

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

### **Anonymous Referee #3**

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The paper by Spang et al. is a study on how to classify PSCs with Bayesian classifiers using MIPAS infrared limb spectra. The PSC types ICE, STS, and NAT can be distinguished. KOPRA radiative transfer model runs were used to build a database of 600,000 spectra for different cloud scenarios to define separation lines for the cloud types. MIPAS classification results were compared to CALIOP and AIRS measurements.

The paper gives an interesting and comprehensive overview on how to differentiate PSC types using MIPAS data. It suits AMT's publication criteria regarding scope as well as novelty. Thus I recommend the article to be published with minor revisions, after the few following comments are addressed.

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#### General Comments:

- Bayes' theorem with strong (naive) independence assumptions: More background information on this basic concept is appreciated. Are there any references?

#### Specific comments:

- P3L28: VFOV base width of 4 km and top width of  $\sim 2.8$  km: What is the meaning of these parameters? Does base/top refer to tangent height?

- P5L11: How was the optimized list created?

- P6L7: single scattering properties of spherical particles: Is the effect of non-spherical particles (e.g. ice) negligible in this spectral range?

- Table 1: Cloud minimum bottom height=12: Is this the general lower boundary of all clouds simulated?

- Table 1: Why is the PSC cloud top height restricted to 21.5km?

- P6L15: various cloudy path lengths: The clouds has to be modelled as layers. How can the path lengths be varied? Is the model able to simulate PSC/clouds with a vertical extent below the instrumental VFOV?

- Fig.1: The 3 cloud type spectra differ in time and latitude, but also in tangent height? Does this have an effect on the radiance? While NAT has a clear nose at 820, ICE and STS look rather similar.

- Fig.3: What is the cloud height range for the PDFs?

#### Technical corrections:

- The few typos and comma errors can be corrected during the English language copy-editing.