

Interactive comment on “HESS Opinions: A Planetary Boundary on Freshwater Use is Misleading” by Maik Heistermann

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I would like to thank Dr Jaramillo for pointing out the commentary article by Jaramillo and Destouni (2015).

In that commentary, Jaramillo and Destouni argued that Steffen et al. (2015) *“ignored recent scientific advances implying that the global consumptive use of freshwater may have already crossed the associated planetary boundary”*, and presented studies which suggest a consumptive water use that is substantially higher than the 2600 km³ figure published by Steffen et al. (2015). One key argument of the commentary was the finding that reservoirs can *“increase the net total actual evapotranspiration from the hydrological basins that include the reservoirs”*.

Please note that in the opinion paper, I referred, on p. 3, ll. 2-3, to Destouni et al.

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(2013) instead of Jaramillo and Destouni (2015): *"Critical commentaries, however, mostly called for a revision of the actual numbers (e.g. Molden, 2009; Destouni et al., 2013)."*

I did this because the 2013 reference forms the original and *main* (though not exclusive) basis of the 2015 commentary, and already contains the statement that *"a global indication of the regional results is a net total increase of evapotranspiration that is larger than a proposed associated planetary boundary"*. In order not to overrepresent that position of the group around Jaramillo and Destouni, I did deliberately not include the 2015 reference on top. I also put an "e.g." before the citations on p. 3, ll. 2-3, in order to indicate that the corresponding references are not considered exhaustive.

In hindsight, however, I think it might be better to include the Jaramillo and Destouni (2015) reference into that statement in order to avoid the impression that the opinion paper misses a specific thread of the PB debate (as it occurred to Dr Jaramillo). I also admit that Jaramillo and Destouni (2015) considered further studies and findings that had not been included with Destouni et al. (2013). And finally, I appreciate very much Jaramillo and Destouni's criticism regarding the *"message of apparent calm for freshwater"* which is being implied by Steffen et al. (2015). For those reasons, I think it is warranted to include the Jaramillo and Destouni (2015) reference in a revised version of the paper.

However, I have to emphasize that neither Destouni et al. (2013) nor Jaramillo and Destouni (2015) question the general concept of a planetary boundary on freshwater use. They only challenge the estimate of current human freshwater consumption. Accordingly, Gerten et al. (2015), in defence of Steffen et al. (2015), gratefully note *"that Jaramillo and Destouni accept the position of the freshwater planetary boundary but question our quantitative estimate of current human freshwater consumption."*

My opinion paper fundamentally challenges the concept of a planetary freshwater PB. Therefore, I want to avoid overemphasizing the debate on quantitative estimates. In

that regard, please also see my response to the short comment by Christof Lorenz (SC2) in this interactive discussion.

References:

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Molden D.: Planetary boundaries: The devil is in the detail, *Nature Reports Climate Change*, 3, 116-117, doi: 10.1038/climate.2009.97, 2009.

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