

## ***Interactive comment on “Mid-Pliocene shifts in ocean overturning circulation and the onset of Quaternary-style climates” by M. Sarnthein et al.***

**M. Sarnthein et al.**

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On the basis of kind external suggestions on our paper we like to add a number of text corrections listed below. In particular, the corrections may help to specify the details of age control and to improve on the precision of citations we used for composing figures and text, thus may help to avoid potential misunderstandings.

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p. 254, line 6, after 2006, 2009, we propose to insert the references to  
Groeneveld et al., 2006, 2008; Schneider and Schmittner, 2006; Steph et al., 2006).

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p. 260, line 23-24: The statement

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(Bartoli et al., 2009). Using the (more likely) age model 2, IRD....

should be replaced by:

(unpubl. data of Sarnthein and Bartoli, 2009). Using age model 2 which appears slightly superior to model 1 of the Expedition 303 Scientists (2006), IRD....

.....  
p. 262, line 9: The reference

(Fig. 11; Bartoli et al., 2009

should be replaced by:

Expedition 303 Scientists, 2006.

.....  
p. 262, line 16: Bartoli et al., 2009 needs to be replaced by:

Bartoli et al., 2009, modified.

.....  
p. 266, lines 17-19: The present reference to Bartoli, G., et al., 2009 needs to be replaced by:

Bartoli, G., Weinelt, M., Anderson, N., and Garbe-Schönberg, D., Persistent cooling of the East Greenland Current after 3.0 Ma contributed to the onset of Northern Hemisphere Glaciation. EPSL, 22 ms-pp, submitted, 2009.

.....  
p. 267, after line 3: We need to insert the reference:

Expedition 303 Scientists, Site U1307. In: Channell, J.E.T., Kanamatsu, T., Sato, T., Stein, R., Alvarez Zarikian, C.A., Malone, M.J., and the Expedition 303/306

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Scientists. Proc. IODP, 303/306: College Station TX (Integrated Ocean Drilling Program Management International, Inc.). doi:10.2204/iodp.proc.303306.107.2006.

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p. 270, after line 1: We need to insert the reference:

Tiedemann, R., Sarnthein, M., and Shackleton, N.J., Astronomic timescale for the Pliocene Atlantic  $\delta^{18}\text{O}$  and dust flux records of ODP Site 659. *Paleoceanography* 9, 619-638, 2004.

.....

p. 280, caption of Fig. 10, lines 5-6 : Age scales tuned to LR04 (Lisiecki and Raymo, 2005), slightly modified by Tiedemann et al. (2007)

needs to be replaced by:

Age scales tuned to Tiedemann et al. (1994), slightly modified by Tiedemann et al. (2007), coming close to LR04 (Lisiecki and Raymo, 2005).

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p. 281, the caption of Fig. 11 needs to be replaced by:

Fig. 11. DSDP, ODP, IODP site locations and surface and deepwater currents in the Atlantic.

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p. 282, the caption of Fig. 12 needs to be replaced by:

Fig. 12. Closure of CAS (record inverted from Fig. 10) and IRD abundance at ODP Site 907 (Bartoli et al., 2005; age model of Jansen et al., 2000, modified by Lacasse et al., 2002) and IODP Site 1307 (Bartoli et al., 2009, modified; unpubl. age model 2 of Sarnthein and Bartoli, 2009, tuned to LR04), where the great IRD increase 3.15 - 3.0 Ma matches a major freshening of the EGC, shown in Fig. 13.

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p. 283, the caption of Fig. 13 needs to be replaced by:

Closing of CAS (record inverted from Fig. 10), IRD abundance at Site 907, warming of northern North Atlantic (Mg/Ca-based SST records from ODP Sites 609 and 984), and increased Atlantic MOC deduced from a drop in Mg/Ca-based bottom water temperatures (BWT) at ODP Site 609 and increased benthic  $\delta^{18}\text{O}$  values at ODP Sites 609 and 610 (Bartoli et al., 2005, modified; Kleiven et al., 2002). Age scales tuned to Tiedemann et al. (1994). Small letters and numbers (101 - M1) label marine isotope stages (MIS).

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p. 284, the caption of Fig. 14 should be replaced by:

Fig. 14. Major temperature and salinity drops in the EGC at IODP Site 307, 3.15–3.0 Ma (Bartoli et al., 2009, modified; unpubl. age model 2 of Sarnthein and Bartoli, tuned to LR04) versus the final closing history of CAS (record inverted from Fig. 10), and benthic  $\delta^{18}\text{O}$  stacked record LR04 (Lisiecki and Raymo, 2005). Small letters and numbers (104 8211; MG8) label marine isotope stages (MIS).

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Michael Sarnthein February 4, 2009

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Interactive comment on Clim. Past Discuss., 5, 251, 2009.

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