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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Observation of Polar Stratospheric Clouds down to the Mediterranean coast" *by* P. Keckhut et al.

P. Keckhut et al.

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Replies to comments by Referee #1 Philippe Keckhut on behalf of co-authors

Authors thank the referee #1 for its interesting comments

Ozone observations

The observation at mid-latitude for such an ozone depletion occurring during few days is very difficult to quantify because it is masked by natural variability induced by short-term dynamic and horizontal inhomogeneities. While ozone measurements are made on the same site, ozone from balloon sounding are performed weekly and do not match any of the PSC observation days or those just after. Also Lidar observations are not performed on a daily basis. So to extract such a small ozone depletion, at least daily observations will be required. Even the use of a climatology will be not sufficient to

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quantify such a anomalies. To quantify the chemical ozone lost at polar latitude (where the largest ozone depletions are observed) the chemical and the dynamical contribution need to be separate and several months of data are required. To perform such separation two approaches are conducted one based on many “match situations” that are identified though forward trajectory model using ballon, lidar or satellite data (Streibel et al., 2005). Another approach consists in using a CTM to quantify the ozone changes due to the transport and dynamic and remove such variations from observed ozone changes from many spectrometers located in the polar regions, to get an estimate of the ozone chemical lost (Goutail et al., 2005). In this work it was not intended to quantify ozone lost because this process is quite well known and do not differ in principle with spring ozone depletion. The goal of this study was to evaluate the impact of the occurrence of such low latitude PSC event on the ozone depletion. The approach using a model was then appropriate for such an estimate. If there are unanswered questions related to ozone lost at mid latitude, ozone observations will be valuable but from our point of view we did not see the value of some ozone investigations and the quantification of the ozone destruction using observations would have been associated with a large uncertainty. We suggest in the final manuscript to include a comments to clarify our approach and the reason of not incuding ozone lost quantification using direct observations.

The PSC type

The PSC type is not suggested using the scattering ratio alone, but also in considering the temperature level. This information is given on page 5, on the 5 first lines. But this can be clarified in the final version of the manuscript. The model that was used includes the both types of PSC and the ozone depletion rate would be different with frozen particles, but the area where the occurrence of ice particles was possible was rather null. The rate of ozone depletion depends on temperature and PSC type in the model too.

Lidar description

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The wavelength is 532 nm and this information is mentioned on page 4 line14. This lidar has already been described in many publications.

Goutail F., J.P. Pommereau, F. Lefèvre, M. van Roozendael, S. B. Andersen, B.A. Kastab Hoistar, V. Dorokhov, E. Kyrö, M.P. Chipperfield, and W. Feng, Early unusual ozone loss during the Arctic winter 2002/2003 compared to other winters, Atmos. Chem. Phys., 5, 665-677, 1680-7324/acp/2005-5-665, 2005. Streibel M., M. Rex, P. von der Gathen, R. Lehmann, N.R.P. Harris, G.O. Braathen, E. Reimer, H. Deckelmann, M. Chipperfield, G. Millard, M. Allaart, S.B. Andersen, H. Claude, J. Davies, H. De Backer, H. Dier, V. Dorokov, H. fast, M. Gerding, E. Kyrö, Z. Litynska, D. Moore, E. Moran, T. Nagai, H. Nakane, C. Parrondo, P. Skrivankova, R. Stübi, G. Vaughan, P. Viatte, and V. Yushkov, Chemical ozone loss in the Arctic winter 2002/2003 determined with Match, Atmos. Chem. Phys., 5, 4311-4333, 1680-7375/acp/2005-5-4311, 2005

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 6557, 2007.