# Sensitivity analysis of the Netcen and ERG models

1. A sensitivity analysis of the road lengths and areas of London that are predicted to exceed an annual mean $PM_{10}$ concentration of 20 µg m$^{-3}$ with perturbations of ±2 µg m$^{-3}$ indicates some large variations in both the Netcen and ERG models, in some cases varying from a small fraction of exceedence to almost complete exceedence across London. This is explained by the statistical distributions of the estimated road lengths against the critical ranges of concentration and daily exceedence.

2. The distribution of roadside concentrations across the UK network in Figure A8.1 tends to be broader than that for London due to more variation in both background concentrations and road contributions. The annual limit of 20 µg m$^{-3}$ lies close to the centre of the distribution and small variations of ±2 µg m$^{-3}$ make a large difference to the proportion of road links to the right or left in the distribution.
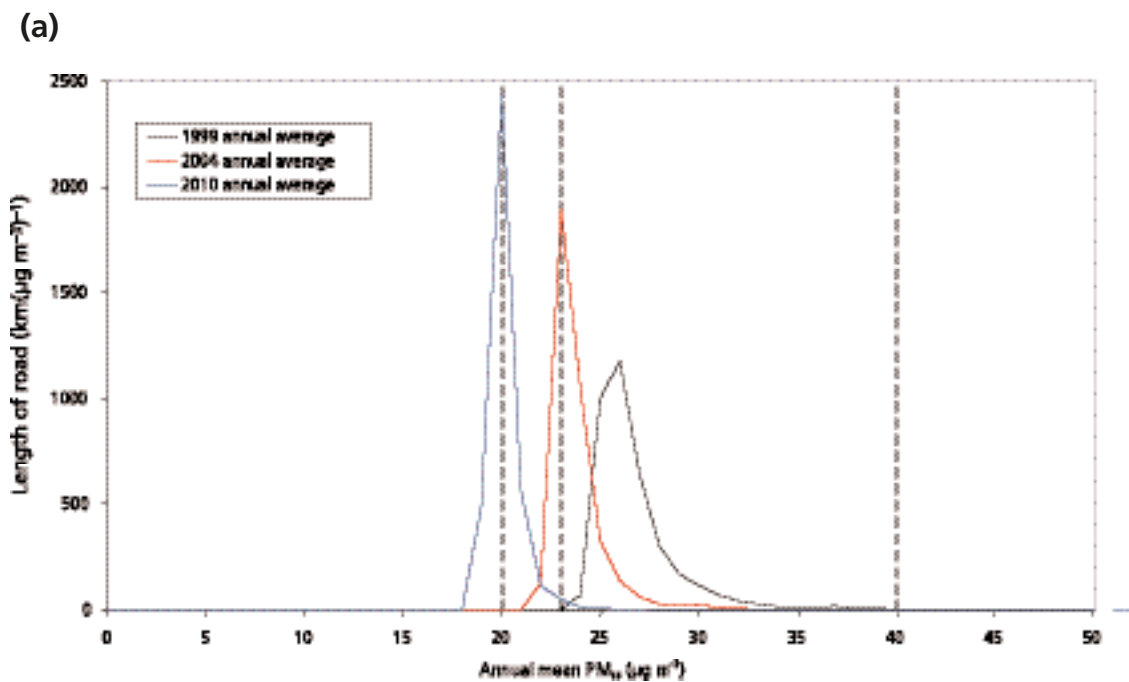
**Figure A8.1** Frequency distribution of road links in UK against annual average concentration: Netcen model for 2010.
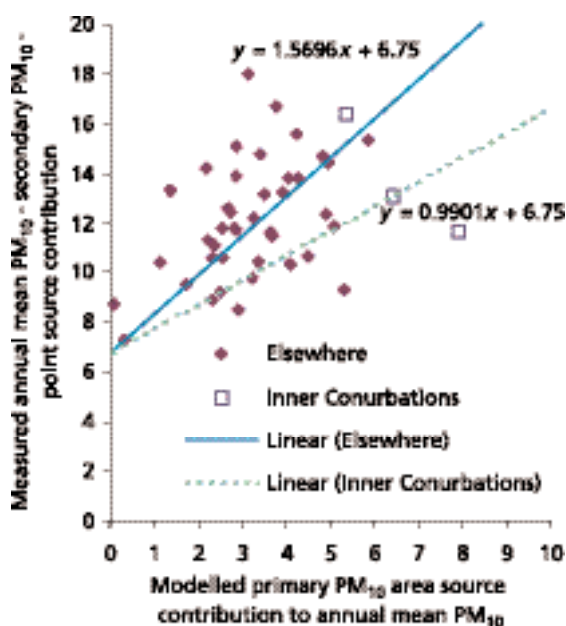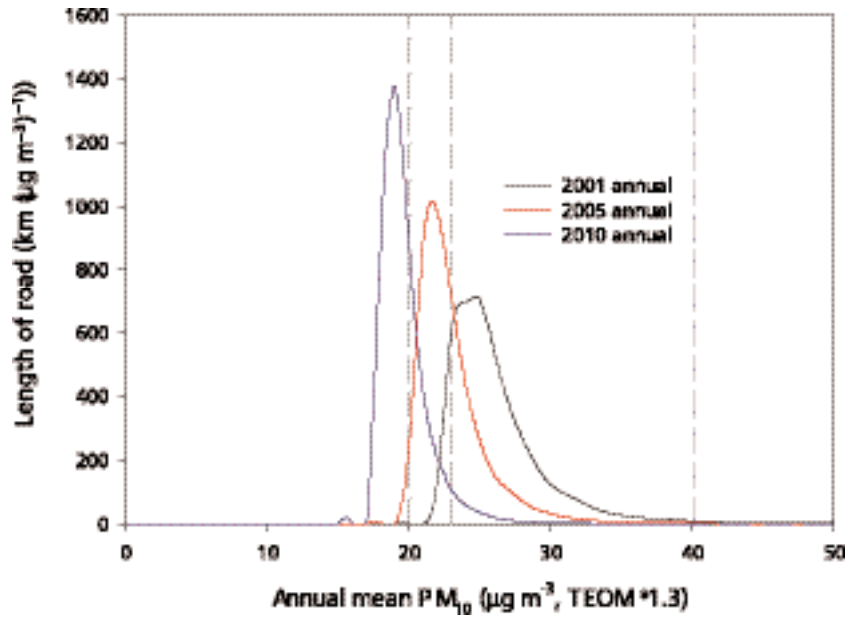


