

Interactive comment on “Polar stratospheric cloud observations by MIPAS on ENVISAT: detection method, validation and analysis of the northern hemisphere winter 2002/2003” by R. Spang et al.

Anonymous Referee #2

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Review of the paper “Polar stratospheric cloud observations by MIPAS on ENVISAT: detection method, validation and analysis of the northern hemisphere winter 2002/2003” by R. Spang et al.

General comments The paper by R. Spang et al. validates a Polar Stratospheric Cloud (PSC) detection method, based upon a radiance ratio technique, and applies this method using MIPAS data to study the evolution of PSCs during the Arctic winter 2002/2003. The MIPAS data will be extensively used to study PSCs, and therefore this paper, which strives to validate a particular PSC detection method, is of interest to the research community. I encourage the publication of this paper after some revision.

Specific comments

There is a notable difference in the vertical width of the lidar signal in the top panel of Figure 4 (vertical width of 6 km, from 22 to 28 km) and the width of cloud index (<4) region (vertical width of 14 km, from 14 to 28 km), in the bottom left panel of Figure 4. Please comment on this difference.

In Figure 5 the vertical width of the PSC observed by MIPAS (11 km) is larger than that of POAM (6 km). The MIPAS detection technique seems to correctly specify the upper altitude of a PSC in a satisfactory manner, and overestimate the width of the PSC region. Please comment upon this difference.

Technical comments

Page 6285, line 2 What are the key questions addressed by Toon and Tolbert?

Page 6287, line 19 Change to “aerosol cloud emissions”.

Page 6287, line 22 Change to “referred to as the Cloud-Index (CI)”.

Page 6289, line 7 Change to “for December 2 and 19, 2002”

Page 6289, line 15 Change to “The absolute pointing error of the MIPAS instrument, and the subsequent CTH error, is estimated to be of the order of 1-1.5 km”.

Page 6289, line 25 Change to “which has been analyzed by Spang and “

Page 6290, line 11 Change to “For example, the spectrum in Figure 1..”

Page 6291, line 19 Explain, in a sentence or two, the scheme of Browell et al. (1990). The phrase “well accepted” should be deleted.

Page 6292, line 16 Change to “by the requirements of sunrise/sunset geometry”.

Page 6393, line 8 Change to “lower than a threshold value, is..”

Page 6294, line 28 Identify the Type 1b composition type. Also, I am confused by the phrase “an outlier primarily in e1022”. Please clarify this sentence.

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Page 6295, line 20 The phrase “as well the large number of cloud-free..” is not clear. Please revise this sentence.

Page 6297, line 5. Revise to “dominated by NAT ‘rocks’ “.

Page 6297, line 11. Change to “The following section gives”

Page 6297, line 17 Change to “The winter of 2002/2003”

Page 6300, line 11 Change to “and the assumption of constant HNO₃ and H₂O values of 10 ppbv and 5 ppmv, respectively, for all altitudes”.

Page 6301, line 9 It’s perhaps more correct to say “From 12 December, PSCs were only observed towards the pole and were \checkmark ”. I don’t think the clouds actually moved northward.

Page 6301, line 13 Change to “when the PSCs were observed northwards again..”

Page 6302, line 21

Change to “the formation of PSCs in both hemispheres”.

Page 6303, line 19 Change to “scheme, with a threshold value of $CI < 4$, has been validated”

Page 6310, Figure 2.

Change to “Red curves highlight profiles which are \checkmark ” The sentence that discusses the “grey plus dark grey” region is not clear. Does this refer to the light grey region? The region could be identified by text, by stating numerical bounds, to make the region unambiguous.

Page 6311, Figure 3. I found it difficult to identify numbers with the color scale. If it is possible to do so, please place numbers on the color scale, as long as the numbers are not too small in size.

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