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# Integrated stratigraphy and astronomical tuning of Smirra cores, lower Eocene, Umbria-Marche basin, Italy.

Vittoria Lauretano (1), Antonio Turtù (1,2), Frits Hilgen (1), Simone Galeotti (3), Rita Catanzariti (4), Gert Jan Reichart (1,5), and Lucas J. Lourens (1)

(1) Utrecht University, Earth Sciences, Utrecht, Netherlands (v.lauretano@uu.nl), (2) Alpine Laboratory of Paleomagnetism (ALP), Peveragno (CN), Italy, (3) Dipartimento di Scienze della Terra, della Vita e dell'Ambiente, University of Urbino, Urbino, Italy, (4) Istituto di Geoscienze e Georisorse-CNR, Pisa, Italy , (5) Marine Geology Department, Royal Netherlands Institute for Sea Research, NIOZ, Texel, The Netherlands.

The early Eocene represents an ideal case study to analyse the impact of increase global warming on the ocean-atmosphere system. During this time interval, the Earth's surface experienced a long-term warming trend that culminated in a period of sustained high temperatures called the Early Eocene Climatic Optimum (EECO). These perturbations of the ocean-atmosphere system involved the global carbon cycle and global temperatures and have been linked to orbital forcing. Unravelling this complex climatic system strictly depends on the availability of high-quality suitable geological records and accurate age models. However, discrepancies between the astrochronological and radioisotopic dating techniques complicate the development of a robust time scale for the early Eocene (49-54 Ma). Here we present the first magneto-, bio-, chemo- and cyclostratigraphic results of the drilling of the land-based Smirra section, in the Umbria Marche Basin. The sediments recovered at Smirra provide a remarkably well-preserved and undisturbed succession of the early Palaeogene pelagic stratigraphy. Bulk stable carbon isotope and X-Ray Fluorescence (XRF) scanning records are employed in the construction of an astronomically tuned age model for the time interval between ∼49 and ∼54 Ma based on the tuning to long-eccentricity. These results are then compared to the astronomical tuning of the benthic carbon isotope record of ODP Site 1263 to evaluate the different age model options and improve the time scale of the early Eocene by assessing the precise number of eccentricity-related cycles comprised in this critical interval.