

February 1^{er}, 2015

Doctor

Stephane Blain

Associate Editor

Biogeosciences

Dear Editor,

Attached to this letter I am enclosing the revised version of the manuscript entitled
“Dissolved greenhouse gases (nitrous oxide and methane) associated with the
naturally iron-fertilized Kerguelen region (KEOPS 2 cruise) in the Southern Ocean”
by L. Farías, L. Florez-Leiva, V. Besoain, G. Sarthou and C. Fernández

The manuscript has been modified taken into consideration each specific comments made by
associate editor.

We proceeded as follows:

We performed each of the changes outlined by you below (see new file Keops II 2014
Farias et. al Jan 2015 v1 track mode). Then check grammar and an English native checked
again the text.

We deeply appreciate the comments and suggestions of the referees and of the Editor. Their
comments have indeed helped us to improve our manuscript. We hope all comments and
questions have been examined and addressed correctly.

Sincerely,

Laura Farías
Department of Oceanography
University of Concepción
P.O. Box 160-C
Concepción, Chile

List of revisions

page 1

line 5 : replace Fe with iron **R: done**

line 2 : replace (N-S) with (TNS) and west-east (W-E) with east west (TEW)

In your response to the reviewer #1, who pointed out inconsistencies in the labels of the transect between the text and figures (TEW and TWE), you write : " we corrected it in the figure legend, standard nomination by all colleagues is TWE".

If you have a look to already published manuscripts the correct label is TEW not TWE.

In your revised manuscript it also obvious that there are still a lot of inconsistencies in the labels of transects, stations, between the text, figures, legends, table. (see for example page 9, table 1, within table 2 (TNSO5, RK2...)

This manuscript will not be accepted without a very careful work on this issue. The correct labels are for example TEW-1 (not TEW01 or TEWO1 or TEW1 or something else). Please refer to the log book. **R: the nomenclature of transect and stations were changed according to editor observations and nominations of them are in concordance with other authors**

line 17 : replace "strongly stimulated by" with "associated to" . The reviewer #1 mention that CH4 at station TEW-7 may result from transport of coastal waters enriched in Fe and CH4. **R:OK**

line 20 : for the same reason rephrase also the last sentence of the abstract to take into account the advection explanation into account. **R: this was considered and included in the abstract**

page 3 :

line 8 : better to refer the last IPCC report **R: indeed a reference of 2013 was reported**

line 19 : remove Antarctic R:K

line 21 : write in the Southern part of the Antarctic Zone (AZ) (the polar front zone is region between PFZ and SAF). **R:OK**

line 21 : the correct ref is Park and Vivier 2012) check also the reference in the list **R: it was checked-**

page :4

line 6-7 "which...GHC cycling " rephrase. **R:OK**

line 11 : replace ", " with "." **R: OK**

line 14 : "replace "dessimilatory" with "dissimilatory" R:OK

page 5

line 2 : "natural iron fertilization" and remove "events"

line 3 : define KPR. **It means Kerguelen Plateau Region and the definition of it acronyms was done**

line 6 : write " the coastal waters of Kerguelen Island and of the central Kerguelen plateau/. "quasi permanent has no clear meaning". **R: it was changed by recurrent annual bloom**

line 11 : already define line 3. **R:OK**

line 14 : remove "sample" **R:OK**

line 16. start a new sentence after Fe-enriched. write : "Station R-2, located east of the kerguelen plateau was considered as typical of HNLC conditions" **It was done**

line 18 replace " the hydrographic...stations" with "the positions of the stations were selected according... (the ref is D'ovidio et al. this issue). (have a look to keeps2 web site for the complete ref. **Yes it was included**

line 20 : "continuous" has no meaning because the data are bined every meter.

line 21 capitalize the first letter of "Photosynthetic Available Radiation" **R:OK**
line 22 and 23 check for correct description of CTD and rosette in Lasbleiz et al .for example. **It was replaced by the text written by Lasbleiz**

page 6 :

line 1 "correlative" ??? what does it mean

line 2 : write "and 500 m) OK

line 8 : update the ref OK

|

line 13 : if you want to used He in place of Helium mention this notation the first time you used it (line 13) and not line 14. **We were consistent and used Helium**

line 23 : remove " the samples... until analysis" already mentioned in sampling section. **OK**

page 7:

line 2-3 : what is the difference with what is mentioned pge 6 line 22.?? **It was clarified**

line 9 : PO43- not PO4- R: **it was corrected**

line 9-10 the precision +- should be expressed using a percentage. make your values consistent with the numbers mention in my paper (they were provided by Louise oriol). **R: we could not found precision reported as %, thus we maintained the same lines**

line 16 : no clear what means "at one meter" means : clarify. **R: it was clarified**

page 8

line : function of ... **It was clarified**

line 7 "remove "from an onboard registrar" and "as per international protocols". **OK**

line 17-18: write " because no dFe concentrations were not determined). **I was modified as you suggested**

line 18 remove "all" there was much more biogeochemical parameters measured in the ML than those used in your PCA. **It was done**

page 9 :

