Earth Syst. Sci. Data Discuss.,
https://doi.org/10.5194/essd-2018-87-RC2, 2018

Open Access Earth System Science Data Discussions

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

Anonymous Referee #2

Received and published: 9 November 2018

The paper describes static global data sets (global raster maps) of wetlands showing, with a spatial resolution of 15 arc-sec, the location of regularly flooded wetlands RFW (one map) and of a groundwater-dependent wetlands GDW or rather shallow groundwater table areas (various alternative map versions). According to the authors, the dataset is to be applied in large-scale land surface modelling (hydrological, ecological and biogeochemical modeling) and environmental planning.

General comments

The data set is accessible via the given identifier and is documented. It is significant – unique, useful, and complete. It is unique and complete in that it combines RWF and GWD. It is useful as there is currently a low level of knowledge with respect of the location and size of wetlands at the global scale and there exists a demand for an

improved knowledge. The data set usable in its current format and size.

The article itself is not yet appropriate to support the publication of the data sets.

A) In particular, the uncertainty of the data is not yet discussed enough (read more details below).

B) The authors should explain more in detail how this data set could be used for what purpose, dependent on the (large) uncertainties. Particularly difficult to utilize is the information on GDW. How could, for example, the estimated GWD distributions that are based on simple steady-state modeling of groundwater tables, without interaction with surface water bodies and without taking into account human activities, beactually used in large-scale land surface modelling? Maybe focus on results for France, e.g. Landes.

C) Please state very clearly that the wetlands identified in this data set do not correspond to wetlands with typical wetland vegetation.

D) Validation of the data set is not done correctly. I think it is not appropriate to use GDW-WTD derived from Fan et al. (2013) as validation data set as this data set is the basis of your estimates of GDW in all CW maps, directly or indirectly. It is not correct to say that the other CW maps (those were topo indices were used) are independent from GDW-WTD as the total area of GDW (15% of land area) that is only distributed via the topo indices is prescribed by GDW-WTD. Do not use GDW-WTD as a validation data set.

Regarding a clearer presentation of uncertainty, please discuss 1) the uncertainties of the GIEMS-D15 (and in particular the underlying GIEMS data set) and 2) the GDW data set that, with the resulting 15% of global land area being identified as GDWs by global groundwater modeling (Fan et al. 2013), also constrains the topographic index-derived GDWs.

Regarding 1), the work of Adam et al. (2010) indicates that GIEMS overestimates

inundation area in the Netherlands and Northern Germany and more so in India (if rice paddies are taken into account), likely due to confounding wet soils with inundated areas. This was later supported by unpublished work (Master thesis of Matthias König). Here, the author compared Landsat ETM+ scenes with GIEMS and found a strong overestimation of inundation extent by GIEMS in Ganges-Brahmaputra and Parana river basins during and after months with more than 100 mm rainfall. Evaluating the presented RFW map for the Netherlands and northern Germany (around Hamburg), I do not find it realistic that so many km2 of land are inundated on average in one out of twelve months. I suggest providing the dataset on Google Earth such that the validity/uncertainty of the data set can be judged more easily based on local knowledge about e.g. the mean annual maximum extent of inundation that was predominantly used to produce RFW.

Regarding 2), I would think that with the steady-state groundwater flow modeling approach of Fan et al. (2013), an overestimation of areas with shallow groundwater tables is very likely. In this approach, the location of surface water tables is not taken into account but groundwater flows out freely and is removed if the groundwater table exceeds the land surface elevation. However, rivers are in most cases incised into the land surface, i.e. the river channel forms a long depression as compared to the surrounding floodplain such that the groundwater table will be lowered in comparison to the Fan et al. (2013) approach because the drainage level is lower.

It would be interesting to better understand the map of potentially wet zones in France. With 23% of France being wetland, or rather a potentially wet zone, is this based on having 23% of France covered by soils with hydromorphic features? Do you have an idea about the actually wet area in France, taking into account human impact? Are there maps for France for RFW? Commissioning error in Berthier et al. (2014) is high (75% of validation points are wrongly classified), what does this mean for your comparison?

Specific comments

P4L29ff: Why did you exclude only natural lakes and not also reservoirs that can are estimated in the GRanD database to cover 305.000 km2? Please mention.

P6L6: Modelled WTD was not constrained by observations by Fan et al. (2013) but only compared.

P7L9-10 and Table 1: GLWD-3 values listed in Table 1 actually do not include lakes and reservoirs, and not the Caspian Sea (see Table 3 in Lehner and Döll 2004). Why do the values in the table differ from the values on page 7?

Please explain more clearly in the manuscirpt why the 15% assumption works better than the 6% assumption, by referring more strongly to Table S1.

Technical comments

P6L16: 1-meter DEM?

P16L33: illegible

References Adam, L., Döll, P., Prigent, C., Papa, F. (2010): Global-scale analysis of satellite-derived time series of naturally inundated areas as a basis for floodplain modelling. Adv. Geosci., 27, 45-50. doi:10.5194/adgeo-27-45-2010.

Interactive comment on Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2018-87, 2018.