3. Comparing Figures A8.2(a) and A8.2(b), and bearing in mind the differences in years, the picture is very consistent, showing a similar improvement with time. Although the CERC distribution may appear to give slightly higher mean values than the ERG model, it covers less of the more minor roads in the network. Again the results illustrate the problem of a large change in exceedence for a small percentage change in the total concentration, because the distribution of roadside increments is superimposed on a large and fairly uniform urban background.

4. With respect to the areas of exceedence, the small perturbation of ±2 µg m$^{-3}$ on rather flat contours of urban background concentration can lead to very little or almost all of London exceeded. In practice there is likely to be a considerable spatial variability in the coarse component, maybe enhancing the importance of roads and making the contours of concentration far more hilly, with peaks above and dips below the annual limit. Until better information is available it is not possible to resolve this, but it is an important limitation in assessing exceedence.

5. Figure A5.2(c) relates to the frequency of occurrence of days above 50 µg m$^{-3}$ and compliance with daily limit values. The problems of accurately representing the frequency of extreme episodic events are discussed in Chapter 9.

**Figure A8.2** Statistical distribution of results for London from ERG and CERC. (a) CERC results using ADMS, (b) frequency distribution of annual mean PM$_{10}$ concentration for all roads in the LAEI using the ERG model and (c) frequency distribution of daily mean PM$_{10}$ concentration >50 µg m$^{-3}$ for all roads in the LAEI using the ERG model.

**(a)**

**(b)**



**(c)**