Response to Editor Comments for HESS Discussion Article

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Sulistioadi, et al., 2014

Satellite Radar Altimetry for Monitoring Small River and Lakes in Indonesia

1. General Comments

The authors gratefully thank the editor for her critical comments and suggestions. These comments and suggestions are vital in improving the quality of this manuscript, as the authors desired.

As the response to your suggestions, in the following pages you will see that each concerns from the two reviewers addressed. We also have been improving the proof reading as well as the presentation quality of this manuscript.

Thank you and best regards,

Y Budi Sulistioadi

On behalf of all authors

Response to Anonymous Referee #1 for HESS Discussion Article

doi:10.5194/hessd-11-1-2014

Sulistioadi, et al., 2014

Satellite Radar Altimetry for Monitoring Small River and Lakes in Indonesia

1. General Comments

The authors gratefully thank the 1st anonymous referee for his/her critical comments on the revised version of the article. In the following section, each comments are addressed. The manuscript has also been revised according to the minor comments listed afterward.

2. Major Concern

As has been documented by previous authors, the retrievals of water level become extremely challenging even for a medium size river (40-800 m). In this manuscript, authors also experimented on the river level retrievals in which the river widths varied from 8-45 m. In this experiment, the authors cannot even identify the crossing point from the Landsat data (resolution 30 m). The authors' use 1 m pan-sharpened IKONOS data to identify the crossing point between the river and the altimetry ground track. No Validation has been carried out. As far as I see, there is so much of uncertainty of their experiment for the water level retrievals for widths between 8-45 ranges. Furthermore, the comparison of the water level anomaly data and with the TRMM data (Figure 8) does not provide any added information to the manuscript. It is very hard to see if there is any correlation between these two variables. So, would you please provide any single reason that why you need to keep this section in this manuscript? (Line no 8, Page 10)

Solutions/Explanations

First of all, let us clarify the classification of the river based on the width (Meybeck et. al., 1996):

River Size	Avg. Discharge (m^3/s)	Drainage Area (km^2)	River Width (m)	Stream Order
Very large rivers	> 10,000	> 10^6	> 1,500	> 10
Large rivers	1,000 – 10,000	100,000 - 10^6	800 – 1,500	7 to 11
Rivers	100 – 1,000	10,000 – 100,000	200 – 800	6 to 9
Small rivers	10 – 100	1,000 – 10,000	40 – 200	4 to 7
Streams	1 – 10	100 – 1,000	8 – 40	3 to 6
Small streams	0.1 – 1.0	10 – 100	1 – 8	2 to 5
Brooks	< 0.1	< 10	< 1	1 to 3

So, this research is talking about two river classes, i.e. the small rivers (40 – 200 meters width), which is represented by the Karangmumus River and “rivers” that we called “medium-sized rivers” (200 – 800 meters width), that is represented by the Mahakam River. Part of the Karangmumus River even represented the “streams” class since its width is less than 40 meters.

We admitted one error which is, merged definition of "small-sized river" and "medium-size river" in the Page 8, Line 10 of the manuscript (40-800 m width) and we have now separated the definitions for both classes (small-sized river: 40-200 m width, medium-sized rivers: 200-800 m width). We realized that even with the plot contains estimated precipitation data from TRMM, it is still hard to synthesize the relationship between the precipitation and the water level anomaly for very small river (i.e. Karangmumus River, width 8-45 meters, categorized as "streams" in Meybeck et al. (1996) classification). We also realized that the absence of in-situ water level data for part of the 2002-2010 period made it even more difficult to validate the altimeter measurements over this very small river (stream).
However, it is important to show to the scientific communities that these challenges exist. Even an experiment without a glorious success is still worth it to present at least to tell the reader that similar experiment with such a very small river may not be successful in the future. We have had started a good way to identify the valid altimeter measurements (i.e. through a very-high resolution optical remote sensing imagery), thus we are confident that these results also call the other researchers to further investigate and find a solution for this essential problem related to the altimetry's spatial resolution. Overall, we see this section is relevant, thus would like to keep it in the paper.

3. Technical Corrections

Page	Line	Issues	Solutions in the revised version of manuscript
10	16	Roman numerals (i) was not continued	The list is now continued
	23	Numbering for Figure 3, include in the text	The text is now including the panel's numbering
	26	Consider to include a similar method with weight to discriminate non-water waveforms	Michailovsky et al. (2012) approach on waveform selection is now presented with a comment on its comparison with the approach implemented in this study
11	22	Incorrect citation	deSa, 2007 has been replaced with de Sa, 2007 The reference list has also been updated
12	28	Replace best w/ better	Fixed
13-14	27-4	Experiment with very small river	This major concern/question has been addressed in section 2 of this response. In short, we believe that this research paper should not only present successful experiment, at least to communicate with other scientists about the limitation of the altimeters.
	18-19	Consistent use of Fig.	Fixed. Figure is now used throughout the text

Response to Anonymous Referee #2 for HESS Discussion Article
doi:10.5194/hessd-11-1-2014
Sulistioadi, et al., 2014
Satellite Radar Altimetry for Monitoring Small River and Lakes in Indonesia

1. General Comments
The authors gratefully thank the 2nd anonymous referee for his/her critical comments on the revised version of the article. In the following section, each comments are addressed. The manuscript has also been revised according to the minor comments listed afterward.

2. Plots of the result
The in situ water level data looks quite different from the previous version of the manuscript. If any additional processing was carried out please specify this. If you have chosen to only show data on the day of altimetry measurements, I would recommend changing this: it masks one of the major limitations of satellite altimetry over rivers which is that the temporal resolution will make it miss many short events.

Solutions/Explanations
Regarding the difference of the plots compared to the previous submission, we have been included the following explanation as part of the author response:
"There was a period (before October 2002, we suspect as a spin up period) when the altimetry measurement data were offset constantly from their mean. Now, these data have been discarded from the processing."

In the previous submission, we also have followed your suggestions to double check the RMS error value, especially those for Lake Matano. Related to this, we revised the plot in the previous submission so it was showing the in-situ gaged water level anomaly **only at the days of altimetry measurements**. The purpose was to provide a clear picture to the readers that the altimetry measurements were evaluated against the in-situ data in the same period. Below is the explanation we provided in the previous response.
"The solid line that represents the in-situ measurements was including the water level anomaly that was not used to validate the satellite altimetry measurements (i.e. higher interval of background in-situ measurement). As the result, the in-situ water level looked very smooth, thus the difference between the altimeter- and in-situ measured points looks more contrast and impressed the reader that the error was significant. The revised manuscript is now presenting only in-situ water level anomaly that used to validate satellite altimetry measurement only."

For now, we prefer the current plots because:

- We evaluated the performance of the satellite altimetry measurements by comparing them with the in-situ water level measurements on the days when altimetry measurements were available.

- Plotting the satellite altimetry measurements along with the in-situ water level measurements with higher intensity (i.e. not only the days when altimetry measurements were available) may raise confusions among the reader, similar to what happened during our first submission.
- We have provided plenty explanations on the spatial and temporal limitations of satellite altimetry at the different sections (e.g. 4.1, 4.2 and 5).

3. Additional Concerns

The following issues have now been resolved

Page	Line	Issues	Solutions in the revised version of manuscript
Fig	8, 11	Remove the precipitation data	Plots have been revised, precipitation data removed
	9	Need x-axis description	X-Axis Label added
16	25	Include RMS error in the conclusion	RMS error is now included in the sentence
	9	Distance to lakeshore	Due to inconclusive results, we recommend to further investigate this hypothesis in the future research