



Mammal Dispersion linked to The Paleocene Eocene Thermal Maximum (PETM): New Insights from India.

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The Paleocene Eocene Thermal Maximum (PETM, 55.5Ma) is globally related with the extinction of deep benthic foraminifera, the diversification of both planktic foraminifera and mammals. In India, the tempo and timing of mammals dispersion, their association with the PETM or EECO (Early Eocene Climatic Optimum) and the India- Asia collision remain uncertain (Smith et al., 2006 Clementz, 2010). Three sections located in north and northwest India have been studied using sedimentology, micropaleontology, mineralogy (bulk and clay mineralogy) and geochemistry (stable isotopes, major and trace elements, organic matter). Both PETM and ETM2 (second Eocene Thermal Maximum, 53.7Ma), a short-lived warming episode that followed the PETM, are globally marked by a pronounced $\delta^{13}\text{C}_{\text{carb}}$ and org negative peak. Both isotopic excursions have been recognized in the Vastan and Tarkeswhar lignite mines (Cambay basin, Gujarat), above the main mammals bearing level. The lower shift is located above the first lignite seam (=lignite 2 of Sahni et al, 2004, 2009) and corresponds to the transition from continental to shallow marine conditions marked by benthic foraminifera and bivalves. The upper excursion appears to be linked to the ETM2 and corresponds to a second marine incursion containing bivalves, benthic (*Nummulites burdigalensis*) and planktic foraminifera located below the second lignite seam (lignite 1 of Sahni et al, 2004, 2009). A single but very pronounced $\delta^{13}\text{C}_{\text{org}}$ peak has been detected in the Giral Lignite mine (Barmer, Rajasthan), around 6m above the vertebrates bearing level and may correspond to the PETM. This correlation is confirmed by palynological data (Tripathi et al., 2009, Sahni et al., 2004, 2009) and more particularly by an acme in the dinoflagellate *Apectodinium* that globally characterizes the PETM interval (Sluijs et al. 2007). Our micropaleontological data combined with stable carbon isotopes indicate the presence of both PETM and ETM2 events and constrain the age of the early mammals in northwestern India in between these two thermal events (early Eocene). These new data will improve significantly the ongoing debate on « in-to or out-of-India » palaeobiogeographic hypotheses.