

## ***Interactive comment on “Multi-source global wetland maps combining surface water imagery and groundwater constraints” by A. Tootchi et al.***

### **Anonymous Referee #1**

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This paper describes a new global, high-resolution (15 arc-seconds) mapping of wetlands based on hydrological functioning, combining existing surface water imagery and model-derived estimates of groundwater-fed saturated areas. One aim of this new composite dataset (or, better said, the different versions proposed) is to reconcile the large discrepancies existing between current databases of wetlands extent and location. Another is to propose a readily-available datasets for land surface hydrological modeling, and indeed such datasets are critically needed to constrain (eco)hydrological simulations often seeking an increasing level of details. This new dataset is thoroughly evaluated against other global to region-specific datasets, showing various degrees of agreement but with superior overall performance as compared to evaluating existing datasets against each other. In particular, this new estimates shows significant agree-

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ment with a specifically-developed dataset from France where groundwater contribution is also included. In addition, the broad definition used for wetlands here yields one of the highest reported estimates for global wetland coverage. In particular, the authors suggest that including groundwater contribution better captures small scattered wetlands and much-underestimated tropical wetlands.

I found the manuscript pleasant to read, with a clear presentation of the methodology and results, for the most part. I only have a few minor comments, following which I would recommend this work for publication in Earth System Science Data.

## General comments

- While Sect. 2 is termed "Methods and data", it mostly presents datasets and Sect. 3 presents most of the methodology. I would suggest to move Sect. 2.6 to Sect. 3 and rename Sect. 2 "Datasets" or "Data".
- Several times in text, the authors highlight the dispersion existing between the three datasets of regularly flooded wetlands (RFW) they use. For example, in P9L7 they show that their overlap is only 5% of the summed RFW area coverage. This intuitively raises questions about the accuracy of each of these RFW datasets. Section 3.1.2 somewhat describes some reasons why some features are specifically captured by each one of them, but do not discuss why they do not overlap. It seems to me that such a short discussion would be desirable, given that these datasets are merged to produce the RFW part of the new composite wetland (CW) estimates presented in this study.
- It would be helpful for the reader to draw rectangles corresponding to the sub-regional foci where the authors discuss some of the features of the datasets, e.g. in Fig. 6 (P13L20-21), Fig. 7 (P14L5-6), and in Fig. 10 (L15P22).

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- The conclusion is quite long and sometimes feels like a discussion. In addition, it tends to reformulate the main results (e.g. P18L22-27) instead of providing conclusive remarks and outlook. Please consider avoiding too much repetition from Sect 3, and passing elements of the Conclusions over to the Discussion.

## Specific comments

**P6, L34:** Can the authors explain why they decided not to consider the permafrost effect for  $K_s$  estimates? Especially given the likely influence on the performance of TCTrl.

**P10, L16:** The transmissivity ( $T_r$ ) map used here using GLHYMPS is at a much coarser resolution ( $1^\circ$ ) than the TI map (15 arc-sec). This mismatch is in addition likely to have a larger impact on dataset accuracy of TCTrl than the mismatch present in TCI ( $P_e$  is at  $0.5^\circ$ ), since intra-grid  $T_r$  variability, from fine-scale heterogeneities, is likely higher than that of  $P_e$ . In a way, the lesser performance of TCTrl (or at least its little added value as compared to TCI) was thus somewhat predictable?

**P13, L10:** "covered above" is vague, can the authors specify which datasets they are mentioning?

**P13, L25:** "in line with recent estimates of wetlands and peatlands": references to published works would be needed here.

## Technical comments

**P6, L34:** The symbol or notation after "polygons of" is not properly rendered.

**P13, L4:** "Fig. 5j", instead of "Fig. 5".

**P15L17** Instead of "CW-TCI(15%)", "CW-TCI(6.6%)", "CW-TI(6%)" , dropping the "%" in the name (CW-TCI15, CW-TCI6.6, etc.) could help avoiding confusion when these names are used to describe wetland extent.

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