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Interactive comment on "Modelling the global tropospheric ozone budget: exploring the variability in current models" *by* O. Wild

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Thank you for your positive response to this paper, and for picking up on one issue that needs further clarification. I have performed more detailed studies on the effects of horizontal resolution on the flux of stratospheric ozone into the troposphere in previous work [Wild and Prather, 2006], where we looked at the systematic changes between T21 (5.5°), T42 (2.8°), T63 (1.9°) and T106 (1.1°) resolution. It was clear from this study that STE was overestimated at the coarsest resolution (T21), and possibly also at T42, but there wasn't a clear convergence with higher resolution, suggesting that a number of different factors affect the resolution dependence. The effect of averaging over each model grid box is considered here, and the **decrease** in STE at higher vertical resolution appears to confirm that this is the dominant effect. However, this is in competition with better resolution of vertical motions which may lead to increased

STE at higher resolution, as pointed out in the comment. This "noise" in the vertical fluxes in the lower stratosphere can be introduced by data assimilation processes when spin-up times are short, as is typically the case with pieced reanalysis products. This may affect STE, as pointed out by Douglass et al. [1996; 2003], and the effects have been quantified using ECMWF data with different reanalysis methods by van Noije et al. [2006].

Some previous studies have found an increase in STE with resolution [e.g., Kentarchos et al., 2001; van Noije et al., 2004] in contrast to these studies and those of von Kuhlmann et al. [2003]. It is clear that the van Noije et al. [2004] studies were influenced by the timescales used in the meteorological reanalysis; it is less clear if the same factors affected the Kentarchos et al. [2001] study, but this was performed online in a GCM run at different resolutions, and differences in model dynamics may therefore influence the results. It is also likely that differences in advection scheme affect the results, too. I have added a sentence to section 4.3 to acknowledge that there are differences between model studies in the response of STE to resolution, and to highlight the potential impacts of reanalysis methods, citing the studies mentioned above.

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