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Atmospheric Measurement Techniques Discussions

Interactive comment on "Improved cloud detection over sea ice and snow during Arctic summer using MERIS data" *by* Larysa Istomina et al.

Anonymous Referee #1

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The manuscript describes an improved cloud detection algorithm for MERIS, developed especially for a sequential retrieval of melt pond fraction (MPF) in the summer Arctic, denoted as MECOSI. A clear improvement with respect to the previously used algorithm is demonstrated. That is, a significant progress is reported. On the other hand, the study needs to be motivated and presented more clearly.

First of all, the cloud mask from AATSR is here used as reference and is assumed to have a 100detection algorithm for MERIS seems to be an increase in the swath width for the MPF retrievals, with respect to if the cloud masking would have solely been based on AATSR. The application of retrieved MPF is not stated. If the aim is to derive climate data, I would say that close to perfect retrievals (AATSR is assumed to give perfect cloud masking) over the smaller swath is to prefer, than significantly less

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accurate data over the broader swath. That is, I found the motivation to be weak, or unclear.

OLCI seems to be used as motivation in the abstract, but this sensor is not discussed at all in the text.

That AATSR should give a perfect cloud masking sounds to good to be true. The limitations of the AATSR cloud detection should be discussed. And presumably, the error of the AATSR retrievals should be considered, both when setting up the MERIS Bayesian scheme and when evaluating the performance of MECOSI.

Sections 1 and 2 needs to be restructured. At least I fail to see a clear logic in these sections. The introduction should more clearly focus on motivation and goal of the study. For example, objective/goal is now formulated in the middle of Sec. 1 and at start of Sec 2. The information around line 21 on page 1 and line 17 on page 2 is very similar, that indicates that the order is not optimal.

The review of available cloud screening approaches (Sec 1.1) is nice, but causes distraction as placed now. I would suggest to reformulate the title of Sec. 2 somewhat, and then move the review to Sec. 2.

There is a quite heavy use of acronyms, and you assume that many are understood by everybody. Note that this includes all names of satellite sensors. Is needed to use VIS and NIR? What is SGSP? Is RMSD the same RMS? MPF is defined in the abstract, but I would say that it needs to be defined in the Introduction as well.

Minor comments:

Page 4, line 18: "R11/R10<0.27" This needs further explanation.

Page 4, line 19: Writing "small fraction" is misleading as cloud systems in the Arctic typically are very shallow. In fact, are not low clouds a special problem for using oxygen A-band in this way? Probably what you mean on page 7, line 11, but this requires a more careful discussion/analysis.

Page 5: Add information about resolution of AATSR.

Page 6, line 5: What is the maximum distance of mismatch in position. That is, what is the maximum nearest neighbour interpolation?

Page 6, line 6: This sentence needs further explanation.

Start of Sec 3.3.1: Seems to be quite some repetition from Sec 2.1. Can be avoided.

Page 9, line 10: The equation below defines b as a mean, not an integrated value.

Page 9, line 14: I don't understand what "I = [1, 14] {11" means.

First paragraph of Sec 3.4: This needs further/better explanation.

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