

Interactive comment on “Using modelled discharge to develop satellite-based river gauging: a case study for the Amazon Basin” by Jiawei Hou et al.

Anonymous Referee #1

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The study combined hydrological model outputs and satellite-derived surface inundation to develop satellite-based river gauging. The idea is interesting and potentially very useful, but the approach does not seem to me an optimal one with severe restrictions.

(1) Page 3 Section 2: “The fundamental assumption in our methodology is that there exist strong, monotonic relationships between remote sensing signal, surface water extent, river channel storage, and river discharge.” This assumption is the basis of the whole study while it may not be true for many cases due to low-quality inundation observations caused by cloud (for optical sensors) or dense vegetation (for both optical and microwave), reservoir regulations, hilly terrain and inhomogeneity of the study re-

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gion. The approach developed under this assumption will inevitably find difficulties for global applications.

(2) Section 2.3.2 “A Spearman correlation > 0.6 in a grid cell ($0.05^\circ \times 0.05^\circ$) was used to identify a potential river reach for developing SGR”. It seems a paradox to me. If the high correlation implies the good quality of model and satellite results, why not use model simulations alone? In other words, under such high correlations, satellite retrievals do not provide much support on improving the model predictions.

(3) Why not use assimilation techniques and refine the model predictions by incorporating the satellite-derived inundation data?

(4) Overall the gauge readings are well correlated with satellite inundation data for the Amazon region (Pham-Duc et al., 2017). It will be interesting to check one more major river basin for evaluating the method.

(5) There are several satellite inundation data sets (e.g. long-term record described in Pham-Duc et al., 2017). What about the alternative choices of using these data sets?

Minor issue: Page 12 “A likely reason for this is that MODIS optical remote sensing is limited to clear-sky conditions and requires surface water to be unobscured by a dense vegetation canopy while GFDS passive microwave remote sensing is not affected by either of these factors”. This statement is not accurate since passive microwave also has its limitations when sensing land surface over severer weather or dense vegetation conditions.

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