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Orbitally paced cycles from the lowermost Danian Elles section (Tunisia): implications for high-resolution chronostratigraphy across the Cretaceous/Tertiary boundary

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The Cretaceous/Tertiary Boundary (KTB) event - now widely appreciated to coincide with the impact of an extra-terrestrial body - is one of the most discussed subjects in the field of Earth Sciences. Incertitude in several factors makes it very difficult an effective understanding of the impact's global environmental effects. Among these, the absence of a firm high-resolution ($10^{2-}10^{3}$ yr) chronostratigraphy across the KTB does not allow to precisely evaluate the timing of the changes observed in the geochemical and biotic records. As an example, the duration of planktic foraminiferal Zone P0 has been estimated by various authors to range from 3 kyr to 100 kyr. Nonetheless, constraining the duration of the various events observed in the geochemical and biotic records is crucial for discriminating between various KTB scenarios and

would shed light on our knowledge of the post-impact climate-system disruption and on subsequent feedback mechanisms. To develop a high-resolution chronology across the KTB two short cores have been obtained from the expanded El Kef and Elles sections (Tunisia), respectively. The cores have been obtained by using a metal box hammered on a deeply dug trench. Ten 50-cm-long sections have been obtained from the Elles section to form a composite lowermost Danian core of 411 cm when depth is corrected by dip within individual sections. According to available biostratigraphic data, the cored interval covers thus the lower third of calcareous nannofossil Zone NP1, the entire planktic foraminiferal P0 Zone and the entire planktic foraminiferal P1a Subzone. Analyses of a quantitative, grain-size based, estimate of total foraminiferal abundance (i.e. the percentage of washing residue fraction in the size range of both planktic and benthic foraminifera) reveals a neat cyclic pattern across the studied interval. In particular, both Multi Taper Method spectral analysis and Singular Spectrum Analysis treatment allow to identify two periodicities of 250 cm and 55 cm. Also taken into account the amplitude of eccentricity cycles already identified in the Maastrichtian interval of the same section, the identified periodicities are interpreted to be orbitally controlled reflecting the eccentricity and precession cycles. This allows to calculate the duration of the 28-cm thick planktic foraminiferal Zone P0 at about 10 kyr. Detailed micropaleontological and geochemical analysis currently carried out on the Elles core will allow to place the environmental changes inferred from these records in the newly obtained chronology.