



The Boltysch crater record of rapid vegetation change during the Dan-C2 hyperthermal event.

D.W. Jolley (1), R Daly (1), I Gilmour (2), M Gilmour (2), and S.P. Kelley (2)

(1) University of Aberdeen, Geology & Petroleum Geology, Aberdeen, United Kingdom (d.jolley@abdn.ac.uk), (2) Department of Physical Sciences, Open University, Milton Keynes MK7 6AA UK.

Analysis of a cored borehole drilled through the sedimentary fill of the 24km wide Boltysch meteorite crater, Ukraine has yielded a unique, high resolution record spanning <1my of Early Paleocene terrestrial environmental change. While the oldest crater fill sediments preserve a record of the K/Pg boundary, overlying sediments preserve a record through the earliest Danian Dan-C2 hyperthermal event. This event is preserved in ~220m of lacustrine organic mudrocks and shows close similarities to the carbon isotope records of the Toarcian and PETM CIE's. At Boltysch, the rapid sedimentation rate and lack of bioturbation in the crater fill lacustrine deposits preserve uniquely high resolution pollen, spore and algae records. These records reflect environmental change from the K/Pg1 to the post Dan-C2 Danian. Leading into the CIE, warm temperate gymnosperm – angiosperm – fern communities are replaced by precipitation limited (winterwet) plant communities within the negative CIE. Winterwet plant communities dominate the negative CIE, but are replaced within the isotope recovery stage by warm temperate floras. These in turn give way to cooler temperate floras in the post positive CIE section of the uppermost crater fill.

The distribution of temperate taxa about the negative CIE represents the broadest scale of oscillatory variation in the palynofloras. Shorter frequency oscillations are evident from diversity and botanical group distributions reflecting changes in moisture availability over several thousand years. Detailed analysis of variability within one of these oscillations records plant community cyclicity across the inception of the negative CIE. This short term cyclicity provides evidence that the replacement of warm temperate by winterwet floras occurred in a stepwise manner at the negative CIE suggesting cumulative atmospheric forcing. At <1mm scale, lamination within the negative CIE showed no obvious lithological or colour differences, and are not seasonal couplets. However, palynofloral analysis of laminations from within the negative CIE has yielded evidence of annual variation identifying the potential for recoding changes in 'paleoweather' across a major hyperthermal event.

[1] Jolley, D. W. et al. (2010) *Geology* 38, 835–838.