

Interactive comment on “Development of a new expendable probe for the study of pelagic ecosystems from Voluntary Observing Ships” by M. Marcelli et al.

Anonymous Referee #1

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General comments

This manuscript describes characteristics and calibration procedures of an expendable oceanographic probe which allows joint physical and biogeochemical measurements in the water column. Temperature and chlorophyll fluorescence profiles can be collected through a low cost device, thus allowing high frequency and non invasive measurements of phototrophic organisms distribution in the ocean.

The interest of this kind of measurement is evident, it could greatly improve, as for XBT probes, the present data acquisition density, thus contributing to fill the existing gap between field and remote sensed measurements, as well as between physical and

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biological ones in basic research studies. It could also contribute to increase the inputs to forecasting models in operational oceanography, especially useful for highly dynamic systems.

Actually the paper has a clear and rather exhaustive description of the technical aspects concerning the new instrument, but it lacks discussion of collected data, even if just considered as an example of possible application. This work in my opinion is worthwhile to be published, however it would greatly benefit of a more extended discussion of the results with, for instance, a comparison with similar measurements and/or about field tests the interpretation of the discrepancies, when observed (see Fig. 10 and Fig. 11), should be addressed: those differences could be justified or not, depending on the lag time or on the distance between the measured profiles.

A more recent bibliography is recommended, especially about remote sensing and in vivo fluorescence as methods for phytoplankton biomass estimate, it could increase the potential audience of the paper. The English form needs a careful re-reading and improvement.

Finally, taking in account the high interest and innovation involved in these measurements, I recommend the publication of the manuscript after major revision and improvement of the discussion of results and of the underscored points.

Specific comments

In the Introduction - p.3 line 6 (but also elsewhere): “this method is an in vivo chlorophyll measure...” but phytoplankton in vivo fluorescence measurements should be considered rather an estimate than a measure of chlorophyll concentration. In fact the yield of fluorescence in vivo is well known to depend on biophysical but also biological and physiological variables such as the phytoplankton species, the state of photoadaptation, the light history of organisms and their nutritional state. Moreover the concentration of organisms at very high levels could imply re-absorption phenomena leading to non linear relationships.

p.3 I.6 “the immediate biophysical reaction of the cell inside the aquatic environment” should be: “the immediate biophysical reaction of phytoplankton inside the aquatic environment” as one idealized cell is a too rough proxy in this case.

p.4 § 3.2 “For the chlorophyll a fluorescence measurements is employed a semiconductor element” should be “ \ddot{E} a semiconductor element is employed \ddot{E} ” see also similar corrections to be made elsewhere.

Depth calculation, supposedly based on free falling of the device, here is not mentioned. Which fall rate equation has been used ?

LEDs emission data (spectrum and irradiance values) if available, would be very useful to improve the interpretation of data and particularly to understand if or at which degree fluorescence induction phenomena have to be taken in account.

The linearity of the relationship T-FLAP fluorescence vs chlorophyll is tested in a realistic but rather short range of values, is there a specific reason ?

p.7 line 7, 9, 11 and everywhere else : “fluorimeter” has to be replaced by fluorometer

Fig 6 and 7 : if possible it would be interesting to comment and give a reason for the difference in the b coefficients of regressions. It could depend from the cultures conditions or from the different calibration conditions (static or dynamic).

Fig. 9 : on X axis units are mV like for fig. 8 ?

Figs. 9, 10 and 11 should be cited at least once in the text and some more details be given on where and when the measurements have been performed.

Rererences; Bosc et al 2004 is Bosc et al. 2003 in the text, Falkowski P.G. 2002 is indicated as Falkowski et al. 2002 in the text, Marcelli et al. 2005 lacks the journal name.

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