

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

**Anonymous Referee #2**

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It is quite obvious that the ozone concentration in the atmosphere has experienced great changes. These changes over the decades have been particularly difficult to track qualitatively. In the northern hemisphere, the rate of change, based mostly on indirect evidence, has been highest during the post-war decennia. It seems that the concentration stabilized in 1980's but the most recent data presented for example in the Quadrennial Ozone Symposium 2004, Kos (e.g. Tarasick et al. Kivi et al. ) show again high increasing rates in the troposphere of the northern hemisphere. The reasons behind the oscillations of the trend are unresolved. Precursor emission trends regionally and by species follow different trends, stratospheric ozone depletion plays a role and biomass burning events vary from year to year. Nonlinear ozone chemistry

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acts in wide spectrum of time and space which may result in opposing trends in urban and background sites.

However, in many important applications, such as IPCC atmospheric chemistry scenarios for climate change studies, continuous increasing trend from 1990 onwards is assumed for the next decennia despite the fact that precursor emission trends are will be deviating in different regions of the globe. Better understanding of present day trends is needed, that motivates this manuscript.

In this manuscript Carslaw uses ozone data from Mace Head to study monthly trends. The time series begins only 1990 which is not very long period, but during this period we may expect that the calibration procedures have been well established. Carslaw uses advanced statistical method to resolve seasonal and trend components together with unexplained remainder. Monte Carlo simulations are used to produce statistical uncertainties.

How original is the result ? Increasing trend of in nonpolluted air masses at Mace Head have been documented and analysed very recently by Simmonds et al., 2004 (Atm. Env., 38, 2769). In the new manuscript Carslaw shows that monthly distribution has been changed towards unpolluted conditions, which is a new result. The statistical method used by Carslaw is different from that of Simmonds et al. and the resulting trend estimates as well. I would like to see more discussion on the reasons behind the different trend estimates.

The methods are partly distributed to the results chapter. It is somewhat difficult to follow what have been done. One major thing missing is the uncertainty of the measurements. There should be estimate of the instrumental uncertainty. Do the trend estimates exceed long-term experimental uncertainty ? This question is not addressed in the text or references.

In general, there are new results on the ozone trends and statistical methods used are sound. The manuscript merits to be published in the ACP.

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 5987, 2005.

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