

Dear Wiebke Frey,

Thank you for giving us the opportunity to improve the introduction.

We have taken your suggestions into consideration and in some cases they revealed the need to clarify the text, go into more detail about the CNN technique to demonstrate why it is a significant improvement over older methodologies, and more directly state the motivations of this study. The quoted lines refer to the numbering of the new track change version.

Response to Editor's Public Justification:

(line numbers refer to the track change version)

line 1: "...and allows a more refined processing..."

This study allows processing? I think, 'allows' is not the right word here, please rephrase.

The full sentence was changed to :

"This study addresses the challenges of ice particle morphology classification from images of Optical Array Probes (OAP) and proposes a more refined processing to enable better interpretation of observational data."

For the following comments substantial changes were made.

line 64 : "CNNs ... automatically identify patterns and features ..." How do CNNs differ then from feature based algorithms (line 60)? Please clarify this.

The series of paragraphs starting at line 55 and continuing up to line 89 have been rearranged. Despite it being done more specifically in Section 2 for the models trained in the study, the general principles of the CNN methodology are shortly presented in order to distinguish them from feature-based approaches. In addition, it demonstrates more clearly why CNNs are more effective.

lines 82-85: I think this sentence is not entirely clear, could you please rephrase or expand the explanation to make it better understandable.

The paragraphs starting at line 90 and finishing at line 108 have been reworked to more clearly express the motivations of the study, which was the intent of this sentence. The sentence itself has been made into two sentences, completed with further explanations, and the remainder of the paragraph has been redirected towards this one message.

The following suggestions were applied to the manuscript :

line 13: "from whatever OAP dataset" - remove 'whatever'

line 16/17: please remove "and thus extends..." I think that goes a bit too far.

line 74: remove "also"

line 47-49: Again, why do you change this sentence and its meaning? In the new version, it is not clear how knowledge of morphology is translating to improved weather forecast (do weather forecast model

treat ice crystal habits at all?). Please change back to old version.

line 71/71: "... sample volumes, however..." Please make it two sentences (...sample volume. However,...)

line 79: "This current study " -> The current study

line 90/91: remove sentence, "grey" literature; same for line 312 - grey literature should be avoided. To the least, the conference name and place should be given in the references.

This change was reverted back keeping “two order of magnitudes in size”.

line 94: why the change from "most of" the size range to "the full"?