Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2016-20-RC2, 2016

Atmospheric Measurement Techniques Discussions

Interactive comment on "A multi-wavelength classification method for polar stratospheric cloud types using infrared limb spectra" *by* R. Spang et al.

Anonymous Referee #2

Received and published: 15 March 2016

A multi-wavelength classification method for polar stratospheric cloud types using infrared limb spectra by R. Spang et al.

MS No.: amt-2016-20

Spang et al present a new infrared PSC classification scheme based on results from the MIPAS instrument using a two-color ratio method combined with 2D brightness temperature PDFs. The classifications are compared with independent and coincident classifications by the CALIOP lidar. The newly developed MIPAS PSC database should provide an excellent resource as it is over a decade in length. However, no indication is given as to when/whether the database will be made available to the scientific community. The manuscript is suitable for publication in AMT following attention to comments

raised below.

/xxx/ means remove xxx

[xxx] means add xxx

P1 L17: a new [infrared] PSC

P1 L26: we can assume that CALIOP is not perfect wrt ice classification either.

P3 L3: More recent instruments e.g. SAGE-III, SciSat ACE are able to discriminate PSC types

P3 L19: satellite [was] operated /on/ [in]

P3 L22: /changed/ [reduced]

P3 L24: /are/ [were]

P4 L3 /like/ [such as]

P4 L6: more sophisticated yet simplified?

P4 L9: provide /a/ summary

P4 L13: Just to clarify, 1.2cm-1 is not the ILS of MIPAS, which is 20 times better than this. The plots shows a MIPAS spectrum recorded at higher resolution (needed for gas species retrievals) but here smoothed with a Gaussian function convolution to remove sharp features. The NAT signature (several cm-1) is hardly "sharp", you might say "narrow" though.

P4 L23: Why aren't the sensitivities compared for the same kind of averaging volume i.e. by smoothing CALIOP to the resolution of MIPAS.

P5 Table 1: Thin horizontal line is missing between NAT and STS. Remove the pointless replication of table entries. e.g. volume densites are all the same for NAT and STS, and the mean radius values are the same for STS. [um] should be below "Mean

Radius". "Cloud minimum bottom height" is better rendered as "cloud base" in the text.

P6 L1: optical/ly/

P6 L2: /this is/ [optical thickness is dominated by] ADP

P6 L3: /median radii/ [particles]

P6 Fig 1: could use nW instead of 10ˆ-9 W

P6 Fig 1: Superimposed /by/

P6 Fig 1: /Additional/ Planck

P8 L2: Inclination of the Aura spacecraft is 98 deg.

P8 L10-11: remove repeated author name ... (2013, 2014)

P8 L21: Mie Theor/ie/[y]

P8 L22: [complex] refractive index

P9 Fig2: Does extinction vs wavenumber (with example for small and large particles) help to explain choice of wavenumber regions better than the RI alone?

P9 L16: /former/ [previous]

P10 L9-10: What about the NAT particle shape? This applies to spherical particles (Mie theory) what about non-spherical shape effects on the NAT spectral peak?

P10 L28: restrict/s/

P10 L34 [Synoptic] temperatures

P11 L1: /only/ little indication/s/ for NAT particles /are/ [is] found, where/by[as]

P12 L14 and L19: Figs 4 and 5 show CI-BTD

P14 L13: The gradient reversal for sulfate and NAT/ice in the infrared near 7-8 um has

been long established and exploited previously for limb measurements e.g. Taylor et al, 1994, J. Atmos. Sci., 51, 3019–3026. Corresponding wavelengths found in the MIPAS study are 8.16um and 7.1um near the peak and trough of the STS absorption curve, see Taylor et al Fig 7.

Acronym Area... I found the labeling of Figs 3, 5, 7, 8 and reference to Table 2 extremely confusing ...

Why are the regions named differently in the figures? What is the correspondance to the names of the regions given in Table 2? By the process of elimination I was able to identify ...

P11 Fig 3:

(1) sNAT => sNAT3_H06 (2) Ice => ICE_STS_H06 (3) STS_mix => sNAT3_H06

P14 Fig 5:

(4) Ice => ICE_ci (5) Ice+sNAT => ICE_ci_sNAT1 (6) STS+lNAT => STS_ci_lNAT2

P16 Fig 7:

(7) sICE => sICE5 (8) MIX => IICE5_STS_lNAT3 (9) mNAT => mNAT (10) sNAT => sNAT2

P17 Fig 8:

(11) ice => ICE => ice (12) IICE (LICE should be IICE) => IICE_SNAT (13) MIX => STS_lNAT

Please simplify all of this. Just use the same names in the figures and the table. I wasn't able to keep track of the changing names as I switched pages between the figures and the table, so eventually I labeled the regions numerically (1) to (13) in these four figures to correspond directly with Table 2. I suggest you do the same in the revision of the manuscript. Also in Table 2 I added the corresponding Figure number in the "Classifier"

column.

If you do this then the lengthy description of ... P18 L2: ice region in Figure 5 and acronym ICE_ci in Tab 2 would be easier to find as would also also be labeled region (4) both in the figure and the table.

P18 L18: Could this be improved optimally? What is the sensitivity to the ad hoc settings?

P21 L13: This is not detection. i.e. is there a cloud or not? This is classification. i.e. what type of cloud is it. If r<3um then a NAT cloud can be classified as NAT, otherwise it will not have the unique NAT classification but will still be detected as a cloud above threshold.

P30 Table 3: Too many significant figures used, can round most of these with no loss of real information.

P31 L 10: statistics /was/ [were]

Please do something to improve the presentation quality of the figures. Some of the plots could really do with a serious tidy-up to remove "junk" in titles and labels that don't mean much to the reader. These are ok to pass around the table at meetings but some effort needs to be made for a wider audience. See Fig 9 where V1.2.8 is repeated three times ... why do we need to see this in the figure as there is no mention of what it means anywhere else. Also much nicer to label polar regions with NH or SH than "-90<lat<-55" (which don't have degree signs either in case you insist on keeping these). Instead of "200906" etc why not label as "June 2006". No need to replicate "MIPAS" in Fig 7 title six times over or CI<5.0.

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