

Interactive comment on “On the changing seasonal cycles and trends of ozone at Mace Head, Ireland” by D. C. Carslaw

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This referee raises two issues: comparison of ozone trend estimates with Simmonds et al. (2004) and the issue of measurement uncertainty.

The measurement precision is estimated to be 1 ppb, based on the instrument manufacturer's specification, and this has been added to the text. In general, changes to the ozone amplitude are much greater than 1 ppb, as outlined in the paper. Over the full time series the increase estimated in ozone of 2.7 ppb, is somewhat greater than the measurement uncertainty. Clearly, the ability to detect changes of below 1 ppb ozone would be questionable based on this level measurement uncertainty.

There are several probable causes for why the trend in ozone calculated in the current

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paper differs from of Simmonds et al. (2004) and these are discussed below.

Probably one of the principal differences between the current work and that of Simmonds et al. (2004) is the period chosen for calculating the trend. Simmonds considered 1988-2003, whereas the current work considers 1990-2004.

For the different air mass components, the estimated trend does depend on the filtering technique used, as described on page 5996. Even though different periods are considered, the slope estimates are similar in each case (i.e. 0.25 ± 0.06 vs. 0.30 ± 0.25 ppb yr⁻¹ for Simmonds for baseline air). Therefore, similar techniques do result in similar ozone growth estimates despite the different periods considered. Unfortunately, Simmonds does not provide a slope estimate (with error) for unfiltered data to allow for a direct comparison between the slope estimates here. However, the results calculated in the current work of 0.25 ± 0.06 ppb yr⁻¹ (baseline air), 0.01 ± 0.10 ppb yr⁻¹ for polluted air and 0.20 ± 0.07 ppb yr⁻¹ for unallocated air masses, is consistent with an overall slope of 0.18 ± 0.04 ppb yr⁻¹.

The difference, however, cannot be explained by the technique used to calculate the slope. Simmonds et al. (2004) used the Sen slope method, whereas the current work used linear regression. There is very little difference between the slopes calculated by these techniques when applied to the unfiltered data (linear regression = 0.18 ppb yr⁻¹ and the Sen method 0.20 ppb yr⁻¹).

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