line 4-5 : not understandable. better to simply refer to Park et al. 2014 (Journal of geophys res.) **OK we referred to Park et al 2014**

line 8 for temperature make the number of digit consistent. **Ok**

line 9 : what means a weak structure. make the sentence shorter and clearer. " during the transect TEW the PF was crossed twice at ... " **This sentence was changed**

line 9 : "FP" I think you mean PF. **Ok**

line 12 : " bathed. by ...AASW) I do not understand. modify. OK

line 16 : " within the PF" do you mean in the recirculation area. if so clarify R, **it was modified**

line 16 : " revealing a vertical mixing process produced by convergence"; I am sure a physical oceanographer will be happy with that. I think the point you want to mention for the interpretation of your data is that circulation and mixing produced a complex physical environment in the studied region. it is not your role and it is not necessary to described the driving physical processes. **We eliminated physical interpretation and only referred to published references**

page 10 :

line 6 why HPO42-, in the methods you used PO43- **OK**

line 13 : remove the sentence " the observed pattern ... by quéroué et al." there is no correlation presented in your ms (neither in lasbleiz nor in queroué) . If you want to say that there is a correlation you must say clearly between which parameters (concentrations in the MI or integrated value or ?) and you must provide the equation and correlation coefficient. *We removed these lines, because the relationship between chlorophyll and dFe*

line 16 : "maintaining super saturation conditions" I am confuse. do you mean percentage of

saturation above 100%. I do not think that the case. if you mean something different clarify.
line 18 : replace "superficially" with " in the surface water" and remove "in surface water" at the end of the line. **It was clarified.**
line 21-22 : make the number of digit consistent. (1.4 and 31.35) **OK**

page 11

line 5 : PO43- not PO34- **OK**
line 9 : " these trends coincided ... distributions (Fig 2 b , d)" remove this sentence . the method used in Zhou et al. is criticized (see the comments of the reviewers). if you want to say something on the upwelling read Gilles et al; already published. You will see that the issue of the occurrence of upwelling in this region is complex. **It was removed**
line 11 I do not fully understand the sentence and do not see why you mention that.
line 17 : what mean "corresponded" **it was replaced by associated with**
line 18 remove "bioavailable". and write dFe concentration in place of Fe
line 21 remove "this" **OK**
line 22 : the variability of what?
line 22 : " come"? I guess you mean "coming". I suggest to replace using... with . When the data set used in the PCA is restricted to the ML**OK**
line 23 : rephrase "were grouped in three sets" **It was done**

page 12

line 3 : replace "demonstrate" by "suggest" **OK**
line 5 : dFe not Fe **OK**
line 11 : remove "quasi permanent" . if you want to mention that the bloom is present each year you can write "recurrent annual bloom". **OK**
line 12 : low F levels . this is in contradiction with your statement page 11 line 18 "relatively high". make it consistent. **Yes, there was a mistake and it corresponded to moderate levels of DFe**
line 13 : why do you mention iron uptake? Because
line 15 " a well... stR) simplify! **OK**
line 20 : write " the stations located at the extremities of TEW ...) **OK**
line 23 : " located in one of the more oligotrophic condition" not correct : rephrase. the reference is not appropriate. The western part of the plateau was not investigated during Keops1.

page 13 :

line 14 : remove "trophic conditions" you do not present any data related to this topic. **OK**
line 15 (give the numerical values to support your statement of no correlation. **OK**
line 20 -21 : not understandable. rephrase and clarify what means standardization. **OK**

page 14 :

lines 1-2 remove "thus ... higher". **OK**

page 15 :

remove the section 4.1.
this description is not relevant for your ms. **Discussion section was shorter and two initial paragraphs were removed of the ms**

page 18 : line write dFe **OK**

page 19

line 8 : Park and Vivier 2012 **I was checked**
line 14 : "under the influence of in ..." not clear : modify **It was modified**

page 21

line 9 : include space and dot "after 1994)" **OK**

page 24

line 20 remove ")" at the end of the sentence **OK**

page 33 figure caption

line 6 : remove "sampled" **OK**

line 9 : under the influence of PFZ not correct see my comment above **OK**

line 14 remove "for" PK **OK**

line 22 replace ML's base with "base of the ML) **OK**

line 27: may be replace " within" with "close to " **OK**

Table 1 : All modification were done respect to the tables

modify the labels of the stations

first column there is a problem with NPF and SPF. TEW-7 and -8 are north of the PF. to be corrected

second column : longitude east should be positive values

third column : latitude south should be negative values.

last column : unit for oxygen ($\mu\text{mol /kg}$) in the text $\mu\text{mol / L}$: make it consistent.

table 2:

modify the labels of the stations **done**

line 1 : Inventory in the ML (not MLD), **done**

line 1 : it is not the entire water column but 0-500 m . modify also the legend of the table **done**

line 1 : wind speed **done**

figure 1 : replace subantarctic zone with polar front zone, **done**

figure 6

oxygen unit (see comment above). **Done**

correct nitrous oxide in the legend **Done**

unit for chl_a (mg m^{-3}) in the text you used $\mu\text{g/L}$: be consistent **Done**