Orbital forcing of climate in the Mississippi Embayment during the Campanian

***O'Connor, L.K.*[1,*], Robinson, S.A.[1], Batenburg, S.J.[1], Jenkyns, H.C.[1], Naafs, B.D.A.[2], Pancost, R.D.[2]**

*1) Department of Earth Sciences, University of Oxford, Oxford, UK, *E-mail: lauren.oconnor@univ.ox.ac.uk*
2) Organic Geochemistry Unit, School of Chemistry and Cabot Institute, University of Bristol, Bristol, UK

Over periods of tens to hundreds of thousands of years, Earth's climate is controlled by small quasi-periodic variations in energy received from the Sun. However, for past periods of greenhouse climate, such as the Cretaceous, the mechanisms by which changes in solar insolation are amplified by the Earth's system remain poorly understood. Many records from the Cretaceous greenhouse world indicate roles for both variabilities in low-latitude seasonal climates and carbon cycling that may have driven changes in global climates. In addition to their palaeoclimatic significance, records of Cretaceous cyclicity may also be useful for the construction of orbitally tuned timescales.

Here we present geochemical records from the Shuqualak-Evans borehole, Mississippi (USA), which provides a Campanian record of hemipelagic shelf sedimentation in the Mississippi Embayment. The Mississippi Embayment was strategically located to record both the influence of the Western Interior Seaway, through which the embayment is connected to the high latitudes, as well as the influence of the Tethys Ocean and local run-off from North America, both affected by low-latitude climatic processes.

High resolution geochemical data show strong periodic variability, which spectral analysis suggests is consistent with orbital frequencies. These data indicate a palaeoclimatic response to a hierarchy of cycles, including a prominent obliquity component. Although the Campanian is generally considered a period of climatic quiescence, our records demonstrate that the palaeoenvironmental conditions off the south coast of North American varied considerably in response to local, regional, and potentially global climatic processes. The interplay of high- and low-latitude signals sheds light on climate dynamics in the Late Cretaceous greenhouse world.