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Interactive comment on "Biologically labile photoproducts from riverine non-labile dissolved organic carbon in the coastal waters" *by* V. Kasurinen et al.

Anonymous Referee #2

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General comments This study measured the AQYs of BLPs from non-labile tDOC for 10 large worldwide rivers, established a quantitative relationship between BLPs production and photobleaching, and estimated BLPs production fluxes in global coastal oceans. In particular, the authors simultaneously determined AQYs of BP and BR on BLPs, thereby making it possible to evaluate the relative importance of carbon respiration and incorporation in bacterial utilization of BLPs. Such data, if obtained with sound methodology (see comments below), will greatly improve our understanding of the fate of tDOC in global oceans and thus the role of coupled photochemistry and biology in the global carbon cycle.

My main concern is the potential compromising of the sample integrity associated with

the often lengthy sample transport by air cargo (17-155 d, average: 33 d). Were temperatures during transport similar to those in situ at the time of sampling? If not, what were the differences? Would these differences affect bacterial species composition and physiology? Would DOM and POM properties and their interactions change significantly after transport, including a change of the proportion and properties of tDOC? (Note that samples were not filtered and thus contained all living stuff including phytoplankton and zooplankton which should mostly perished during transport).

I also doubt the validity of use of the mixture of river water and artificial seawater to represent coastal waters. First, bacteria that is indigenous in river waters is often not indigenous anymore in coastal waters; there must be shifts in species composition. Second, estuarine mixing is a gradual process in terms of changes in salinity and pH, in a marked contrast with the "shock" treatment of adding artificial seawater to river water at a 1:1 ratio. Salinity and pH affect DOM concentrations and properties and influence trace metal concentrations and speciation and thus alter the photoreactivity of DOM. Third, biological activity occurring in coastal waters, which was lacking in the authors' artificial seawater, also affect trace metal concentrations and speciation.

I found the correlation between BP on BLPs and photobleaching as shown in figure 2 is not robust enough for estimating BLPs production from photobleaching. The relatively high R2 is largely due to a single point at delta(aCDOM) at ca. 12 m-1. What is the R2 after this point is removed? To minimize the bias, please try plotting data on a log-to-log scale.

Detailed comments (xxxx.xx stands for page xxxx and line xx) 8201.19: delete "to" after "yielding" 8202.3: "Despite" not "Despite of" 8203.3: please provide in situ water temperatures and DOC concentrations in Table 1 at the time of sampling. 8204.2-3: how to prove this? 8204.6: Is 19% the mean value for world oceans? Section 2.2.2 Irradiations: any concern of self-shading? acdom(330) for Congo is >20 m-1! 8211.23: this CDOM fluxes actually also contain a portion of labile CDOM. 8213.22-23: so the actual R2 could be smaller even without considering the bias resulting from the lack of

intermediate values as commented previously. 8215.9: would the in-situ coastal bacterial species composition be similar or identical to that of the riverine bacteria surviving the salinity shock introduced during your experiment? See general comments as well. 8216.20-21: If it can be assimilated by bacteria, then it should not be termed "non-labile". 8216.24: “in” not “at” estuaries. 8217.6: “river” not “rivers” plumes. 8217.10: “a robust estimate” is an overstatement. See comment on R2 in fig 2.

Interactive comment on Biogeosciences Discuss., 12, 8199, 2015.