Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2020-419-RC3, 2020

Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation of VIIRS Neural Network Cloud Detection against Current Operational Cloud Masks" *by* Charles H. White et al.

Anonymous Referee #4

Received and published: 7 December 2020

A new neural network cloud mask for VIIRS measurement is presented. The neural network is trained with collocated CALIOP observations. Using a global testing dataset of one year, the performance of the neural network is evaluated, using several metrics, for different categories like land/water, day/night, latitude range and varying COT threshold. Results show general good agreement with mean cloud fraction from CALIOP, including consistency between different categories, though larger differences are found for small-scale, low-level clouds. Comparison to two operational VIIRS cloud mask show that the neural network outperforms them for almost all conditions, however also here the struggle with small-scale, low-level clouds is evident. The largest improvements are found for collocations at higher latitudes.

In general the manuscript is well structured. The method is clearly presented, including many corresponding references , and considerations made during the set-up of the neural network well explained. The manuscript could benefit from some additional information on the data used as well as from more details on the two operational cloud masks. The assessment of the performance and comparisons are done in multiple ways and accompanying figures clearly presented and explained. Issues and differences are analyzed and extensive discussion provided.

Minor comments/questions:

Line 85: Before going straight to the Collocation Methodology I would recommend to add a small subsection on the VIIRS instrument/observations as well as for the two operational cloud mask swith which a lot of comparisons are done.

Line 86: Also some more information on the CALIOP data could be provided, like what is the width of one cloud layer, time of overpass etc.?

Line 105: Would be nice to see a global map of sampling frequency of valid collocations for the training dataset, maybe even per season, like is presented for the testing dataset (Fig. 6 b).

Line 108: Observations in form of radiances/brightness temperatures? Please provide more detail on the input for the neural network.

Line 109: How are the eight categories combined?

Line 175: It is not clear to me how the sun glint scenes are labeled, on a pixel-basis? There is a reference, but some more information would be nice.

Line 202: All inputs are standardized.. meaning for the 3 x 3 pixels?

Line 217: Already refer to corresponding equation numbers.

Line 314: Why not continue with BACC?

Line 351: How are the surface temperature from the model matched, spatially and temporally, with the measurements? Some more detail should be provided.

Line 354: are smaller than

Line 360/Fig 6.: The large negative difference for the grid cell in front of the coast of Namibia, could that be related to biomass burning aerosol layers?

Line 472: Could some (pseudo) labeling technique be useful here? Or using a larger pixel matrix than 3 x 3? Maybe combined with taking information from not only 1 CALIOP profile but from adjacent profiles as well?

Technical corrections Line 29: ..large amounts of training data.. Line 47: ..how a very simple.. Line 298: .. compared to the MVCM.. Line 323: All of the previous.. Line 325: ..depend on the particular.. Line 363: the distribution of the.. Line 423: .. may be a result of sea ice cover. Line 428:.. is subject to a large amount..

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