Hydrol. Earth Syst. Sci. Discuss., 7, C4923–C4926, 2011
www.hydrol-earth-syst-sci-discuss.net/7/C4923/2011/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Estimating river discharge from earth observation measurement of river surface hydraulic variables" *by* J. Negrel et al.

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Received and published: 31 January 2011

Dear reviewer,

We would like to thank you very much for your interesting comments. Our manuscript need an extensive work of rewriting to present in a better way our work and results. General comments Ad 1) at present, we do not have sufficient accuracy on remotely sensed river data to work with. All our work starts from this first assumption we have this data and we can work on it. In fact all the data we used are derived from ground ADCP measurements and level recordings from gauging stations. We used it as if they

were recorded from Earth observation techniques and all measured variables should come from EO in the future. Huge efforts are made to study the ability to measure hydraulic surface variables from EO and results are really encouraging. Therefore we didn't work on this part, stating, in the introduction, this will be possible in a close future. This part might be developed in section 3, to make it clearer.

The section 4 will be redeveloped and rearranged to be more coherent. We will present all the results at first, and then explore the possible error source of each assumption. The use of the hydrodynamic model also needs a thorough rewriting to explain how we used the model and what assumption the SIC model uses to compute the data. The main idea in using simulated data was to see how the model reacts with noiseless data and to control what kind of perturbation we add to the data.

Ad 2) we clearly miss the point about remotely sensed data. As we write it, these data are not suitable, for now, to estimate discharge. The estimation of surface velocity is just beginning, altimetry made great improvements and work great on Amazon River on high water stage but still has problem on low water stage and smaller river, and finally, surface slope is not measurable with a sufficient accuracy for now. In order to avoid any issues with the precision of data we only used ground measurements derived data. We process surface data just as if they were remotely sensed data. This explains we didn't discuss the uncertainty of remotely sensed data. The equation (13) present a linear regression equation; we didn't explicit the resolution method which is simple matrix computation. In this case, if the solution exists, it's unique, we can't have local minima issues.

Specific comments

Page 7841, abstract: the abstract will be developed to better summarize the work done.

Page 7841, introduction: thank you very much for this paper which seems quite interesting. We missed it when published.

Page 7841, line 25: as we say before, the remotely sensed data are not accurate enough for now to be used. We should clarify this point. What we can study is the boundaries of our method for each surface variable.

Section 2: we thought citation were clear enough. For the example of Bjerklie work, even if the equations used stem from Bjerklie et al. (2005) it seems important to us to cite both Bjerklie et al. (2003) and Bjerklie et al. (2005) as the equation were developed in the first paper and improved in the second.

Section 3: the harmonization of the symbols will be done in the whole manuscript.

Page 7844, line 6: this is a little semantic issue, we will correct it.

Page 7845: Vmoy if Vmean. We should have pay more attention using symbols while proof reading the manuscript.

Page 7845, eq (11): this is a typographic error which needs to be corrected.

Page 7845, eq(13): we have another typographic error, the equation have to be squared. As explain earlier, this is a simple linear regression and therefore it is solved using a matrix inversion. We don't have initialization point issues. It appears clear the manuscript need to explicit this point.

Page 7847, section 4: the section 4 will be completely reorganized to reach an extensive presentation of the datasets the presentation and analysis of results for each dataset and finally the exploration of the error sources.

Page 7848 section 4.2.1: the question of the explanation of α has arisen while writing the manuscript. We finally decided to place it with the analysis of a possible error source because the formulation of the assumptions initially came from the current knowledge in hydraulic, observations only confirmed the validation of α value. While using the mean measured bottom elevation to calculate discharge, we point out the fixed α value is consistent with Obidos data. And in the same time, a fixed mean bottom elevation too. This only applies on equation (8) which don't need the K parameter

value.

Page 7849 section 4.2.2: analyzing the influence of the Strickler parameter is quite difficult to lead as we can't measure it directly. The conclusion will probably be removed from the revised paper.

Page 7849, section 4.2.3: The flow depth appears higher at Obidos gauging station than Manacapuru station. Therefore, this it can be another source of invalidation of the assumption. We will include and discuss this point in the new version of the manuscript.

Page 7852 conclusions: The conclusion, as the abstract, will be thoroughly rewritten and the conclusion about Bjerklie's models weakened as we didn't mean to disparage this work, we just wanted to test it as a first approach.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 7839, 2010.