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Interactive comment on "**Applying Deep Learning to NASA MODIS Data to Create a Community Record of Marine Low Cloud Mesoscale Morphology**" *by* **Tianle Yuan et al.**

Anonymous Referee #2

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The authors report an interesting work of applying a deep learning model to 16 years of satellite data to create an observational classification of marine low cloud mesoscale morphology. The deep learning technique is quite novel in this area of remote sensing measurement and analysis. The science topic is also of interest to the atmospheric and climate science community. The paper is well written. I only have a few minor comments and questions for the authors to consider for improving the presentation quality of the paper.

Specific comments:

Line 18: Considering that AMT is an international journal, the authors might want to

clarify on "NASA funded project" or remove it (which I don't think is critical to mention here)

Line 21, Line 52, Line 77: Are these (128x128 or 256x256) the number of pixels? Is the pixel size 250 m? Please clarify in the main text. I wonder how the size of each scene has been determined. I imagine that a too big or too small size might cause some ambiguity in the classification of mesoscale cloud morphology. For example, some of the disorganized MCC scenes in Figure 7 look like evolving open-cell or closed-cell MCC. Have any sensitivity tests been performed to decide on the scene size for the training data?

Line 97-98: Except for the scenes got filtered out, does each scene have to belong to one of the six types when being analyzed for the frequency distribution? Please clarify.

Line 105: Is the droplet size information used for disorganized MCC in the classification algorithm? This could be useful to remove ambiguity mentioned above.

Line 141: how does rotating or flipping scenes help to increase the open-cell MCC sample size? That makes me wonder how the orientation of each scene affects the pattern recognition of the deep learning model here.

Line 160-162: Was each scene in the training dataset labeled by at least two people? How if there is a disagreement?

Line 226-227: Please clarify on the "internal mechanisms". Are you referring to the self-organizing mechanisms (e.g., Feingold et al., 2010)? Feingold G, Koren I, Wang H, Xue H, Brewer WA. (2010): Precipitation-generated oscillations in open-cellular cloud fields. Nature 466:doi:10.1038/nature09314.

Line 330: More details are needed for the PDFs in Figure 4. How many scenes? What time periods and regions?

Technical corrections:

Line 78: No more than 10% of the scenes got filtered out? Please clarify.

Line 117: classify -> classifying

Line 146: remove the first "low"

Line 311: units of LWP in Figure 2 are wrong.