

## ***Interactive comment on “A quantitative analysis of grid-related systematic errors in oxidising capacity and ozone production rates in chemistry transport models” by J. G. Esler et al.***

### **Anonymous Referee #2**

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The manuscript is an interesting contribution to the understanding of modelling errors due to limited resolution in CTM models. This question has been addressed in a number of other studies but here the authors aim at separating the direct averaging effect of lowering the resolution from the other indirect effects induced by changing the horizontal resolution. A few more or less minor reservations are, however, needed. -1] Figure 2 and associated comments miss the point that  $P(O_3)$  is not a linear function of concentrations. The same comment can be attached to the definition of the weighted ozone production efficiency. -2] Smoothing of the SONEX ozone signal is largely due to (3). For instance, the T42 averaging alone would retain much more variance than the curve shown in the previous version of the figure. Replacing it by the curve for T21 is not the right answer. In principle numerical diffusion in a model could be measured,

for instance, by estimating the cutoff scale in a spectral analysis of concentrations and this cutoff scale could be used to filter SONEX data. Instead, (3) cannot be associated with any cutoff scale and makes unreliable the comparison of SONEX and CTM results for a given resolution. -3] As several other studies, the manuscript points out the role of vertical resolution but does not make exception in avoiding to provide a quantitative estimation of changing the vertical resolution near the tropopause. -4] Vertical displacements and vertical diffusion may be overestimated as an effect of undersampling the fluctuations of vertical winds used in CTM. In this respect it should be useful to mention whether TOMCAT and ECHAM use analysed or model vertical winds, or diabatic velocities..

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