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A complete high resolution record of the Dan-C2 hyperthermal event in the lacustrine sediments of the Boltysch Impact crater

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

(1) Centre for Earth, Planetary, Space and Astronomical Research, The Open University, Milton Keynes MK7 6AA, UK, (2) Department of Geology & Petroleum Geology, University of Aberdeen, Meston Building, Aberdeen, AB24 3UE, UK

Drilling of the 65.17 Ma old, 24 km diameter, Boltysch impact crater in the Ukraine recovered over 400 m of Danian organic-rich lacustrine sediments [1]. We have undertaken geochemical and palynological investigations of the newly cored borehole, which demonstrate that these strata contain a unique high resolution record spanning <0.5 Ma of Early Palaeocene terrestrial environmental change. The palynofloras recovered are consistent with terrestrial early Danian successions and geochemical data have highlighted a record that extends through 220m of cored sediments encompassing the earliest Danian Dan-C2 hyperthermal event first identified by [2]. To date, the Dan-C2 hyperthermal event has been identified in marine records, where it is characterised by a pair of negative carbon isotope excursions (CIEs) of around 1.5‰ within planktonic foraminiferal zone P1a, post-dating the K/Pg boundary. Geochemical and palynological investigations have enabled us to identify the Dan-C2 event in the lacustrine Boltysch crater fill where it is characterised by a 3-4‰ negative CIE.

In common with other hyperthermal events, it has been suggested that the Dan-C2 reflects transient perturbations in the global carbon cycle, however, whether the Dan-C2 is a global event has been disputed. The event has been confirmed in the S. Atlantic but was not found in the equatorial Pacific leading to the suggestion that it was restricted to the Atlantic Ocean [3]. Its presence in the lacustrine sediments of the Boltysch crater fill disproves this contention. The Dan-C2 CIE has also been regarded as being of shorter duration and lower magnitude than the PETM hyperthermal [2]. This view is brought into question by the Boltysch carbon isotope record, which highlights the close comparability of Toarcian, Dan-C2 and PETM excursions. We have also established the position of the Dan-C2 with respect to the K/Pg boundary [1] since its close proximity this boundary, also marked by a negative CIE, makes it probable that the event has been misidentified or even amalgamated with the K/Pg in many sequences.

[1] Jolley, D. W. et al. (2010) *Geology* 38, 835–838. [2] Quillevere, F. et al. (2008) *Earth Planet. Sci. Lett.* 265, 600–615. [3] Westerhold, T. et al. (2011) *Paleoceanog.* 26, PA2216.