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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Spatio-temporal observations of tertiary ozone maximum" *by* V. F. Sofieva et al.

Anonymous Referee #2

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This paper reports four years of observations of the tertiary ozone maximum (TOM) which occurs at high latitudes in the mesosphere during polar night. The GOMOS instrument measures O3 by stellar occultation, and is probably the best instrument currently available for measuring O3 in the mid- to upper mesosphere. The TOM is caused by a coupling of photochemistry and meridional transport, and is also very sensitive to "sporadic" events such as sudden stratospheric warmings and solar proton events. These observations, which contain examples of these perturbations as well as showing the general climatology of the layer, therefore provide a powerful test of general circulation models and chemical transport models. In this paper, this is demonstrated by comparison with predictions from the NCAR Whole Atmosphere Chemistry Climate Model (WACCM). In general, the comparison is extremely good.

The paper is clearly written and the diagrams are all appropriate to the discussion. The paper should therefore be published with little revision. One point the authors should consider is adding a short discussion about why WACCM overestimates the maximum O3 concentration in the TOM by about 50%, compared with the observations (we are told that O3 is measured "accurately" by GOMOS because bright, hot stars are used at high latitudes in winter - but some statement of the accuracy would be useful). Is this a significant difference and, if so, what could be the possible reasons?

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 6597, 2009.