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Climate of the Past Discussions

Interactive comment on "An Ocean – ice coupled response during the last glacial: zooming on the marine isotopic stage 3 south of the Faeroe Shetland Gateway" *by* J. Zumaque et al.

Anonymous Referee #2

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The authors present new multi-proxy MIS3 data from a high-sedimentation MD-core taken in 1999 south of the Faeroe-Shetland Gateway. In their ms, they focus on dinocyst assemblages for the time-interval 26 to 42 kyrs BP and add paleomagnetic, XRF-corescanner, planktonic foram (NPS) abundance and d18O, and IRD (lithic grains) data to document the sensitive response of this oceanic area to the abrupt MIS3 climate oscillations, particularly investigating the role of the Fennoscandian and British Ice Sheets dynamics on the local surface hydrology. The paper is generally well-written and structured with a suitable introduction to the topic citing all the relevant literature and with figures presented in a commendable way. However, I am missing an introduction to the regional paleoceanographic works on MIS3, which appears only

in the later part of the discussion. Some chronostratigraphic issues as well as some critical proxy-related aspects, however, weaken the discussion of these new data especially with respect to the already published paleoenvironmental reconstructions from this region.

The stratigraphy of the core is basically a tuned age model to the NGRIP-GICC05 chronology. Up to 36 kyrs the authors use radiocarbon ages from Boulay (2000) (Master-thesis), four additional radiocarbon ages from ARTEMIS (2010) (ref. is missing; two dates were rejected) that are calibrated after Bard (1998). The radiocarbon dates are not reported properly (Lab-ID, reservoir correction etc) and the calibration method after Bard (1998) might be outdated and new calibration curves are available. Second, the older part of the age model is based on the correlation of magnetic susceptibility to NGRIP (Figure 3). If it holds true what the authors develop in chapter 4 (lines 11-24) it would have been good to show at least one correlation with a second MS record from the region. It would also have been reasonable to show the magnetic paleointensity record, in order to substantiate the Mono-Lake and Laschamp excursions identified in the investigated core. This at least would justify the extended description of the paleomagnetic methods beside of determining the magnetic susceptibility. It is also obvious, that the MS to NGRIP relationship is not anymore straightforward in the interval >2200 cm core depth.

While some of the presented data sets are real “high-resolution” data (e.g., XRF, MS) the other data has a moderately good resolution (av. 200 years; in a sediment core with a definitively much higher potential) which not really justifies the “zooming in”-approach claimed at in the title of the manuscript and which introduces some ambiguity in the interpretation of the data as well. Especially the dinocyst-derived MAT data are exemplifying this, since some of the interpretation is based on 1-2 datapoints only. A more detailed study of a narrower time interval may have revealed some more interesting aspects. In chapter 6 the authors point out the good consistency between the different proxies used. This is true for most of them, but there are also some exceptions, which

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clearly require more attention. One is, e.g. the K/Ti ratio. This record is not as clearly tight to the DO-patterns as the authors claim. There might be some interesting detail hidden here and the authors should look more differentiated to the XRF records. It is also not clear why cold temperatures during interstadials as indicated by close to 100% NPS are associated by warm summer (and in fact +4° rel. to present) dino-temperatures? Present NPS% is at around 40%. Later in the discussion the authors mention water column stratification and fresh water advection in summer ("brackish water lens"). Do dinocyst MAT do not potentially provide (or are even biased by) also sea surface salinities to verify this assumption? In Figure 5 the authors present the results on core MD99-2881. The colored dinocyst-related records are shown together with the (dashed) coldest/warmest analogues. What to learn from this, except graphically scaling up the record? Not having all the paleorecords from the region at the same time in mind (which are frequently discussed and referenced in the later part of the discussion) I would urge the authors to compile a graph that compares some relevant records mentioned in the text.

Minor remarks. P3046, 14 "sediments by rich layers.." should be "sediments by layers rich.." P3048, 1-4. At the end (see discussion) I don't have the impression that the manuscript provides dinocyst data AND additions, but the data are equally important. P3051, l20. Which marker was used? P3051, 20-24. Could reworked dinos indicate specific sources and how to differentiate between quaternary reworked and not reworked dinocysts? P3053, 6. See comment above (P3048, 1-4) – this is not a good name for a chapter P3053/54, 8-27/1-12. This detailed description is not really required since the interpretation is basically referring to the magnetic susceptibility and not to the full paleomagnetic record P3053, 14-28. A complete description of this method provides also instrument setting during measurement etc. P3053, 27-28. Not shown and therefore not relevant for present paper. P3055, 1-6. It is not the scope of this paper to introduce planktonic foraminifera. First two sentences can be deleted. P3055, 10. How many specimens were counted? P3055, 20-26. How many grains were counted etc... P3055, 22-23. Rewrite sentence P3056, 2. Replace collapses

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with dynamics P3058, 10-25. This MAT sea-ice reconstruction indicates that sea ice was basically absent (regarding the statistical error) for most of the record and hard to interpret. P3060, 18-19. Description but no interpretation? P3061, GI8. What about the sharp peak in XRF data around 39 kyrs? P3063, 2-4. Could a low salinity layer be traced/verified by one of the proxies? P3063, 19. LLG are no "melt-water" products. P3063, 20-27. LI-source of the Ca peak in H4 based on not-shown Sr-counts is much too hypothetical. P3070, 8-10. The late and terminal warmings of GI's needs more discussion. P3070, 19. Reconstructed ice-cover for <29 kyrs is max. 4-5 month/year. That would mean that the ice shelf was not OVER the core site Table 1: Add dating details. Fig. 1. Remove red dotted line (glacial ice sheet expansion) for the sake of clarity in the figure. Fig.7 shows the expansion as well. Fig. 5. In (a) separate dinocyst concentration from ARM and sed. Rate. Precisely written, your age model is not simply "tuned on NGRIP-GICC05". Fig.6. Check lettering of records (a,b,c. . ..) with figure caption. Its wrong.

Interactive comment on Clim. Past Discuss., 8, 3043, 2012.