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Biogeosciences Discussions

Interactive comment on "Seasonal occurrence of anoxygenic photosynthesis in Tillari and Selaulim reservoirs, Western India" *by* S. Kurian et al.

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The current paper seems technically sound, except perhaps the apparent lack of LC-MS/MS, see below. But, it lacks sufficient depth in presentation of data and interpretation and calls for extensive revision.

The reservoirs described in this paper are clearly "monomictic", i.e. one mixing period and one stratification period per year. They should use this common limnological terminology in addition to the term "meromictic" (permanently stratified) used for other systems. Lines 9-10 page 12155: Note that green sulfur bacteria and filamentous green non-sulfur bacteria (Chloroflexaceae) always contain minor amounts of BChla (compared to BChlc,d, e). The BChla has a fundamental role in the photosynthetic reaction (RC) and in green sulfurs also occurs in the base plate of the chlorosome.

Line 15 page 12155: The authors of this paper do not acknowledge the important contribution of Airs et al. (2001a,b, 2002) in the laboratory of Brendan Keely (York University), who were first to develop and apply LC-MS techniques for Bacteriochlorophyll analyses in cultures and lake water samples.

Detail on Bacteriochlorophylls is absolutely insufficient. Rather than designating simply BChl-e1, BChl-e2 and BChl-e3 as 15 years ago, the authors should carefully interpret their LC-MS spectra and probably apply Tandem mass spectrometry (LC-MS/MS) to assign bacteriochlorophyll structures from their fragmentation during MS/MS analysis (Airs et al., 2001b, Airs & Keely, 2002). Nowadays, it is now possible to describe with great detail the substituents at position C8 and C12 (C2, C3, C4 units) and the chemical nature of the alcohol esterified at position C17. It is particularly important to report whether this alcohol is an isoprenoid (often farnesol) or straight chain, in all cases indicate length etc.

A bit vaguely, the authors suggest that different highly alkylated allomers are long-wavelength absorbing. Perhaps the authors refer the following suggestion that the different C-8 and C-12 side chains on the bacteriochlorophylls modify the aggregation and therefore the packing of structures in the chlorosomes, with an impact on the in vivo absorption spectrum (Airs et al., 2001b), which might provide a basis for a cellular response to light limitation (Borrego et al., 1998). However, to my point of view this remains still enigmatic, because it would require matching the BChle compostion of the extracted cells with their in vivo spectrum in the living cells.

The authors also missed our publication (Massé et al., 2004) where we discussed the drivers that could determine whether esterification of isoprenoid or straight-chain alcohols is favored at position C17. Hence we (Massé et al., 2004) reported that in cultured Chlorobium phaeobacteroides, the proportion of straight alkyl chains over isoprenoid esterified side chains shifted markedly with increasing light intensity: the isoprenoid side chains dominated at low light intensities, while the straight-chain alkyl substituents dominated at higher light intensities. We proposed that this phenomenon

may be explained as a result of changing availability of reducing power, i.e. the highly reduced straight-chain alcohols have a higher biosynthetic demand for NADPH2 than the polyunsaturated isoprenoid with the same number of carbon atoms. Please carefully consider all these points for your data interpretation and discussion.

Finally, the authors engage a comparison of standing stocks (which is the right term indeed) of green sulfur bacteria compared to oxygenic phototrophs. However, this does not allow to make conclusions about the productivity of both groups, because no C-fixation rates have been measured. To me it appears very likely that the low oxygenic phototrophic biomass is the result of growth and grazing, while grazing on the green sulfur bacteria in the anoxic part is less likely or at least less intense. Hence, the high standing stock of green sulfur bacteria may be the result of slow acculmiulation of biomass not requiring high productivity rates.

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