Detection of inundation areas due to the 2015 Kanto and Tohoku torrential rain in Japan based on multi-temporal ALOS-2 imagery

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Our responses to reviewers' comments are written in Italic letters. Red letters are sentences reflected in the revised paper taking the comments.

This paper describes the application of ALOS PALSAR-2 images for flood mapping after a torrential rainfall in areas in Japan. The paper is generally well written and follows a clear structure, however I question somewhat the novelty and value of this study based on my comments below. I recommend carefully addressing all those comments.

Response: Thank you for your kind comments.

- Reference other studies on flood mapping algorithm for SAR. I feel the authors missed many of those recently published.

Response: The introduction was reorganized and more references were added.

- Better explain in how far this method is different from the procedure employed by the authors in a previous study

Response: according to the comment, we added a paragraph as "In the previous study (Yamazaki and Liu, 2016), the inundation areas in the three co-event PALSAR images were extracted using one threshold value of -12.4 dB, which was estimated by comparing the backscatter intensity for the original water regions (Kinugawa and Kogai rivers, Sanuma lake) and the other areas in the whole study area. As a result, 20.4 km2 on September 11 and 16.3 km2 on September 13 were extracted as inundations. Since the threshold values used in this study were -13.5 dB for September 11 and -14.2 dB respectively, lower than the previous study, the extracted areas including the inundated built-up areas were similar in size to that of the previous results. However, the producer and user accuracies increased 3%, whereas the O.A. increased 2% for the results on September 11. For the results on September 13, the producer accuracy decreased whereas the user accuracy increased from 68.8% to 87%. The O.A increased significantly from 77.4% to 81.3%, while the kappa coefficient increased from 0.53 to 0.58. The induvial threshold values for the images taken in different acquisition conditions were more effective than one common value."

- The authors show how the thresholds are selected but it seems to me this is all based on a rather manual technique requiring auxiliary data such as land use. I like the approach but I think, especially in the light of the many recent SAR-based techniques for flood mapping that are fully or semi-automated, the authors should clearly refer to those studies as well and also consider at least applying some of those for comparison. Furthermore, the authors need to justify why their rather simple, manual method should be preferred.

Response: We added the comparison of the proposed method and an automated thresholding method in the new chapter for discussion.

- For the urban area detection, the authors base this on intensity difference but I feel this should be done using coherence information. A couple of papers were recently published using coherence information to attempt mapping flooding in urban areas. In my opinion, using intensity and how this is done, is unclear to me and I question the validity of this part. The mapping results may be OK but then I doubt that the method presented here can be extrapolated to other areas.

Response: We added the references for the detection of inundated urban area. Since coherence is calculated from two temporal images, more than 3 temporal images (two pre- and one post-event) taken in the same acquisition condition are necessary for change detection. Thus, we did not use coherence in this study.