

Atmos. Meas. Tech. Discuss., referee comment RC3
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Comment on amt-2022-268

Anonymous Referee #1

Referee comment on "Ground-based remote sensing of aerosol properties using high-resolution infrared emission and lidar observations in the High Arctic" by Denghui Ji et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-268-RC3>, 2022

Review of Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-268-RC2>, 2022

Title: Ground-based remote sensing of aerosol properties using high

resolution infrared emission and Lidar observations in the high Arctic"

Author(s): Denghui Ji et al.,

General Comment: The article describes in detail the characterization of aerosol and cloud optical properties by application of an inversion retrieval methodology using sophisticated models for combined measurements of Raman Lidar and FTS (Fourier Transform Infrared Spectrometer) instruments in the station of Ny-Ålesund (Svalbard). Certainly, the authors restrict the study to two specific cases: aerosol-only case (on 10 June 2022) and cloud-only case (11 June 2022) observing the limitations of FTS data and the help of Raman Lidar measurements for a correct discrimination of aerosol and clouds. In that way that the combination of both instruments allows a better characterization of aerosols and cloud properties. The measurements made by Lidar-Raman and FTS are highly complicated, so these results are of great interest and especially since the study is carried out in Arctic areas.

- However, I found a little poor the aerosol characterization and I recommend to the authors to add supplementary information from AERONET for a major aerosol characterization, taking into account that only two days are characterized. More detailed information will benefit the section of results. The use of SDA algorithm to

discriminate coarse and fine particles can be useful. Furthermore, the data allows to combine visible and far infrared information.

- The paper is not focused in the methodology, already described elsewhere (Richter et al, 2020), hence this section may be shortened, for example the equations may be removed and give a more qualitative description and problems involved. On the contrary, an idea more quantitative of the associated errors to the retrieved parameters, as AOD, would be appreciated.
- The Appendix A may be included in the Section 3

Specify comments

Line 135, modify the word DSIORT, Stamnes et al. (1988))

Line 222, Capital letter are used along the document for TCWret V1 and V2: modify **Tcwret** V1 and aerosol parameters using **Tcwret** V2.

For all of this, I considers that he paper may be accepted for publication after the recommended revision of the above points.