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Atmospheric Chemistry and Physics Discussions

Interactive comment on "CALIPSO observations of stratospheric aerosols: a preliminary assessment" *by* L. W. Thomason et al.

Anonymous Referee #1

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General:

Thomason et al. explore the potential of CALIPSO observations (that is, the 532nm lidar of 'CALIOP') for measurement of stratospheric aerosol. CALIPSO was not designed for this task, but the lack of other instruments (SAGEII/III, HALOE, POAM are at end of lifetime; HIRDLS has degraded performance) renders it a pressing task to search for alternatives. Thomason et al. show that the current standard processing of the data is insufficient to derive a reliable stratospheric aerosol product. They show that one of the problems is the assumption for calibration of only molecular backscatter in the height range 30-34km. SAGE II data suggests that the backscatter ratio in this altitude region is actually between 1.03 and 1.1. Taking this into account, Thomason et al. arrive at a better aerosol product that shows structures familiar from the SAGE mis-

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sions. However, they also note several remaining deficiences. The topic of the paper is well suited for ACP, and the results are novel and of great interest to a broad community for a wide range of appications. My main concern with the paper, however, is that it leaves too many open questions, and leaves the reader wondering whether we now can hope to have soon a stratospheric aerosol product from CALIPSO, or not. I would urge the authors to at least numerically test some of their hypotheses provided as possible explanations for remaining errors in their final aerosol product (temperatures, for example).

Specific comments:

(I agree with much of the detailed review by Dr. Wienhold, and will therefore omit aspects already mentioned in that review.)

P5600/L24: I'm not sure what is meant by '... averaging above and beyond ...'

P5600/L29: You may want to remove 'realistically'; 'realistic' on the following page suffices.

P5601/L27: 'this effect is (eliminate 'a') very ...'

P5602/L14: '... that is enhanced ...' - enhanced in backscatter?

P5602/L16: Perhaps give a very brief description of the South Atlantic Anomaly (sufficient to mention van Allen belt).

P5602/L23: Would it not make sense to try a cloud clearing algorithm for the analysis here? If the strongest signal is found in a layer where perhaps very rare clouds can occur, it would be useful to eliminate these.

p5604/L7: '... non unexpected ...'

P5604/L22: '... very sensitive ...' - sentence

P5604/L23: How large do you expect the difference between GEOS-4 and GEOS-5?

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1 Kelvin, 10 Kelvin? I assume this sensitivity arises from the dependence of molecular backscatter to air density? So, an error of 1K translates to an error in density of approx. 1/200 = 0.005? Does GEOS-4 have similar deficits elsewhere?

P5605/L6: If the expected backscatter is a strong function of latitude, is there any hope at all that CALIPSO can provide an accurate aerosol product without information from other sensors? (That would have to have at least a reasonable meridional coverage?)

P5605/L21ff: Slightly cryptic; and: if a climatology based on SAGE II/III may be adequate, then I'd expect to see results using that climatology in this paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 5595, 2007.

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