

Interactive comment on “Snow cover data derived from MODIS for water balance applications” by A. Gafurov and A. Bárdossy

A. Gafurov and A. Bárdossy

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We are very grateful to Dr. J. Parajka for his review of the paper. Following are statements to his comments:

The paper is revised with many changes commented by all reviewers. Several comments that can not be answered here directly because of length of texts will be included in the final revised paper.

General comments

J. Parajka: From the scientific point of view, the study needs to be, in my opinion, complemented and extended. The hypothesis (the proposed mapping approach) should be more thoroughly verified. The proposed approach seems to be very efficient in cloud removal, but the accuracy assessment needs to be more complex. In my opin-

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ion, taking only two images for a robust hypothesis verification is simply not enough. I understand that the study region is probably not covered with sufficient ground observations, but there are certainly several alternatives which may be used to do the task. These may include e.g. assessment based on greater number of days (seasonal accuracy assessment), considering clear days as partially cloud covered, comparison with another type of remote sensing products etc.). The more general conclusions, e.g. seasonal assessment of the accuracy, performance of individual steps, its relation to different elevation zones or land cover will be certainly of interest to the readers. Additionally, the clarity of presentation should be improved.

Gafurov et. al.: Results and validation are carried out for greater number of days and will be presented in final revised version of the paper. More general conclusion for performance of individual steps is also explained in extended discussion and conclusion section of final revised paper.

Comment 1.

J. Parajka: Please consider to change the title. As it is presented, the main objectives are methods for cloud reduction, not the snow cover application for water balance assessment.

Gafurov et. al.: The title of the paper is changed from Snow cover data derived from MODIS for water balance applications to Cloud removal methodology from MODIS snow cover product.

Comment 2.

J. Parajka: Abstract should be revised, focusing more on the results found than the general statements.

Gafurov et. al.: The abstract is revised in the final revised paper according to the comment.

Comment 3.

J. Parajka: Please discuss and justify in more detail the selection and order of the six steps procedure.

Gafurov et. al.: This is also done and will be submitted with the final revised paper.

Comment 4.

J. Parajka: I would suggest to extend the Methodology with the Accuracy assessment section. This should include the description of methods used for the hypothesis verification (e.g. contingency table, etc.)

Gafurov et. al.: Accuracy assessment is discussed in the Methodology section as well as in validation section in the final revised paper.

Comment 5.

J. Parajka: The results section should more balanced. The example presentation is fine, but more general assessment (e.g. seasonal) of the results is needed. Please consider to revise the Figure 16 (it is very difficult to read) and to combine the example maps into single figure.

Gafurov et. al.: More general assessment of the results is done using greater number of days for results representation and also for validation of the methodology. Because of insufficient information due to cloud and snow coverage, seasonal assessment of results was not possible to carry out. The Figure 16 is revised. Hopefully this will be clear enough for results visualization purpose. The example maps are combined into single figures.

Comment 6.

J. Parajka: A discussion of the results is completely missing. Please provide a discussion, which will highlight the benefits, uncertainties and disadvantages of the proposed method in comparison to existing studies.

Gafurov et. al.: A discussion part is included in the final revised paper.

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Specific comments

1)

J.Parajka: Introduction: There are some others studies focusing on the cloud reduction (Liang et al. 2008, Pepe et al., 2005, Wang et al., 2008 and accepted) and snow cover mapping in similar region (Khan, Holko, 2008). Please cite them.

Gafurov et. al.: The studies by Liang et al. 2008, Pepe et al., 2005, Wang et al., 2008 are reviewed and used in this study for improving the quality of the paper. The citations for those studies are done as well.

2)

J.Parajka: p.798: The fourth approach is not clear. Which three direct pixels are examined?

Gafurov et. al.: Four direct side-bordering neighboring pixels of the cloudy pixel are examined in this approach. If at least three pixels are defined as snow, then the cloudy pixel is also assigned to be as snow covered pixel. The same applies for land covered pixels. It is possible that this assumption is not always true, but the probability of a pixel having the same cover as at least three of its direct neighbouring cells is higher than the middle pixel having the opposite cover. This is included in the final revised paper as well.

3)

J.Parajka: It may be interesting to see the performance of individual approaches (not applied in the sequence).

Gafurov et. al.: This is done in the validation section in the final revised paper.

Thank you for your comments!

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