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## ***Interactive comment on “Direct and indirect effects of vertical mixing, nutrients and ultraviolet radiation on the bacterioplankton metabolism in high-mountain lakes from southern Europe” by C. Durán et al.***

### **Anonymous Referee #1**

Received and published: 17 June 2014

This manuscript reports results from a single experiment done in 3 high mountain lakes of different water transparency to understand the single and interactive effect of solar UV radiation, nutrients enrichment and mixing. The topic is interesting and relevant to the Biogeosciences Journal. The authors have published an accompanying paper on this topic but showing the effects on primary producers. So, some of the information is somehow here repeated. Though the idea of the experiment as I mentioned above is interesting, I have several concerns on the experimental approach used and the conclusions extracted.

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For example, I am not convinced that a model adjusted for an eutrophic, turbid, shallow tropical lake (Viallafane et al. 2007) and used to define the speed of circulation (1 m every 4 min) in the experiment can be directly extrapolated to high mountain lakes. Will that PQY follow the same pattern? I think this need to be discussed.

Similarly, I am concerned about the lack of direct measurements of bacterial respiration and therefore about the derived calculations on BCD and bacterial carbon limitation that are essential to the study. It is unacceptable that no direct measurements were done because the conclusions extracted have a large question mark.

Sampling: What does it exactly mean "water samples within the upper 3m of the water column"? How many samples were taken? Was the water pooled from different water layers?

Another concern is on the exp. procedures: One cannot really follow how the experiment was done. Were all parameters measured from the same bottle or were parameters such as bacterial production and total respiration measured separately? It seems the authors used just small volume quartz tubes that were treated in the same way, but I am not sure. Also how were nutrients added ?

More important is the lack of rationale on why samples were moved surface-down to 3 m and back to the surface when the temperature profiles indicate that in LE the thermocline was at 4 m depth and in the other two lakes the epilimnion was even shallower. If the objective of the study was to compare the effects on communities with different light conditions, why the real mixing depth and attenuation of light were not considered to determine the extent of the vertical mixing simulation. In my opinion, this is in strong contrast with the statement by the authors in the discussion that these experiments were made under realistic experimental exposure conditions resembling the epilimnetic vertical mixing. . .

The text is unclear in many parts (see some examples below), but the Introduction is particularly difficult to read and lacks clear structure. Also many citations that are not

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always referred to the type of lake studied are used, which is confusing. So one ends without a clear picture of which factors are really relevant for those high mountain lakes.

### Specific comments

Overall in text: what is defined here as opaque? To what wavelengths do the authors refer?

Is a lake located at 1075 m asl a high mountain lake? I am not sure though I did not find a clear definition of what "high" is.

p.5, l.5. Write CDOM instead of DOM because only the colored or chromophoric DOM will have that effect

p. 6, l.2, the sentence including "nutrient-addition instead of enrichment" is awkward

p.6, l.7, "Previous studies" is just one study

p. 6, l. 13, revise use of "nutrient input"

p.7, describe type of quartz flasks used

p. 7, l 13, "filtered through a 45  $\mu\text{m}$ -pore size mesh" not really a pore

p. 8, l24, what is "UV-spectrophotometric screening" in the case of nitrate? are units for PAR also in  $\mu\text{W cm}^{-2}$ ?

p. 9, l14 "SYBER" is wrong

p. 9 l24, Revise meaning of "incorporating " in "HBP was determined by incorporating 3H-thymidine (S.A= 46.5Cimol<sup>-1</sup>, Amershan Pharmacia) into the bacterial DNA. By the way, it is Amersham!

p. 11 Revise "were filtered onto 0.7 pore size filters"

END

Interactive comment on Biogeosciences Discuss., 11, 7291, 2014.

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11, C2592–C2594, 2014

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