

Tectonic Versus Eustatic Control in Two Cenozoic Foreland Basins—Southern Pyrenees (Spain) and Molasse Basin (Germany)

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During the Paleocene and Eocene, the depositional history during of the Tremp-Graus Basin (central southern Pyrenees) reflects the interplay of between local thrust movements and regional changes in relative sea level which controls the development of carbonate and siliciclastic systems. The analysis of the depositional sequences is based on a combination of facies geology, paleoecology and biostratigraphy. The rapid evolution of the larger foraminifera during the Paleogene allows a good biostratigraphic resolution with an average duration of zones of less than 2 million years. However, biostratigraphic boundaries tend to coincide with inherently diachronous transgressive or condensed sections, although this diachrony is generally below biostratigraphic resolution. Biostratigraphic correlations provide a rather loose framework and do not allow to identify unambiguously “global” eustatic cycles.

A study of the German part the late Eocene to middle Miocene Molasse Basin based mainly on well and seismic data has allowed to recognize at least five major sequences which in part can be subdivided into several more localised sequences of lower order. Flexural subsidence caused by thrust loading creates the accommodation space and causes the depositional axis to shift in a N-S direction, whereas sea-level changes displace the shoreline in a W-E direction.

A comparison of an accommodation curve of the SE part of the Molasse Basin shows some similarity with the eustatic sea-level curve of Haque et al. (1987), but the stratigraphic resolution and the rather lose age-attributions available for the Molasse Basin prevent a reliable correlation.

In my opinion, it is probably an illusion to try to correlate single relative changes in sea-level with the postulated global eustatic cycles. We must be aware of the danger of circular-reasoning. Correlations, particularly those based on biostratigraphy, should not be overstretched.