

Interactive comment on “Equatorward phytoplankton migration during a cold spell within the Late Cretaceous supergreenhouse” by Niels A.G.M. van Helmond et al.

Anonymous Referee #3

Received and published: 15 March 2016

This study establishes a link between the first consistent occurrence of dinoflagellate cysts grouped in the *Cyclonephelium compactum-membraniphorum* (Ccm) morphological plexus with the Plenus cold event during OAE 2. Whereas most data were literature derived one additional section was added which represents a locality in northern Alberta. This locality is presented as a High Latitude northern hemisphere site. Data for this locality are shown in Figure 3, which is not very informative. The segment of the featured carbon Isotope curve can be anywhere within the Cretaceous history. No correlations to biostratigraphic zones that are mentioned in the text are indicated. No lithostratigraphy is mentioned either. Since this is the only new data point, more information would be desirable. The Ccm occurs throughout and shows an increase

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within the OAE 2, but not only during the interval that was designated as the Plenus Event. Two other peaks occur above which would indicate that the increased productivity signal prevalent throughout this interval and the possibly increased preservation potential of organic matter during this interval could also be regarded as causes for these occurrences. This illustration is then repeated in Figure 6, which is unreadable in the small format as presented. In Figure 6 five localities are compared, all in the northern hemisphere of which Pratts Landing from Alberta is the only locality that shows the Ccm throughout the Cenomanian. Other localities show the first occurrence within the Plenus Event, but several sections show increased abundances during the warmer interval of the OAE 2 further up section. These occurrences do not confirm the interpretation presented here namely that this species group is a marker for a cold spell. This species group appears to range throughout the Cenomanian to Turonian. The Plenus Cold Event is near the base of the OAE 2 interval, where a number of global paleoenvironmental changes take place. The distribution of this fossil as shown here does not convince me that it is indeed the cold spell that is the main control. Additional comments are: Page 1, Line 41: Jenkyns et al. is the wrong reference, their work addressed Arctic sections of Campanian age, not late Cenomanian. Figure 1: Occurrences of Boreal fauna: *Hamulus* sp., sp should not be italicized. Why does the carbon curve leave some dots out? Page 3, Line 11: Figure 3 is cited to show carbon isotope stratigraphy and inoceramid biostratigraphy. Biostratigraphic and lithostratigraphic information should be added. Figure 3: See comments above. In addition, what is the wavy line, normally indicating a disconformity. Is that the case here? Its meaning should be added to the legend. Page 4, Line 23: The genus of a species named for the first time, should be spelled out. Page 6, Line 22: zone should be plural.

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2015-659, 2016.

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