage, however, direction of progradation changed and occurred from N to S, with the source area situated in the central part (Axial Zone) of the Pyrenees.