The revised version of the paper significantly enhances the clarity of the fundamental structure of the research. It is now evident that the primary achievement of this study lies in the fusion of two previously unrelated algorithms into AEROSNOW, while incorporating quality control measures. This combination allows the algorithm's application for the reliable retrieval of aerosol optical depth (AOD) over the Arctic region. Once the outstanding issues are addressed, this paper appears suitable for publication in the Atmospheric Measurement Techniques (AMT) journal.

Nevertheless, certain areas still require clarification. In the prior review, several questions arose due to the reviewers' misunderstanding of the content. Although the author guided the reviewers to relevant sections within the article, it highlights a fundamental issue with the paper - its difficulty in comprehension. While all the necessary information may be present, it lacks a logical organization that would enable someone unfamiliar with the research to grasp and follow it seamlessly.

As a proposed improvement, restructuring the paper is recommended. Section 2 should exclusively focus on data, encompassing descriptions of all data used in the algorithm, such as the MODIS data employed in the quality assurance (QA) process. Section 3, dedicated to the algorithm, should begin with a clear presentation of the algorithm's flowchart, emphasizing that this paper's core contribution is the development of a robust aerosol retrieval algorithm over the Arctic. This is achieved by amalgamating two existing algorithms and implementing dependable QA procedures, expanding the algorithm's applicability across a wider region and time span. Sections 3.1 and 3.2 can address the pre-existing algorithms, while Section 3.3 should expound upon the novel elements (notably, the "new contribution" seems to occur in the post-processing phase).

In the introduction, it is imperative to elucidate the limitations of exclusively using Istomina, 2009 and underscore the key advantages of uniting these two algorithms. Distinguishing between a research algorithm tailored to specific cases and a robust algorithm capable of operating across an entire region and data records is pivotal. The paper should emphasize this crucial distinction to effectively persuade its readers.

I have some algorithm related questions as well, particularly concerning Istomina, 2009. Although this isn't the primary focus of your research, it's crucial due to its centrality in the algorithm. I'm not clear about where τ fits into the equations, which is the goal parameter. In my experience, τ should be in the ρ_{atm} term in Eq. 3, which includes contributions from aerosol and Rayleigh and gas. Once you know how much is ρ_{atm} you can get τ using an assumed aerosol model. However, between line 249 to line 267, you describe two different methods of estimate ρ_{atm}. Many questions regarding these two paragraphs. First, is this ρ_{atm} the same in Eq. 4 vs. Eq. 3. If so, what is the point of having BRDF estimation if you already got ρ_{atm}. I assume this roughly estimated ρ_{atm} is only for atmosphere correction to get a better BRDF ratio, which is used in iterative process to fine tune the ρ_{atm} contribution. Eventually the ρ_{atm} in Eq. 3 will be the same as ρ_{atm} in Eq. 4. Not sure if my understanding is correct. Because it is not clearly stated in the paper. Second, both methods of estimating ρ_{atm} has their own

uncertainties, one assuming coastal aerosol properties are the same with inland, another uses pre-defined aerosol models, plus assuming negligible ocean surface contribution, which also raises big concerns. It is not clear whether any of the method considered sedimentation or other watercolor contribution.

Other clarification questions:

1. It is still not clear to me how can ρ_{atm} converted to τ without an aerosol model (or maybe it is the same model stated in Table 1 and Figure 2?).
2. The airmass factor and Angstrom equation discussion from line 269 to line 275 does not provide sufficient connection to the previous text.
3. Eq. 18 is still very hard to understand because there is no specific definition of what ρ is, on the second term in the righthand side. If ρ_{sfc} is calculated from Eq. 15, then I assume ρ is from observation. But based on which equation, is it Eq. 3?
4. Which the ρ in Eq. 4 is the ρ in Eq. 5? I assume is the left-hand side ρ. But when I read until Eq. 15, I realized the ρ in Eq. 5 maybe $\rho_{sfc,sim}$. To enhance clarity, it would be helpful to move Eq. 15 to the beginning and explain how you solve Eq. 15 instead of Eq. 4.
5. Line 241 to 249 discuss uncertainties in Eq. 4, which again, doesn't align with your approach completely, so it requires further discussion.

Other points:

1. The abstract should explicitly state that AEROSNOW is a result of merging two existing algorithms.
2. The paragraph that commences with "Recently, Toth et al., (2018)" around line 65 lacks a clear connection with the preceding content. This connection should be established earlier in the paragraph.
3. The repetitive mention of "use AATSR to retrieve aerosols over the Arctic" should be minimized throughout the paper.
4. Lines 93 and 95 both refer to "cloud masking." It's important to clarify that these are distinct cloud masking procedures, and a detailed explanation is necessary. However, if the suggested structural changes are implemented, this may no longer be an issue.
5. Ensure proper citation is provided in the AATSR data section.
6. The paragraph discussing the lack of other field campaign validation data should be relocated from the AERONET data section to the introduction within the Data section.
7. In line 246, "but The …" the capitalization of "T" in "The" is unnecessary.
8. Clarify whether this LUT is used for retrieval or solely for atmospheric correction in line 286.
9. Enhance the clarity of the flow chart by using color-coding to differentiate existing algorithms from new elements. The algorithm section should also encompass any additional pre-processing and post-processing steps applied, such as solar zenith angle (sza), snow-only filtering, and other quality control (QF) requirements.
10. Despite previous inquiries, there remains confusion regarding whether this algorithm is designed for partial snow cover or exclusively for 100% snow cover. Line 340 implies the consideration of snow cover fraction, suggesting applicability beyond 100% snow cover.

However, line 225 states that "only pure snow-covered areas (100% snow cover) are used." This discrepancy requires clarification.

11. Specify whether the seasonal mean is calculated from level 2 data or monthly mean data.
12. Figure 7 still lacks standard deviation information; consider including it for greater completeness.