

Dear Editor:

We thank you for this opportunity to revise and improve our manuscript. We have considered all comments made by the Anonymous Referee and modified the manuscript with real thought as to make it more interesting and relevant to the readers of Earth System Science Data. This revised version includes significant improvement and addresses all comments expressed by the Anonymous Referee.

Please find below a detailed description of our response to the comments made by the Anonymous Referee. We gratefully acknowledge the helpful comments that have contributed to the improvement of our paper.

Sincerely,

The authors.

Response to Anonymous Referee #1

The authors have largely improved the manuscript and I support its publication in ESSD.

Response: The authors take the opportunity to acknowledge the valuable comments provided by the Anonymous Referee #1, as well as the time that has been committed to provide this valuable feedback. All suggestions made have been considered and addressed in a reasoned manner. Revisions have been made to the manuscript and are described below.

Minor revisions:

- 1.** The DoR index should be used with active storage instead of total reservoir storage. However, if active storage data are not available, it is understandable to use the total reservoir storage values. Please just make it clear and discuss it briefly in the text.

Response: Thank you for this relevant suggestion. We have used the total reservoir storage values instead of the active storage data because this information is not available for many dams. We have improved section 4 'Data limitations and uncertainties' in order to briefly discuss this issue.

References to lines with the suffix 'RM' refer to the revised manuscript, the reference to lines with the suffix 'TCM' refer to the revised manuscript with the track changes option activated.

Line 329RM / 329TCM:

'Also, in the case of the DOR index, there are many important inputs in our assessment which have not been considered and may alter the assessment results. For example, given the scale of this study, we are not considering information about local water use, specific stream characteristics or relevant and updated urban information. Also, two relevant inputs were not considered in our DOR assessment: unidentified small reservoirs, and the reservoir's active storage instead of total reservoir storage. These inputs should be considered in order to obtain more accurate results of the flow regulation but were not considered due to the absence of this information. Furthermore, the impacts of river regulation also depend on a wide range of factors, e.g. local or international water management policies, which have not been considered either. Altogether, we consider that despite the aforementioned uncertainty factors, our results give a consistent first approximation of these indices at a regional scale.'

- 2.** Line 290 correct "Yayreta" by "Yacyretá"

Response: Thank you for this suggestion. We have corrected this word and revised the accents in the manuscript.

Line 290RM / 290TCM:

Yacyretá

Line 291RM / 291TCM:

Itaipú

Line 294RM / 294TCM:

Yacyretá

3. About the '245 future projects in South America', Almeida et al (2019 Nature Communications, <https://www.nature.com/articles/s41467-019-12179-5>) identified 351 proposed dams for the Amazon basin. This may be worth mentioning here. I could not find the Supplementary Table 1 with the list of future projects in the attached files, but I encourage the authors to double-check this '245' value.

Response: Thank you for this relevant suggestion. We are sorry that you were not able to find the Supplementary Table 1 in the attached files. The Supplementary Table 1 was uploaded as a supplementary file in the authors response stage and was also attached in the Author Comment 3: 'Response_referee1_files' which was uploaded on November 20 on the Interactive Discussion forum. Likewise, this file is available in the Zenodo repository, which is also mentioned in the manuscript. *We are including the Supplementary List 1 in the Supplement section as a PDF file.*

We have updated Supplementary Table 1, which now includes 574 future projected dams in South America, 61 under construction for 2020 and 513 planned projects for the future. This updated list includes all future projects identified by Almeida et al. 2019.

Line 369RM / 365TCM:

'... (Almeida et al., 2019; Anderson et al., 2018; Moran et al., 2018; Zhang et al., 2018). We have identified 574 future projects in South America, 61 under construction for 2020 and 513 projects planned to be developed in the future. Supplementary Table 1 details future dams in South America identified by country, name and implementation phase.'

REFERENCES:

Almeida, R. M., Shi, Q., Gomes-Selman, J. M., Wu, X., Xue, Y., Angarita, H., Barros, N., Forsberg, B. R., García-Villacorta, R., Hamilton, S. K., Melack, J. M., Montoya, M., Perez, G., Sethi, S. A., Gomes, C. P. and Flecker, A. S.: Reducing greenhouse gas emissions of Amazon hydropower with strategic dam planning, *Nat. Commun.*, 10(1), doi:10.1038/s41467-019-12179-5, 2019.

Anderson, E. P., Jenkins, C. N., Heilpern, S., Maldonado-Ocampo, J. A., Carvajal-Vallejos, F. M., Encalada, A. C., Rivadeneira, J. F., Hidalgo, M., Cañas, C. M., Ortega, H., Salcedo, N., Maldonado, M. and Tedesco, P. A.: Fragmentation of Andes-to-Amazon connectivity by hydropower dams, *Sci. Adv.*, 4(1), 1–8, doi:10.1126/sciadv.aao1642, 2018.

Moran, E. F., Lopez, M. C., Moore, N., Müller, N. and Hyndman, D. W.: Sustainable hydropower in the 21st century, *Proc. Natl. Acad. Sci. U. S. A.*, 115(47), 11891–11898, doi:10.1073/pnas.1809426115, 2018.

Zhang, X., Li, H. Y., Deng, Z. D., Ringler, C., Gao, Y., Hejazi, M. I. and Leung, L. R.: Impacts of climate change, policy and Water-Energy-Food nexus on hydropower development, *Renew. Energy*, 116, 827–834, doi:10.1016/j.renene.2017.10.030, 2018.