Interactive comment on “Patterns of millennial variability over the last 500 ka” by M. Siddall et al.

Anonymous Referee #1

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In this article, the authors investigate millennial scale variability using a 500 kyr temperature proxy record from Dome 3 and correlate it with a sea level record extracted from the Red Sea (proxy for ice volume).

The authors identify clusters of millennial scale variability that occurs mainly when ice volume is equivalent to 40-80 m of sea level and during terminations. This characteristic of the time distribution of millennial scale variability is new, and I find it interesting and worth publication. Although previous studies found millennial scale variability during periods of both large and small ice volumes, as far as I am aware, this is the first study that systematically investigates the connection between millennial scale variability and ice volume for such a long period.

The authors also confirm that there is no consistent link between Heinrich events and millennial scale variability. This suggests that iceberg discharge cannot be the
sole mechanism behind millennial scale variability, and they suggest that an additional source for the millennial scale variability might be changes in atmospheric circulation driven by precession.

Few comments/suggestions:

1. Method: I am not sure I understand why AAprobed is not minimal during the period of A2, even if the alignment is not perfect. How different will AAprobed be for different spacing between the windows? Why did you choose a window of 100 kyr, which is quite long compared with the total length of the record?

2. References list: Several are missing, such as Seager et al., 2002; Seager and Battisti, 2006, Li and Battisti, 2008 ...

3. Additional references you may want to include:

   a. Orbital modulation of millennial-scale climate variability in an earth system model of intermediate complexity, Friedrich et al., Clim. Past Discuss., 5, 2019-2051, 2009 (precession and millennial scale variability)


Minor comments:

p. 20, line 16: should be millennial and not decadal

p. 22, line 27: expand EDC (EPICA Dome C) (it is defined only in the next page)

p. 26, line 24: change ice-berg to iceberg

p. 31, line 6: Heinrich with Capital H

Interactive comment on Clim. Past Discuss., 6, 19, 2010.