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# Comment on acp-2021-771

Anonymous Referee #1

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Referee comment on "New particle formation event detection with Mask R-CNN" by Peifeng Su et al., Atmos. Chem. Phys. Discuss.,
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The manuscript by Su et al focuses on automatic identification of new particle formation (NPF) events with particle number size distribution surface plots from filed observations. A deep learning model, Mask R-CNN, is introduced to identify NPF events in this work. Compared to traditional manual classification, the Mask R-CNN model shows much higher efficiency and prevents bias from subjectivity. In addition, the model can determine the growth rates and start & end times for NPF events and the statistical characteristics of identified NPF events also are analyzed. The paper is within the scope of ACP and is recommended for publication after the following suggestions/comments are addressed.

Major:

- In the section of ***2.3 Mask R-CNN***, description of the model is rather brief. The readability will be enhanced if authors provide a general description of convolutional neural networks and more details of the model, especially for ones not familiar with deep learning.
- The Mask R-CNN model in this work was tuned with fixed training-validation ratio (300/58). Is testing set not necessary for the evolution of the model? Besides, the reason for choosing the training-validation ratio (300/58) and image size (256 × 256 pixels) should be explained, although it is mentioned that the Mask R-CNN model is insensitive to the sizes and aspect ratios of the input NPF images. (line 234-235)
- As stated in line 123, there seems no distinct boundary between â i-type NPF events and the Undef types, i.e. the overlapping between different types may occur. Hence, the uncertainty due to the overlapping should be discussed in the main text.
- In line 142, the value of objectiveness score is limited within the range of [0, 1]. However, how the value of objectiveness score corresponds to the exact classification type is not clear in the main text. This would originate from the characteristics of Mask

R-CNN, and the authors should give an explanation.

- As shown in Table 1 & 2, the accuracy/performance of the model is dependent on the threshold of the objectiveness score, and the threshold of objectiveness score could vary dramatically when applying the model to other datasets. Can we simply set the threshold 0 to get the maximal accuracy? The authors should discuss the general criterion to choose the threshold of the objectiveness score.
- The ***Conclusion*** section is too plain. The authors may want to summarize the novelty of this work here by comparing with previous works or point out the implications for future research.

Minor:

- The title is too closed to a previous study (Atmos. Chem. Phys., 18, 9597–9615, 2018) and suggested to be reorganized.
- In line 170, one may not identify the misclassification of NPF types directly from the Tables.
- According to the description in line 195-201, there may be some errors in the first panel of Figure 7.

**REFERENCES**

Joutsensaari, J., Ozon, M., Nieminen, T., et al., 2018. Identification of new particle formation events with deep learning. Atmos. Chem. Phys. 2018, 9597–9615.