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Interactive comment on “Macrofauna community inside and outside of the Darwin Mounds SAC, NE Atlantic” by N. Serpetti et al.

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We would like to thank the referee for their comments. However, we do find them somewhat at odds with the comments received from two other referees, which were positive and favourable. They both felt that the paper contained “...new information on the macrofaunal communities and is worthy of publication....”.

Response to Comments “This paper seems to do many things at once” and “This area was protected due to occurrence of corals but deals with small and short-lived infauna sampled with corers and not corals that might still carry signs of damage and of recovery.”

We agree that the Darwin Mounds area was closed to bottom trawling because of

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the corals that were found in this region. However, it is not only the corals that the trawling will have had an impact on both epi- and in-fauna of all sizes classes (mega-, macro-, meio-fauna are affected by bottom trawling (e.g. Kaiser & Spencer, 1996; Clark & Rowden, 2009). Here we are concentrating on the infauna retained in a 250um mesh, which includes mainly macrofauna and some large specimens of meiofaunal taxa. These animals are important components of benthic food webs and their activities have an impact on nutrient cycling and organic matter sequestration. The focus of this paper is to compare the macrofauna community structure within and out-with the Darwin Mound region and this is clearly stated in the title, "Macrofauna community inside and outside of the Darwin Mounds SAC, NE Atlantic."

Response to Comment: "The study compares an area fished 7 years ago with an area still fished. Seven years would probably allow for many infauna species to recover from trawling impact but do we know what the reference conditions are?"

There are few studies looking at the recovery of the macrofauna community from human impact after the establishment of a protected area. We compared the macrofauna communities between stations reasonably similar in terms of distance, grain size and depth inside and out-with the SAC, interpreting the similarity and differences as a possible consequence of the trawling activity. Thiel (2003) showed that seven years is a long enough time-period for a complete recovery of an abyssal deep-sea benthic community disturbed by mining activity, however in some case the faunal composition of all size classes could remain permanently altered (Thiel, 2003). The high similarity in community compositions and diversity indices found between our stations could also indicate that the Darwin Mounds SAC closure is not well respected (see also comment and response to reviewer #1). Because the lack of the reference information before the SAC establishment, we compared our results with the closest stations where macrofauna samples were collected (1998) which were within the now protected SAC region (the full results are listed in the AFEN database and for the specific stations please see Bett 2001, area T36-53 in fig.1 and fig.7 and fig. 8) as well as with other stud-

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ies where different factors impacting on the macrofaunal community distributions have been discussed.

Response to Comment “The grain size differs in the sampled areas within and outside the SAC and thus this can very well explain observed differences in abundance”

We do not think that the small difference in median grain size (all the sediments collected were classed as moderately well sorted fine sand) could determine the big differences (double) found in macrofauna abundances when comparing samples from outside the SAC to within the SAC, primarily for the fact that no differences were found in terms of sediment mud and organic matter content. Substantial changes in median grain size would also drive changes in species composition (Dauwe et al., 1998), however our samples showed a high similarity and the small differences in community structure were determined by a few rarer species.

Response to Comment “it cannot provide conclusive results on patterns relating to the environmental setting.”

Continental margin habitats are increasingly altered by human activities, and the consequences of anthropogenic impacts on benthic biodiversity and ecosystem functioning in the deep-sea are almost completely unknown (Levin and Dayton, 2009; Levin et al., 2010). As we have previously stated there are few studies analysing the effect of marine protected areas particularly on macrofauna size class which, together with the meiofauna, represent the base of the benthic food web. Our paper presents important new data and new ideas that underline the importance of the prey/predator interactions and the necessity of an ecosystem approach also on small benthic communities (i.e. the increase in macrofaunal abundance due to the removal of their megafaunal predators by the fishing gear). We have also emphasised the necessity and importance in standardising the protocol (e.g. sieving mesh) for macrofauna analysis especially in the deep-sea were the specimens tend to be smaller (e.g. Gage et al., 2002; Kaariainen and Bett, 2006; Ramirez-Llodra et al., 2010). We also would like to underline

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that the other two reviewers did not have any major concerns about the title, abstract, interpretation of the results, conclusion, references and the clarity of the manuscript.

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Interactive comment on *Biogeosciences Discuss.*, 9, 16907, 2012.

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