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Interactive comment on "Evidences of thin cirrus clouds in the stratosphere at mid-latitudes" *by* P. Keckhut et al.

Anonymous Referee #2

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1) general comments The paper provides a deep analisys of a single, special cirrus event that should provide an evidence for the presence of a tropospheric cloud layer trapped in the low stratosphere. The topic of the study meets the requirements of ACPD

2)As stated by the authors, the isentropic transport of tropospheric air into the stratosphere is not new, but the LIDAR observation of an ice cloud embedded in such a laminar structure is quite new to my knowledge.

3) Even if the quality of the meteo analysis is very high, the substantial conclusion stated in the title and in the conclusions ("evidences for cirrus...") are not reached,

because the observational part of the work is too poor: Only two OHP stratospheric cirrus observations are cited in the work; Among these two cases, only one case is reported. The quality of the LIDAR profile usef for supporting the presence of this single cirrus is very poor: Fig.2, that should be representative of the LIDAR observations of 20 January 2000 (of 1:30 hours duration), is in fact very noisy above 10 km. The authors claim that a cirrus layer is present between 13.5 and 13.9 km, but in my opinion this conclusion cannot be drawn from Fig.2 alone. With the same criteria used by the authors, cloud layers should have been detected also at 10.5 and 12 km. I see just a very noise profile above 10 km, with some possible layers confused by noise. Also, the altitude resolution of the measurement (75 m as stated by the authors) gives only 5 measurement points within the 13.5 -13.9 km range of the studied layer: too few points in a such noisy profile

4) The methods are well outlined and explained with precision

5) see comment 3

6) results are evidently not reproducible because of the nature of the experiment. The description of the LIDAR experiment doesn't reveal the time resolution (integration time, rep. rate) of the LIDAR data. Fig.2, representing the LIDAR data for January 20 is too noisy to be used as a proof of the presence of a thin, subvisual cirrus. A time series of LIDAR data or a longer LIDAR average showing unambiguously the presence of the studied layer should be used instead of Fig.2. In my opinion, this is the only weak point of this work, but it is very important because all the study is based on this LIDAR profile.

7) The authors give a widespread and proper credit to previous studies.

8) The title reflects the content of the paper, but in the actual version I would replace "evidence" with "indications" or something similar, as no convincing evidence is shown by the LIDAR data

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Interactive Comment

9)The abstract reflects the content of the paper. In the abstract, the word "evidences" is in fact not used.

10)The overall presentation is clear and well structured

11) The language is fluent and clear

12)symbols, abbreviations, and units are correctely defined and used

13)As stated before, some more details about the resolution of the LIDAR measurements should be given in the text. Fig.2 should be replaced with a more reliable one as it is noisy and do not provide a clear evidence for the presence of the studied cirrus layer. Fig.4 in my B/N print is not very clear (the georeference grid is not visible), but this could be a problem of my printer. A simple mark in Fig.3 indicating the OHP latitude could help the reader. A final suggestion: for sake of clarity, Fig.2 should show a double scale: altitude and Potential temperature, as the rest of the figures are in terms of PT

14)References are adequate

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 4037, 2005.