

# ***Interactive comment on “Swath altimetry measurements of the mainstem Amazon River: measurement errors and hydraulic implications” by M. D. Wilson et al.***

## **Anonymous Referee #2**

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The difficulty to estimate the river discharge of Amazon River is well known and mainly due to the influence of ocean elevation and to the width of the river. This width (several kilometres) permits to use measurements from satellites and the future arrival of SWOT mission will provide more accurate data. The method used in the paper to assess river discharge from satellites data is (classically) based on the bed topography and the water surface slope. The data of water surface elevations from SWOT mission are replaced by water elevations coming from the calculation using hydrodynamic model and distorted to have errors inside the requirements (density and accuracy of points) proposed for SWOT objectives. The input discharge is compared to the results of the

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method either using the results of the hydrodynamic model or the distorted data (either using one point per cross section of the river or an average of all the points of a cross section).

The comparison is limited to two reaches of Amazon River and the only aim seems to optimize the discharge estimate for these two reaches. These two reaches are not representative of a set of American or world rivers; then, only the method can be transferred to other cases; the results of the optimization in term of length of reach or accuracy of discharge (or water surface slope) cannot be transferred. Even, the conclusion of the advantage of using SWOT cannot be transferred to other rivers very different from Amazon River. For Amazon River itself, the real applicability of the method from actual SWOT mission is not so sure because of the complexity of the flood plain, the eventual changes or uncertainties of topography and the influence of the vegetation that can bias the actual measurements.

The presentation of the results includes both a text with a lot of numerical values that the reader cannot compare easily (one or several tables would have been much better) and graphs that contain the essential information.

From the abstract but also from the whole paper, it is difficult to understand the scientific interest of this paper. A well-known method is applied to virtual data and provides some results for two reaches of Amazon River. As not all the steps (particularly the way virtual data are obtained) are detailed, the readers will not be able to use the same method for other rivers.

Other remarks:

P. 9402: the values “0.31 m” and “2 mm” are put together without clear explanation of the calculation method for linking them

P. 9403: “32% rivers”, “1% rivers” : the authors do not explain what are the rivers concerned by these values: which length? which width? Which water depth? So the

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values are meaningless.

P. 9406: I understand that the model used includes a series of cross sections and perhaps a 2D flood plain representation; no information is provided about number and spacing of cross sections and cells, topology of the system (1D network, organization of 2D cells, etc).

P. 9407: what is the time spacing of data for calibration (minimization of RMSE)?

P. 9407: does the choice of 100 m influence the results?

P. 9408 §3.2 l.16-20: the authors do not explain why they pass by “500 m” instead of going straight to “100 m”

P. 9409: equation 4 should be explained; for instance what is the origin of the x distances?

P. 9409: equation 5 assumes rectangular cross sections. Is it the case for all the cross sections of the model? How are averaged the width and the water depth along a channel reach (or how is selected the representative cross section)?

P. 9411-9415: Mots part of the values inserted in the text could appear in tables comparing the various methods, the various parameter values and the various locations.

P. 9412: “added to the according”: one word missing

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