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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Evaluating primary productivity, ripple effect and resilience of fluvial ecosystems: a new approach to assessing environmental flow requirement" *by* Yui Shinozaki and Naoki Shirakawa

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We greatly thank you for careful reading our manuscript and for giving important comments to improve our paper. We understand that the referee's main concerns are as follows; -The model is not based on the sufficient scientific evidences, especially it lacks the description about ecological metabolism.

-The model does not reflect recent empirical and theoretical contributions and rely only on some classic studies.

As the referee proposed, we started discussing with experts on freshwater ecology

and receiving advice about improving our model description. We try to add more science-based explanation according to relative literatures in the revised version of our manuscript. We appreciate the referee's concerns on the above mentioned point, however, we would like to express that the purpose of our study is not to evaluate a real tropic status of a river, but is to offer simple boundaries of flow-related ecological structures for setting environmental flow management criteria. As the referee pointed out, in order to express real trophic levels of a complex fluvial ecosystem, it is necessary to consider many factors such as metabolic process at each trophic level, species interactions in food webs, as well as regional differences in metabolic rates. To apply the criteria at a global scale at the resolution of 0.5x0.5 degrees, however, it is necessary to simplify the model without omitting fundamental mechanisms of the system. It is the reason that the authors' rely on few classical theories (Several exceptions and questions have been reported according to certain conditions, but these are not disproved.) For example, the authors tried to establish the TI, based on the classical species-energy theory (Wright 1983, Hugueny 2010). It advocates positive correlation between species richness and energy available, in turn, primary productivity in the area. This theory has also been supported by empirical studies for riverine ecosystems (Oberdorff et al. 1995, and Guegan et al. 1998).

In order to improve our manuscript, we will carefully explain the purpose and structures of our models with referring sufficient volume of recent literatures and knowledge.

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