Biogeosciences Discuss.,
doi:10.5194/bg-2016-431-RC3, 2016

Biogeosciences Discussions

Interactive comment on "Hydromorphological restoration stimulates river ecosystem metabolism" *by* Benjamin Kupilas et al.

Anonymous Referee #3

Received and published: 1 December 2016

GENERAL COMMENTS:

This manuscript examines the response of ecosystem metabolism to river restoration by comparing ecosystem metabolism among three river reaches of a mid-size river: a degraded (unrestored) reach (D), a moderately restored (R1), and a substantially restored reach (R2). The use of ecosystem metabolism to determine the effects of river restoration is fairly novel. In that sense, the manuscript represents a relevant contribution to the challenge of incorporating measures of ecosystem functioning to river monitoring, and to river restoration in particular. The manuscript is well structured and written. In general, the results are clearly and transparently exposed, limitations indicated, and details nicely presented in the appendixes.

My main concern with this manuscript relies on the fact the sampling design of this

case study may not be the most appropriate for correctly answering the important question of whether river restoration caused a significant change in ecosystem metabolism. Ecosystem metabolism was measured in only one river, only after river restoration, and only during a certain period of the year (summer). Ideally, such a question should have been addressed by measuring in several rivers, before and after restoration (BACI design), and considering several periods of the year. None of these criteria is fulfilled, and therefore, the strength of the results and its potential extrapolation to more general responses are limited. This should be at least more explicitly acknowledged in a revised version of the manuscript.

I agree with the comments that have arisen in the open discussion regarding the use of the 1-station method. As indicated in those comments and responses, the authors should incorporate the 2-station method for the restored reaches (R1 + R2) to make their statements more robust. These limitations in the metabolism estimations together with the issue in the general sampling design (previous paragraph) and the statistically significant but relatively minor changes in metabolic fluxes in restored relative to degraded reaches, makes the conclusions of a clear effect of the restoration on ecosystem metabolism not as clear as pointed out by the authors.

I also think that the last part of the discussion could be greatly improved by making more explicit recommendations and by being more convincing about the advantages of incorporating metabolism and other functional measures to river monitoring.

SPECIFIC COMMENTS: L17-18: Unclear sentence. Rephrase. L23-24: Any hints that this is occurring at the study site? L61-64: "natural changes" and "land-use change" are confusingly used in this sentence. L79: Any reference? L89: Do you mean "contiguous" instead of "continuous"? L91: Here I miss some predictions regarding the expected differences between R1 and R2. It seems important to justify the examination of two levels of restoration. L110-115: I suggest including here information on when the restoration was done. It seems important to know how much time has passed from restoration to measurements. L138: Unclear at which flow conditions these measures

were done. L195: It seems odds that some measures were done in 2013 and other sin 2014. How may this have influenced your results?

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-431, 2016.