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Climate of the Past Discussions

Interactive comment on "A permafrost glacial hypothesis to explain atmospheric CO_2 and the ice ages during the Pleistocene" *by* R. Zech et al.

N. Zeng

zeng@atmos.umd.edu

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The permafrost sequence, dating back to >200ky provides good evidence in supporting the role of terrestrial carbon cycle in the long-standing glaical CO2 mystery. I applaud the authors excellent work, and here are a few comments, some of which are especially relevant to the comments from Reviewer 1.

1. I agree with the authors that a reinterpretation of the marine C13 record may be needed. The point that North Atlantic surface water C13 is a good one, but it's not sufficient by itself to disprove the traditional marine C13 interpretation as it is the global mean ocean C13 values that indicates the total land-ocean carbon transfer.

A different interpretation actually comes from the carbonate ion effect as proposed

by Spero et al (1997) in which no terrestrial carbon transfer is required to explain the marine C13 change.

2. A number of key points of your hypothesis have been actually demonstrated by the modeling work of Zeng (2003, 2007) in relation to the Glacial Burial Hypothesis (GBH), which covers not only permafrost region, but also glaciated area as well as continental shelves. Some of his modeling results are broadly consistent with your data/hypothesis. For example, (a) land carbon change in non-ice/non-shelf region is about 200 GtC, dominated by cold regions (b) He simulated a transient d13CO2 at deglaciation which offers even a more nuanced picture, but consistent with the hypothesized land carbon change. (c) He estimated a 100-200 permill anomaly in C14 due to the release of ancient land carbon.

Sincerely -Ning Zeng University of Maryland

Spero, H. J., J. Bijma, D. W. Lea, B. E. Bemis, 1997: Effect of seawater carbonate concentration on foraminiferal carbon and oxygen isotopes. Nature, 390 (6659), 497-500. Zeng, N., 2007: Quasi-100ky glacial-interglacial cycles triggered by subglacial burial carbon release. Climate of the Past, 135-153.

Interactive comment on Clim. Past Discuss., 6, 2199, 2010.