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Interactive comment on "Radiative transfer simulations and observations of infrared spectra in the presence of polar stratospheric clouds: Detection and discrimination of cloud types" *by* Christoph Kalicinsky et al.

Anonymous Referee #3

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Review of amt-2020-144:

"Radiative transfer simulations and observations of infrared spectra in the presence of polar stratospheric clouds: Detection and discrimination of cloud types" by Kalicinsky et al.

This paper demonstrates the clear capability of infrared FTS limb sounders to provide detection, discrimination of particle types and particle sizing in polar stratospheric clouds and is an advance on the current state of the art. The paper is acceptable for

publication following some minor corrections.

I strongly suggest that an attempt is made to make an additional plot that shows the optical depth vs CI for some samples of different PSC cloud types. Likewise the CI vertical gradient is related to the optical thickness gradient.

Specific comments and typos

[xxx] means add xxx /xxx/ means delete xxx

Page2

L35: "incomplete" rather than "difficult"?

L37-38: [An] infrared .... build[s]...

L39: sounder[s]

L44-45: make distinction between CO_2 molecular line emssion and broader continuum like aerosol emission?

L51: color => colour

Page 3

L64-65: Maybe make clearer that for an airborne instrument the limb tangent moves away from the aircraft for downward looking views.

L72: What about changes with the aspect ration of the particles?

L86: itselves => themselves

Page 4

L87: JURASSIC is not defined until L106

L110: PREMIER IRLS is not defined

L111: spectral/ly/

L115: KOPRA is not defined

Page 5

L130: What about spectral regions for STS and background binary sulfate aerosols?

L133: al[t]itude

L139: reference to a rejected ACPD paper?

Page 6

L177: median radius varied in steps of?

Page 8

L215: imaginary part/s/

L234-249 and everywhere else including figure captions and tables: Is it possible to give all these spectral regions a distinct short name? e.g. R1, R2, R3 etc Otherwise the reader has to scan the characters and check to see which regions are the same thing rather than seeing that immediately from the short name.

Page 9

L257: an[d]

Page 10

L312: less => fewer

Page 11

L335: mille => thousand

Page 13

L408: extend => extent

C3

Page 15

L463: called [a] hockey-stick

Page 16

L494: What are the detection levels of the new method compared to the old method? e.g. in terms of the minimum volume density um3/cm3.

L501: "minimisation" means "reduction"?

L507: "safely" means "always"?

Figures 3, 6 and 7: Can an approximate optical depth scale be put on the x-axis?

Figure 8: What are the actual optical depths corresponding to these CI values?