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Atmospheric Measurement Techniques Discussions

Interactive comment on "Detection of ground fog in mountainous areas from MODIS day-time data using a statistical approach" *by* H. M. Schulz et al.

Anonymous Referee #2

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The paper presents a pixel-classification algorithm (called DOGMA; "Detection Of Ground fog in Mountainous Areas") to detect ground fog in mountainous area based on a statistical approach and MODIS data. The DOGMA algorithm has been then applied in mountain cloud forest of Taiwan and validated using local ceilometer instruments. The paper summarized an important research activity about the difficult task of detecting ground fog from space and it is well written and structured. So, I recommend the paper for publication in AMT. A few important specific questions and suggestions that I would like the authors to address are:

- The main concern about the paper is why authors used MODIS Collection 051 instead of Collection 6 (C6). In particular since MODIS C6 cloud optical products (MOD/MYD 06) now provide the cloud optical thickness for partially cloudy pixels (PCL) and cloud

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edge pixels are mostly classified as PCL?. For the development of a ground fog detection algorithm the cloud optical thickness for PCL pixels seems to be an important information that are not used in the current paper?

- A key message that should appear in the conclusion is that the cloud optical thickness (COT) at 250m is important for detecting ground fog (even if it is not clearly demonstrated in the paper: DOGMA performance differences using 250m and 1000m COT?) and that future MODIS collection should provide the COT at 250m and/or 500m.

- The DOGMA algorithm is mostly based on the statistical relationship between the terrain height and the cloud optical thickness and the authors have demonstrated how this information can be used to detect ground fog. However the cloud optical thickness wavelength is not clearly specified in the paper (I assume the authors used the cloud optical thickness at 2.1 micron?). A following question is: why not used the cloud optical thickness at 1.6 or 3.7 microns providing by MODIS cloud optical products? What is the relationship between the terrain height and the cloud optical thickness at those wavelengths? Cloud optical thickness at 1.6 and 3.7 do not provide additional information that can be used to improve the ground fog detection algorithm?

- The data heteroscedasticity showed in figure 4 (Optical thickness vs DEM height) is quite important. Why not try first to adjust it by using data-transformation such as log transformation?

- Validation analysis. Authors use confusion matrices (table 5) and some statistical measures (MCC, PC, etc table 6) to do the validation analysis. I suggest here to use in addition a ROC (Receiver Operating Characteristic) curve to improve and highlight the paper's results (Example for DOGMA: True Positive Rate: 135/(152+135) = 0.47 vs False Positive Rate 115/(115+1138)=0.09). A ROC curve generally summarizes classification algorithms performances in one simple plot.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 12155, 2015.