ABSTRACT

The Middle Eocene Climatic Optimum (MECO) is a gradual warming event that occurred between 40,5 to 40 Ma. The longer duration (*ca.* 500 Kyr), the gradual warming trend, and the highly variable carbon isotopic signature from site to site, make it differs fundamentally from the early Paleogene hyperthermals. For that reason, the MECO is a controversial event and it is dubbed as the Middle Eocene "carbon cycle conundrum".

In the present study we performed a multidisciplinary approach, using detailed high-resolution stratigraphic logs and a large set of analytical techniques (stable isotopes, Rock-Eval, XRD, XRF, SEM) to characterize the MECO in the South Pyrenean foreland basin (SPB). The SPB corresponds to a worldwide example for source-to-sink system research, and here we try to assess how the MECO affected the basin from fluvial (Ainsa basin) to shallow-marine environments (Jaca basin).

For the first time, this study reports the isotopic signal of the MECO in this region, corresponding to the main warming peak at around 40 Ma. A major progradation in the entire routing system occurs synchronically to the MECO interval. This major event also record two smaller progradation-retrogradation (P-R) cycles that are correlated across the Jaca basin.

The proposed hypothesis suggests that a gradual and prolonged warming due to the MECO boosted the hydrological cycle, and in consequence increased the sediment flux towards the basin. After the MECO, a rapid increase in accommodation space could be explained by a significant decrease in sediment supply due to the post-MECO cooling.

All the new results from the present study could be applied to understand better the yet poorly known MECO, and bring new insights about the implications of its effects in the Earth's climatic system.

Key words: MECO, Pyrenees, Jaca, Ainsa, stable isotopes, chemostratigraphy