General comments

The manuscript of Glock et al. reports an ambitious study that aims to quantify the contribution of benthic foraminiferal nitrate storage and denitrification to the nitrogen cycle of the Peruvian OMZ. The results of this study will be an important contribution to our understanding of the oceanic nitrogen cycle, and are worthy of being published in BG. However, there remain some concerns after reviewing the manuscript, specifically with respect to the calculation of foraminiferal denitrification rates (see Specific comments). These issues should be clarified and addressed in more detail by the authors in the revised version of the manuscript. The manuscript is well structured and, for the most part, well written. The Results section could be shortened to some extend as in many cases the text is a repetition of data shown in the tables.

Specific comments

Abstract

Given the approximations applied in this study and the resulting uncertainities, I suggest to formulate some passages of the abstract more cautiously. This has been successfully done in the Conclusions and Implications section. Compare e.g. "…benthic foraminifera account for the total denitrification on the shelf…" (Abstract) to "at 79m to 248m water depth most likely the entire denitrification is performed by benthic foraminifera" (Conclusions and Implications).

Material and methods

Please add a map of the study area indicating the sampled localities!

Page 17781, lines 7-8: The authors should explain *why* they have not considered the *B. argentea* and *F. cornuta* in their calculations! Because other species of these genera show much lower denitrification rates? This is important to know given the approximations for the calculation of denitrification.

Page 17781, lines 16-17: Rephrase; this statement contradicts the Results section in which the authors discuss the strong impact on the calculations for the station at 697m (Page 17784, lines 24-26).

Page 17780, line 21 – Page 17781, line 3: This comment reflects my major concern about the study. Table A1 suggests that the cores have been sampled for benthic foraminifera down to very different depths at the individual stations (for example, 5cm at station M77-1 583-MUC-32; 50cm at station M77-1 540-MUC-49). Does that affect the calculations and has it been considered by the authors? Benthic foraminiferal abundance is a key-variable in their calculations, and neither from the text nor from Table A1 and Figure 1 it is clear to me which value they applied to the equation (total abundance down to the maximum sampling depth at each site or selective abundance down to the same sampling depth at all sites)! This should be addressed and clarified in the methods, results and discussion sections!
As it is now, there is a single, short reference on this topic (Page 17786, lines 7-8) – it's not clear to me if that implies denitrification rates consider only foraminiferal abundance in the upper 5cm of all cores. In my opinion, this is the only way to compare calculated foraminiferal denitrification rates (5cm being the maximum sampling depth at M77-1 473-MUC-32). The presentation of the results in the text, figures, and tables, however, suggests that total foraminiferal abundance regardless of the sampled depth at each station has been used. This has to be clarified and clearly stated in the methods section!

Page 17782, line 4: Figs. 1 and 2 do not show the depth transect! However, as mentioned earlier I suggest to include such a figure in the manuscript.

Results

Page 17784, line 6: According to Table A1, the second-most abundant species at 79m water depth is *Nonionella stella* (16.4%) and not *Bolivina seminuda*.

Page 17785, lines 3-9: It's not clear to me where the calculated benthic foraminiferal denitrification rates come from. Table 4 is referenced by the authors but the respective table shows values different from the main text. See also Page 17776, Line 19, and Page 17792, line 12.

Page 17785, lines 13-14: Explain in one or two sentences why you chose this specific denitrification rate!

Discussion

My concerns about the calculation of foraminiferal denitrification rates should also be reflected in the Discussion chapter. Otherwise the Discussion is fine and offers intriguing ideas, and I have only one minor comment.

Page 17790, lines 16-18: The limitation of the Japanese material to size fraction > 125µm might additionally complicate a comparison.

Tables

Table 2: After checking the listed values for denitrification rates and nitrate storage with literature I have several comments on this table:

- After calculating the mean denitrification rate for the genus *Bolivina* based on Piña-Ochoa (2010a) the result was 124 pmol#$^{-1}$d^{-1} instead of 135 pmol#$^{-1}$d^{-1}.
- Why did you apply the mean denitrification rate for the genus *Uvigerina* to *U. striata* but not to *U. auberiana*, *U. canariensis*, and *U. peregrina*?
- The value of 166 pmol#$^{-1}$ is listed for nitrate storage of *U. peregrina* – a mean value for this species calculated based on values of 0 pmol#$^{-1}$ and 332 pmol#$^{-1}$ in Piña-Ochoa (2010a). Given the big range of these values as well as the significantly higher mean values applied to the other *Uvigerina* species - does it make sense to calculate a mean in this case?

Table 4: Foraminiferal abundance of M77/1 473-MUC-32 is indicated with 522.5 indcm^{-2} in Table A1. Please check which value you considered in your calculations for this site!

Technical corrections

Page 17776, line 5: Rephrase this sentence

Page 17778, line 10: *Fursenkoina*

Page 17779, line 9: The name of the cruises should be M77/1 and M77/2

Page 17781, line 2: Add Risgaard-Petersen et al., 2006 to the listed references for denitrification rates.

Page 17781, line 7: Exceptionally

Page 17784, line 5: Replace 78m by 79m

Page 17784, line 10: Indicate that it's the station at 319m

Page 17784, lines 19-27: I suggest to move this paragraph to chapter 3.2

Page 17786, line 19: According to Table 4 nitrate storage at 79m is 62.1 $\mu molL^{-1}$

Page 17789, line 14: *F. cornuta*

Page 17789, line 15: denitrification

Table 2: Replace Piña-Ochoa (2010) with Piña-Ochoa (2010a)

Table 2: Please add an explanation for the asterisk next to the nitrate storage value of *U. peregrina*!

Table 3: The second and third sentences should be rephrased or removed from the caption, it is not clear to me what they mean.

Table 5, caption line 2: I suggest to rephrase to "…C1 and C2 refers to chambers 1 and 2, repectively."

Figure 1: Replace Piña-Ochoa (2010) with Piña-Ochoa (2010a) and add Risgaard-Petersen et al. (2006).