Hydrol. Earth Syst. Sci. Discuss., 10, C6794–C6798, 2013
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Hydrology and Earth System Sciences
Discussions

Interactive comment on "A statistical approach for rain class evaluation using Meteosat Second Generation-Spinning Enhanced Visible and InfraRed Imager observations" *by* E. Ricciardelli et al.

Anonymous Referee #2

Received and published: 17 December 2013

The authors propose a new algorithm for rainfall intensity classification with high spatial and temporal resolution based on MSG SEVIRI. The technique uses a k-nearest neighbor mean classifier that is trained with rain rate from AMSU-B data. Different spatial and spectral features extracted from MSG SEVIRI channels are considered in the classification algorithm.

I think the manuscript needs some major revisions before I would recommend it for full publication.

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The presentation of the different steps in section 3 should be better structured and more precise.

The authors should elaborate more on deficiencies of existing retrieval techniques and the potential benefit of the presented technique, especially of the rain intensity differentiation.

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The presentation of the different steps in section 3 should be better structured and more precise.

The authors should elaborate more on deficiencies of existing retrieval techniques and the potential benefit of the presented technique, especially of the rain intensity differentiation.

The training and validation dataset should be extended.

The title "... rain class evaluation ..." is misleading. I suggest changing it to "... rain intensity differentiation ...".

The English should be revised.

Section 1:

The authors should focus more on the deficiencies of existing satellite-based techniques. Why is the present study necessary? What would be the advantage in contrast to other existing techniques?

What would be benefit of the presented rain class differentiation for further satellite-based rain retrievals?

Section 2:

The information on MSG is not correct. Please correct this.

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It would be interesting to evaluate the performance of the proposed technique separately from uncertainties introduced by the PEMW algorithm. For comparison I suggest to train and validate the technique with independent data from the radar network.

Section 3.1:

The authors should describe the extensions of the original MACSP algorithm mentioned in section 3.1 in more detail. This should include a description of the considered features as well as the approach for cloud type classification. Given the mentioned update of the MACSO algorithm the training dataset and the validation dataset should be increased. The validation results should be presented and discussed separately in the results section. Page 13679, line 6 to 7: Please explain in more detail how the training dataset “has been updated”.

Page 13679, line 5: The reference to table 2 is wrong. Please correct.

Page 13679, line 12: Please specify “outliers”.

Page 13679, line 11 to 14: Please specify how you “refine“ the “training dataset”.

Section 3.2:

Page 13681, line 5: Please provide a flowchart showing the structure and sequence of the procedure described in section 3 instead of figure 1.

Section 3.2.1:

Please explain the considered spectral and spatial features. Why have you chosen features for cloud detection to classify rain areas? An overview of the spectral and spatial features before and after the selection (Table 6) should be given. The calculated discriminatory power of the individual features should also be presented and discussed. The results should be presented separately for daytime and nighttime scenes.

Page 13681, line26, 27: Please explain the considered time lags of 15, 30 and 45 minutes in more detail.

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Page 13683, line 4 to 5: This sentence is not clear to me. What is meant by “training samples for each class”? I suppose the training set consists of temporally and spatially collocated MSG and AMSU-B scenes.

Section 3.2.2:

The training dataset should be extended over a greater time period and include more nighttime scenes.

Is the training and application done separately for land and sea areas and for daytime and nighttime scenes? If so, explain how.

Please explain the bootstrap procedure in more detail using the concrete training dataset. The whole purpose is not clear to me. I think it is easier to extend the training dataset by considering more precipitation events. Could you please provide a comparison of the training dataset before and after the bootstrap procedure?

Page 13683, line12 to 23: These lines should be included in section 2.

Page 13683, line25: The reference to table 3 is wrong. Please correct.

Page 13683, line26-27: Please explain in more detail how the MSG and AMSU-B scenes are spatially and temporally collocated for the training dataset?

Page 13684, line 1: Please explain to what extent the k-NNM classifier is a pattern recognition classifier and how patterns are considered by the features in the training dataset.

Page 13684, line 4: Please explain the application of the CNN rule in more detail.

Page 13685, line 6 to 12: These lines should be included in the results section.

Page 13685, line 13 to 14: What reference dataset was used for the cross-validation?

Page 13685, line 14 to 15: Please explain in more detail how the features in table 6 were selected. Table 6 should be revised to make it clearer. The presented feature and

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the expected usefulness for rain classification should be explained.

Section 4:

Table 1 is not mentioned in the text. Please correct. Please use the same statistical scores for the validation of the cloud mask and for the validation of the rain intensity classification.

The validation dataset should be extended over a greater time period and include night-time scenes.

The presentation of the results should include a discussion of the results in comparison to other techniques.

The interpretation of the results for the case studies is too positive. Please rephrase the respective sentences.

Section 5:

The conclusion should be revised. At the moment it just repeats the results section. The authors should elaborate more on further steps to improve the presented algorithm and discuss the potential benefit of the presented technique in comparison to other retrieval techniques.

Page 13687, line 25: “rainy/non rainy class”. Please use consistent wording throughout the manuscript (e.g. “rain intensity classification”).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 13671, 2013.