

Interactive comment on “Flux balance modelling to predict bacterial survival during pulsed activity events” by Nicholas A. Jose et al.

Anonymous Referee #2

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Flux balance modeling to predict bacterial survival during pulsed activity events by Jose et al.

This is a very interesting study where genome information is combined with detailed measurements of storage products to reach the quantitative conclusion about the cost of activity in the dark and the light.

Love the paper, well written, full of new information (for me). Not being familiar with the details of genome and flux balance approaches, my questions are mostly related to clarification.

1) in the metabolic model, I assume all growth functions, such as RNA, and protein production are included? Does the model assume that these other functions, such as

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protein production etc, happen at similar rates during the day as during the night?

2) The organisms were cultured at 4.5-10 $\mu\text{mol m}^{-2} \text{s}^{-1}$ (L83). How does this compare to the desert light levels, and how would an increase in light level affect the conclusion of this paper regarding wet/dry cycles during day/night? Is the light level PAR or total radiation? Related topic, in the results and discussion (L 198, 199; Table 3) two light levels are defined. It was not clear when reading the paper what this meant, whether this was caused by a change in biomass production or changed light levels. Please clarify.

3) L 116: please clarify why crotonic acid was determined. As far as I know, it is not mentioned in the results and discussion but seems to be the breakdown product of polyhydroxybutyrate. (?)

4) As a clarification, please explain why biopolymer reactions are included in the model, but not found in the genome. Similar for the other processes.

5) L 150: how were LB and UB determined. On the one hand they seem to be the product of the model (Table

3) but at the same time constrain the model (L 150).

6) Table 1: what is the relevance of the reactions mentioned such as hydrogen production in the table, but neither curated nor found in the genome.

7) L 170-173 and Table 2: I am not familiar with flux balance calculations, so the phrase PHB β nothing is confusing? Please add explanation in one additional sentence.

8) Table 3 and Fig. 2c seem to have some overlap.

9) L 214 – please elaborate how polyP can be used in other ways than an energy source

10) L 218: change consistent to constant or words similar to that.

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L 52: diel does not need to be capitalized

L 63: the use of the phrases dark and light reactions are confusing: they have very specific meaning in the study of photosynthesis, but I don't think that is what is meant here. Please replace with something like metabolism in the dark versus in the light.

L71 complex sentence that can be simplified.

L 94 add rcf to the list of abbreviations, and add units

L 134 what are GPR relations

L 135: comma after databases can be removed

L 168: why the word "side" with reactant and product?

L 194 change profiles to concentrations

L 246: Add year after reference (Knoop)

L 247: is the efficiency measured at the same light level?

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-403>, 2017.