

# ***Interactive comment on “Detecting cloud contamination in passive microwave satellite measurements over land” by Samuel Favrichon et al.***

## **Anonymous Referee #1**

Received and published: 16 November 2018

### General comments:

The manuscript addresses an interesting issue frequently ignored when retrieving Land Surface Temperature (LST) from satellite microwave (MW) data, namely a possibly non-negligible impact of cloud contamination on MW measurements. The developed neural network (NN) approach to cloud detection in MW data can use various channels available on MW imagers over the years, thereby making it applicable to historical and current satellite sensors. The training data consist of suitably filtered MW data (input) and SEVIRI cloud masks (desired output): ambiguous scenes were removed to avoid training the NNs with incorrect data, which improves the NNs ability to dis-

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tinguish between cloud-free and cloud contaminated data. The reported results are in good agreement with previous findings, e.g. precipitation detected with Ferraro's (1977) method in MW data agrees well with the fraction of cloud contaminated MW observations detected with a NN and a suitably chosen threshold. The presented NN approach helps to ensure the accuracy of all-weather LST products retrieved from MW data.

The manuscript is well structured and generally well written, but needs proofreading. Particularly the abstract has to be improved (formulation, construction of sentences, spelling); however, the other parts of the manuscript also require another round of proofreading and stylistic improvements.

Specific comments:

- In the abstract it should say 'Meteosat Second Generation - ...'.
- Please check your use of the definite article.
- In modern English the word 'meanly' has not the meaning that is intended: consider using 'moderately' instead (many occurrences).
- I recommend to make the tables more reader-friendly, e.g. consider using different grey tones for the rows, swap columns 'Cloud type number' and 'SEVIRI class description' in table 2 (so the numbers are directly next to their respective labels), narrower tables 3, 4, 5, 6 (consider using background colours for the rows) .
- In table 4, please avoid two lines of text for the labels in the left column
- In table 5, consider providing the associated SEVIRI class numbers in the left column

Figure 1:

- Consider using different line styles for low, medium and high clouds
- Caption : 'The average frequency of each cloud type over these 2 months is indicated

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in the legend.'

Figure 2:

- Insert tick marks for all x and y axes
- Consider using different line styles for low, medium and high clouds

Sections 3.1 and 3.2:

- You write about the data and the training, but there is no information on the NN software you used.
- I suggest providing figures showing the topologies of the 5-5-1 (and the 5-5-11?) network with appropriate labels - this would be more intuitive for the readers.
- Please write which NN training algorithm was used – simple Backprop or something more elaborate?
- Please provide information on the number of iterations / time required for the results to converge.
- Which stop criterion was used?
- Which hardware was used (e.g. standard office PC)?

Figure 5:

- Consider inserting a vertical line at  $x=0.1$  to illustrate the threshold recommended in the text.

Figure 6:

- The subplots are too small. Consider showing two columns with the current top subplots as left column and the current bottom subplots as right column. Maybe also reduce geographical region. The colour scheme for SEVIRI clouds is too complex – at least I find it hard to see much in the LR subplot.

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- Caption: please mention that the squares in the figures are explained in the text.
- The last sentence of the conclusions could be more specific (and up-beat).

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-352, 2018.

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