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Climate of the Past Discussions

Interactive comment on "Methane release from gas hydrate systems during the Paleocene-Eocene thermal maximum and other past hyperthermal events: setting appropriate parameters for discussion" *by* G. R. Dickens

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I'm particularly enamored of models such as Dickens' here that cast the PETM in the context of the long-term trend from Late Paleocene to early Eocene. The slow discharge of a Late Paleocene methane capacitor, punctuated by more rapid burps during the hyperthermals, is appealing, in that according to Dickens it explains not only the C isotope trend but the S isotope trend as well, something we were trying to do in Kurtz et al. (2002). We focused on the known, large terrestrial carbon (coal) deposits of this age, and the likelihood that what is preserved today is much smaller than

what was originally deposited. Deposition of coal in inland basins would not drive a S isotope shift. If instead it was the charging of the methane capacitor at this time that drove the d13C excursion, then either there's some connection between coal on land and methane in the sea (e.g., sequestering coal cools the planet and thus methane accumulates as hydrate) or the coal is a red herring.

A next step is to explain why the cycle of filling and discharge ended in the Eocene, and how this relates to the stepwise increase in d34S of the Cenozoic ocean (as discussed by Turchyn and Schrag, 2006). The stability of d34S and d13C during the Cenozoic is in stark contrast to its variability during much of earlier Phanerozoic history.

Interactive comment on Clim. Past Discuss., 7, 1139, 2011.