Testing cyclostratigraphy in the non-marine Lower Cretaceous by reinvestigating parts of the English Wealden (UK)

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To date, relatively few studies on changing palaeoenvironments and climate cycles in non-marine (terrestrial) archives of the Cretaceous greenhouse Earth do exist, being primarily a result of the nature of these deposits—strong lateral facies change on local scales and the strong local to regional control of deposition—let alone the lack of high-resolution stratigraphy and correlations to the marine record. On the other hand, major advances in the refinements of the Cretaceous timescale now facilitate the correlation and dating of significant (20–110 m) short-term eustatic sea-level fluctuations and their supposable relation to climate and/or tectonic events with appropriate resolution: on long-term Milankovitch scales (4th-order, mainly 405 ka, and 3rd-order, mainly 1–2.4 Ma ranges), thus implying globally synchronous forcing (e.g. WENDLER et al., 2014, 2016; SAMES et al., 2016). Provided chronological linking, cyclic climate fluctuations play an important role for Cretaceous high-resolution marine chronostratigraphy with considerable potential for marine to non-marine correlations. Despite the progress in non-marine bio-, magneto- and chemostratigraphy and growing data on Cretaceous non-marine successions, convincing evidence for orbitally (climate) driven cyclicity in non-marine Lower Cretaceous deposits is thus far sparse.

The non-marine Wealden deposits (Weald Clay Group) of England are a ‘classical’ example for a Lower Cretaceous non-marine succession for which depositional cycles have been suggested since the 1970s, including the famous ostracod ‘faunicycles’ by F.W. Anderson, but so far lack convincing analyses. The project ‘Lower Cretaceous Climate and Non-marine Stratigraphy (LCCNS)’ funded by the Austrian Science Fund (FWF) analyses an interval of the English Wealden at Clock House Brickworks pit (near Capel, Surrey, England) for orbitally/climate driven cyclicities on long- (405 Ma) and short term Milankovitch scales with an interdisciplinary methodology: micropalaeontology, sedimentology, and geochemistry. Ostracod faunal composition changes are correlated with the variation of geochemical and sedimentological parameters through time to decipher the controlling (palaeoenvironmental) factors and their regulating mechanisms (‘climate changes’, orbital cycles?), while magnetostratigraphy is used for chronological control. First results will be presented and discussed. Crucial point of the approach is that the fluctuating evolution of a Wealden ecosystem over time is presumed to be climatically (thus, orbitally) controlled and that cyclic changes deducible from multiple proxies in its geologic record can be tested and used for cyclostratigraphy.

SAMES, B. et al., 2016. Palaeogeogr. Palaeoclimatol. Palaeoecol., **441**, 393–411.
WENDLER, J.E. et al., 2014. Newsl. Stratigr. **47**/1, 1–19.
WENDLER, J.E. et al., 2016. Palaeogeogr. Palaeoclimatol. Palaeoecol., **441**, 430–437.