Reactions to referee #2

In the first instance we would like to thank the reviewer for his or her insightful comments and the significant amount of time that it must have taken to prepare this review. Our detailed reactions (red font) are below.

The topic of remote sensing of high latitude dust (HLD) is of particular interest because dust has direct and indirect radiative effects on the radiation budget and also on surface albedo. As the authors clearly highlight, despite the wide spatial distribution of HLD in the Arctic, its optical properties and abundance do not allow for a clear signature on remotely sensed signals. The use of space-borne observations together with ground-based in situ and remote sensing measurements, which are scarce in the polar regions, can help characterise the properties and effects of HLD.
The manuscript by S.A. Sayedain discusses local HLD in the Canadian Arctic using both remote sensing and in situ ground-based measurements, as well as satellite observations and products derived from MODIS and MISR. However, the presentation of the work is not very clear, both in the text and due to the lack of significant figures. Although important for following the analysis and describing the results, the figures are included in the supplementary material in PowerPoint format (which was not made available to the reviewer).
The supplements were not available because they exceeded the journal limit. They were instead made accessible via the data repository link provided in the "Supplement" section of the paper. We believe that use of these supplements files makes the essential narrative of the paper easier to understand (please see our footnotes comment immediately below)

More specific comments follow.
The rather frequent use of footnotes and parenthetical text, combined with reference to supplementary material, does not make the manuscript a completely smooth read. A parenthesis within another parenthesis should be avoided.
We tried our best to minimize the use of parenthetical text. However, with respect to footnotes, we believe that they actually help to achieve a smoother read (the essence of an idea is in the main text: the reader is free to dig into the footnote details if he or she wants more than a higher-level narrative).

Additionally, in my opinion some information in the notes may be omitted (such as 18 and 21).
We eliminated footnote 18 which is not essential to the fundamental CM AOD narrative. We disagree with getting rid of footnote 21: there is room for confusion between the indigenous name of the lake (Lhù'ààn Mân'), the (historical) non-indigenous name of the lake (Kluane Lake), the AERONET name of the Kluane Lake research station (Kluane Lake), and the acronym (KLRS) of the research station. These nuances need to be clear if one is to understand the links with earlier literature. That said, and in the spirit of the reviewer's comment about reducing the use of footnotes, we decided that footnote 22 could be eliminated).

It is clear that the complexity of describing what is happening over a large area around Eureka, with a weak footprint especially in remote sensing measurements, requires the use of extensive material, including satellite imagery, reanalysis, etc., hence the use of supplementary material. The result, however, is that the text and figures the reader expects in a paragraph are different

from what they find. An example is paragraph 4.1.3 Satellite imagery versus ground-based measurements at Eureka: the entire discussion of the evidence for the dust plume over Eureka Sound is based on Sentinel-2 imagery and the CARRA wind field, which however are not found in the text, while the text only contains the wind pattern at Eureka. Furthermore, this paragraph would play a key role in the manuscript because it would link the in situ measurements to the remote sensing ones, on which the case analysis in Section 4.2 is based. However, Section 4.2 seems to me to be practically independent of the previous one.
The example description of the September 8, 2020, event is representative.
Figure 5 is very interesting and clear. The reference to Figure S14a doesn't add much, but it makes the reading more difficult. On the other side, Figure S14b with the CARRA wind field could be included in the text to provide a complete description of the case study.
To make reading easier, I suggest selecting the minimum number of images/maps essential to support the methodology and results and reporting them in the text, while leaving non-essential figures and animations in the supplementary material.
We agree that Section 4.1.3 is intended to link the in-situ observations at Eureka with the RS evidence, and that the current placement of key figures takes some effort on the part of the reader. The opening paragraph summarizes a weak dust event using multiple sources, including Sentinel-2 imagery and CARRA wind fields, which are currently distributed between the main text (Figure 3 and Figure 4) and the Supplement (Figures S12 and S13).

We have to respectfully disagree with the reviewer concerning the transfer of any part of the supplementary material to the main text. In all cases, the supplementary material provides high-resolution animation features that we think are quite important to the dust plume identification narrative we are trying to make. These animations should not be transferred to the types of fixed and lower resolution images found in the main text of a paper. For example, Figure S12 shows a full resolution Sentinel-2 color image blinking with wind vectors: we think that it is critical to the dust-plume identification narrative to see the full-resolution dust plumes blinking with full resolution wind vectors (we don’t wish to weaken these arguments with lower resolution imagery or vectors).

Line 342: if the largest AOD is 0.42, why the legend of figure 5b has a lower value, 0.40 as maximum.
True, but we set the upper limit of the color scale to 0.40 for visualization consistency and for comparisons with the CM AOD scale in Figure 5a. (and, in the end the change to the graphic is practically unobservable since only a few pixels exceed this value).

Line 356: same comment as that for line 342.
Our response is basically the same