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Interactive comment on "Persistent millennial-scale link between Greenland climate and northern Pacific Oxygen Minimum Zone under interglacial conditions" *by* O. Cartapanis et al.

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In her comment, Dr. L. Pichevin agrees with our interpretation of a strong atmospheric coupling between Greenland climate and the Pacific OMZ related to productivity via changes in the upwelling strength. However, she raises some minor issues.

She suggests that our proxies (TOC and opal contents), expressed as concentration of the bulk sediment, could also partly reflect dilution by other sediment components. We agree that calculating mass accumulation rates would circumvent this uncertainty. However, the lack of precisely calibrated density measurements on MD08 core and the difficulty of dating beyond radiocarbon method prevent us from obtaining accurate

mass accumulation rates. We roughly estimated opal mass accumulation rate using gamma density obtained on board (Beaufort and Members of the scientific party, 2002) and a constant sedimentation (33cm/ka) rate from 59.1 to 117 ka (Table 1) to examine whether temporal variation of opal accumulation rate is different from that of opal concentration. The maximum range of wet bulk density is 1.1 to 1.8 g/cm3 for core MD02-2508 (Beaufort and Members of the scientific party, 2002), which is much smaller than the change of opal content from several % to nearly 50% during MIS5. Even if we consider that the density is the lowest (1.1 g/cm3) in high opal interval (50%) as compared to low opal interval of the MIS5 (1.8 g/cm3 in density and 10% for opal content), calculated mass accumulation rates are 6.3 g/cm2/ka for stadials and 19.25 g/cm2/ka for interstadials. Consequently, the opal concentration and opal accumulation rate have very similar variability during MIS5. If the decline of carbonates and terrigenous fractions induced a higher opal concentration in bulk sediment, the sedimentation rate of high opal periods would be lower than for periods of low opal content. Nevertheless, the sedimentation rate during MIS5 seems to be rather constant: Our age model assumes a constant sedimentation rate from 59.1 to 117 ka (Table 1). Despite this simplification, there is clear correspondence of timing between the opal record of core MD08 and NGRIP δ18O record (Figure 4). If the dilution effect was a dominant factor of opal content, the periods of high opal concentration should be systematically shorter than interstadials of NGRIP record. Such a trend is not found in the records. Moreover, the Si bio/TOC ratio (that is not affected by dilution, Figure 5), and the calculated opal carbonate free and opal terrigenous free contents, show very similar variability to calculated opal content. Thus, we think that opal content variations cannot be only related to dilution in our record but are mainly due to diatom productivity in surface waters and preferential preservation. This will be considered in the revised version.

In the figure 5, the referee suggests to change the legend of Si:Corg ratio “silicification”. We will change it into “transient iron limitation”.

Beaufort, L., and Members of the scientific party: MD126-IMAGES VIII Marges Ouest

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Nord Américaines MONA Cruise Report, Institut Paul Emile Victor, Plouzané , France., 2002.

Interactive comment on Clim. Past Discuss., 9, 3919, 2013.