

March 13, 2010

Reviewer #2

The reviewer provided a concise review focusing on the relevance of the results from ODP site to understanding global climate patterns.

While we agree with the reviewer that it would be favorable to obtain a large set of reliable records representing the conditions during the PETM, this is unfortunately not the case and the majority of literature discussing and interpreting the climatic evolution during the PETM has focused on few open ocean sites, most notably ODP site 690 from the Southern Ocean.

Our re-evaluation of the PETM interval at ODP site 690, based on the data of Farley & Eltgroth (2003) implies that the carbon burial increased substantially after 70 ka. The reviewer argues that all that the data shows is that sedimentation rate changed (increased) further into the recovery phase. While this is true, the crux of the arguments in this manuscript are, that the Barium mass accumulation rates at ODP site 690 changed too, but only (at least) ~70 ka after the onset of the PETM. This is a major difference compared to the original interpretation of data from this site, which was and still is, considered to be one of the main lines of evidence supporting a productivity feedback mechanism as a trigger for the recovery from this event. The discussion concerning this hypothesis is ongoing with wide spread references in recent publications (e.g., Rohl et al., 2007). We make the point that at ODP site 690, the combined evidence does not in fact support the productivity feedback hypothesis, but rather, seems to support increased silicate weathering as the driving mechanism of recovery. Admittedly, this is indeed “only” one site, but one that is considered to be the type-section for the PETM, and that has been used to derive other “global” conclusions relating to this event (e.g., Robert and Kennett, 1992, 1994; Bains et al., 2000; Stoll and Bains, 2003; Thomas, 2003; Kelly et al., 2005; Rohl et al., 2007; Tremolada et al., 2008; and many, many others).

We agree with the reviewer on the relevance of Sluijs et al. (2007) to our discussion and have added this reference to the discussion and reference list.

In addition, we revised the manuscript at multiple points to point out and emphasize that the interpretations and conclusions in our paper are based on the re-evaluation of results from ODP site 690 in the Southern Ocean (e.g., in section 5 in the revised manuscript: “Re-evaluation of the sedimentary record using the original barium data and updated age models indicates that export production in the Southern Ocean was either constant throughout the event, or lagged the abrupt rise in CO₂ by at least ~70 ka”).