

Interactive comment on “Calibration procedures and first data set of Southern Ocean chlorophyll *a* profiles collected by elephant seal equipped with a newly developed CTD-fluorescence tags” by C. Guinet et al.

Anonymous Referee #2

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General comments:

This paper reports a very large set of fluorescence profiles measured remotely by Elephant seals equipped with automatic tags in the Southern Indian Ocean. Measurements have been made over an almost 3 years period from December 2007 to February 2011. About 4500 profiles have been acquired. The paper focuses on a careful analysis of the data starting first with the absolute calibration in terms of chlorophyll concentrations of the fluorimeters as the manufacturers provide only relative values.

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For the deployments later than October 2009, i.e for 14 amongst the 23 complete set of experiments, the calibration includes 2 steps: first, a calibration of a reference fluorimeter against HPLC measurements of chlorophyll, which we can refer as absolute values. A second step concerns the relative calibration of the individual tags which equip the Seals with the reference fluorimeter. For the first group of fluorimeter installed before October 2009, a statistical approach has been considered.

In coherence with the criteria of the ESSD journal, many details are provided for each step of all the calibrations. A Bayesian method is used to analyze the whole set of informations. I understand that an interesting point of this method is the possibility to take into account all the different sources of errors identified at each step of the whole procedure. At this point, I have a question regarding the sentence: "This approach reveals that for the Indian sector of the SO, the surface chlorophyll *a* (chl *a*) concentrations provided by MODIS were underestimated by a factor of the order of 2–3 compared to in situ measurements". I understand from the equation 7 and the table 2 that the factor should be 1.99 with lower and upper bounds respectively 1.44 and 2.3. This is not 2-3 ! This should be changed.

I have another remark: the calibration Chlorophyll HPLC/fluorimeter reference calibration has been carefully made in the north-west Mediterranean Sea. The authors should at least point out that they make the assumption that this calibration is valid also for the Southern Ocean, notwithstanding that the phytoplankton assemblages may be very different in both basins.

Besides these 2 points which have to be looked at, I think that this paper should be published in ESSD. The analysis of the whole set of data after their careful examination as being done in the present work is very promising to gain insight in the physical and biogeochemical properties in the remote Southern Ocean, as illustrated for instance by the whole set of results shown in figure 7.

Specific comments:

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- Page 864, lines 12-14: "The coefficient found between the MODIS surface fluorescence values for each deployment was used to proceed to the production of a homogeneous fluorescence data set." Is that correct as later, we use the MODIS / fluorimeters data as an input parameter in the Bayesian analysis ?
- Page 872, line s15...and Table 2: the authors should comment the relative values of the coefficients alpha...as they illustrate nicely the relative importance of the various sources sources of uncertainty
- Page 872 :lines 18-20: The detection limit of HPLC is 0.05 mg m⁻³ (line 6 page 862)-
→this may explain why the calibrated fluorimeter indicates an absence of chlorophyll
- Figure 9: I suggest that you rather plot Fluo/MODIS instead of MODIS/Fluo to be more coherent with the previous relationship computed through the Bayesian analysis HPLC/MODIS (equation 7 and table 2).

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