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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical Note: Intercomparison of ILAS-II version 2 and 1.4 trace species with MIPAS-B measurements" *by* G. Wetzel et al.

Anonymous Referee #1

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Review comment for manuscript acpd-7-16227-2007

General comments:
Vertical trace species profiles of the satellite instrument ILAS-II are compared and validated with observations of the balloon-borne MIPAS-B spectrometer. Significantly better aggreement for various trace species is found for ILAS-II version 2 data compared to version 1.4 data presented in *Wetzel et al. (2006)*. This paper is well written and structured and the satellite and balloon data are presented clearly in the Figures for a direct comparison. The work is suitable for publication. However, I would suggest some additions and alterations to the work:

Specific comments:

Issue 1: Page 16229, line 15 and the following: '...good match...' can you be more specific here? What do you consider a good match. Maybe repeat the main details describing the match (geoloction, time....), as done in *Wetzel et al. (2006)*. Have you performed some trajectory calculations, showing that the same air masses were probed by both instruments? This can be important for species with a strong diurnal variation.

Issue 2: Page 16240, Table 1: If possible, you could add the vertical resolution for each species.

Issue 3: Page 16230, line 10 and Page 16249, Fig.9 and Page 16235 - discussion about $N0_2$: ILAS-II uses an onion peeling algorithm for profile retrieval. For occultation measurements, with SZAs (Solar Zenith Angles) around 90 degrees, this is probably not sufficient to retrieve a profile of species like $N0_2$, which undergo a strong diurnal variation. During sunrise (sunset) $N0_2$ concentrations vary largely with SZA and the satellite observes a whole composition of SZAs between at least 85 and 95 degrees. So if you scan the atmosphere from low tangent height to higher tangent heights (sunrise), then e.g. the photochemical change in the different SZA-regimes that are observed can be misinterpreted by the profile inversion as higher or lower concentrations. Thus it is not sufficient to just scale the MIPAS $N0_2$ profile to the location and time of the satellite measurement. Butz et al. (2006) introduced a photochemical weighting factor in order to compensate for this effect, which can be quite significant. Actually I would be surprised and consider it coincidence if the balloon and satellite measurements were to match. This might also partially explain the discrepancy for N_2O_5. Maybe you can comment on this issue and make a statement in the text, considering this effect as an additional error source and reason for the discrepancy.

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Technical comments:

1. Please change the order of the dates **throughout the text (and in Figure legends)** to the English notation, i.e. month day, year. For example - page 16228, line 3: '14 December 2002' should read 'December 14, 2002'.
2. Page 16228, line 11, page 16235, line 16 and page 16236, line 16: 'Northern Hemispheric' is spelled in lower case letters 'northern hemispheric'
3. Page 16228, line 24: '...measurements above large...' change to '...measurements over large...'
4. Page 16229, line 6: spelling - 'quasi-Lagragian' change to 'quasi-Lagrangian'
5. Page 16229, line 9: '...quality of coincidence...' add the spacial and temporal... '...quality of the spacial and temporal coincidence...' for clarity
6. Page 16229, line 17: delete the '...too', it is not necessary and refers to something in the previous sentence
7. Page 16229, line 24: '... has been...' change to '...was...'
8. Page 16230, line 2: '...high latitudes...' hyphenate '...high-latitudes...'
9. Page 16230, line 2: '...(57N-73N and 64S-90S)...' change to '...(57N to 73N and 64S to 90S)...' to make it more readable
10. Page 16230, line 19: '... to data version 1.4...' change to '...to version 1.4 data...'
11. Page 16230, line 22: no need to capitalise 'Northern Hemisphere'

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12. Page 16231, line 1: '...midinfrared...' hyphenate '...mid-infrared...'

13. Page 16231, line 21: '...approach constraining...' change to '...approach was applied, which was constrained with respect to the form of an a priori profile.' - if that is what you mean and how I understand it.

14. Page 16232, line 19: '...around 30km, differences...' add *the* '...around 30km, the differences...'

15. Page 16232, line 21 and page 16233 line 5 and 6: '...amounts only...' add *to* '...amounts to only...'

16. Page 16233, line 11: 'A slightly downwards increasing CH4 positive bias is visible below 23km.' rephrase 'A positive bias for CH4, which is slightly increasing downwards, is visible below 23km.'

17. Page 16233, line 21: '...mesh points...' not sure if mesh-points is the right term here, maybe just use '...values...'

18. Page 16234, line 13: '...have been...' change to '...were...'

19. Page 16235, line 17: 'Southern Hemispheric' is spelled in lower case letters 'southern hemispheric'

20. Page 16235, line 21: '... such that this latter...' change to '...such that the latter...'

21. Page 16235, line 25: '... except the altitude region near 30km ...' change to '...except at the altitude region around 30km...'

22. Page 16236, line 9: 'Such an increase appears not ...' change to 'Such an increase does not appear...'

23. Page 16237, line 11: '... the Esrange team of Swedish...' add the '... the Esrange team of the Swedish...'

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24. Page 16241, caption of Fig.1: '...profile **as** measured...'

25. Page 16244, caption of Fig.4: 'N2O-CH4 relationships...' I guess 'correlation' is a better term

26. Page 16244, ledgend of Fig.4: remove 'year' in the expression 'year 2003' or use '...adjusted to the year 2003'

References:

Butz et al. 2006, Inter-comparison of Stratospheric O_3 and NO_2 abundances retrieved from balloon-borne direct sun observations and Envisat/SCIAMACHY limb measurements, *Atmos. Chem. Phys.*, *5*, 10747–10797.

Wetzel et al. 2006, Intercomparison and validation of ILAS-II version 1.4 target parameters with MIPAS-B measurements, *J. Geophys. Res.*, *111*, D11S06, doi:10.1029/2005JD006287

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