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Supplement of

Advanced methods for uncertainty assessment and global sensitivity analysis of an Eulerian atmospheric chemistry transport model

Ksenia Aleksankina et al.

Correspondence to: Ksenia Aleksankina (k.aleksankina@sms.ed.ac.uk) and Mathew R. Heal (m.heal@ed.ac.uk)

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Figure S1 shows the spatial distribution of k -fold cross-validation errors for the Gaussian process emulators used to estimate the annual average surface concentrations of O_3 , NO_2 , and $PM_{2.5}$. The k -fold cross-validation errors were calculated using Eq. S1 where N is the number of values held out in the analysis, Y_i is the held out simulated value and \hat{Y}_i is the value predicted by the emulator.

$$CV_error = \frac{1}{N} \sum_{i=1}^N \frac{(Y_i - \hat{Y}_i)^2}{Var(Y)} \quad (S1)$$

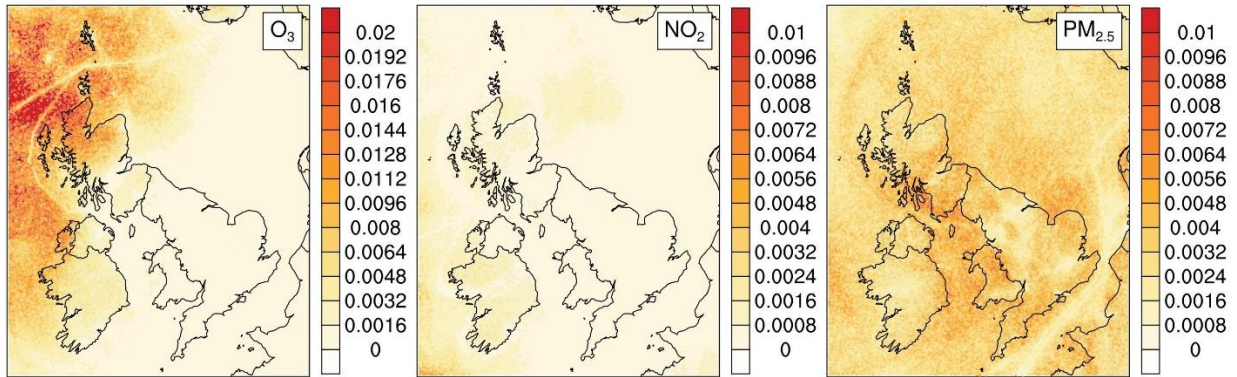


Figure S1 Spatial distribution of k - fold cross validation error values for emulated annual average concentrations of O_3 , NO_2 , and $PM_{2.5}$.

Figure S2 shows the scatter plot of the first-order sensitivity indices against the total sensitivity indices. The grey lines indicate $\pm 3\%$ fluctuation in the sensitivity index values, which were attributed to numerical errors in the calculation of sensitivity indices the analytical values of which are close to zero.

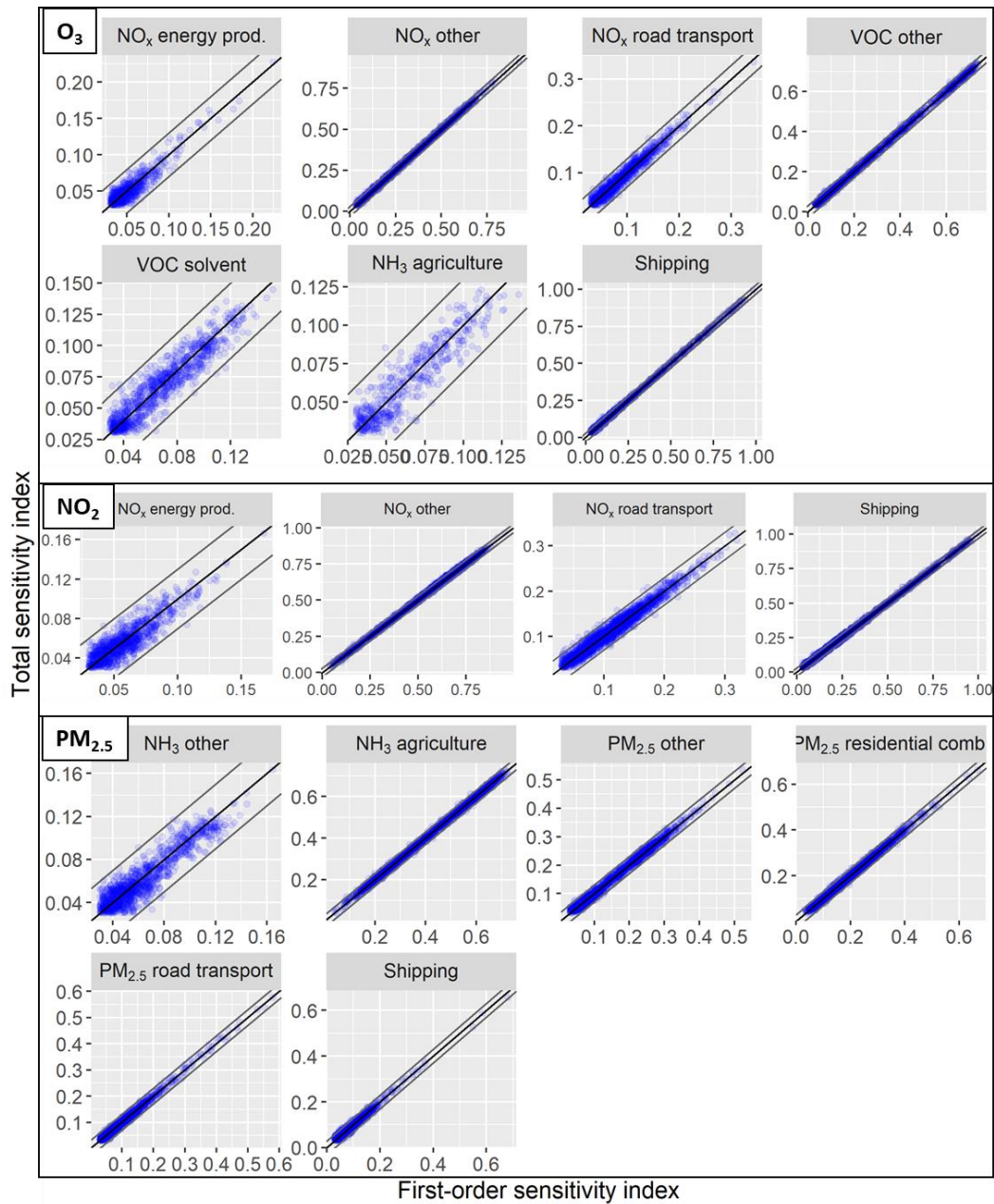


Figure S2 Scatterplot of the first-order sensitivity indices against the total sensitivity indices for the inputs affecting the variation in modelled values of O_3 , NO_2 , and $PM_{2.5}$.

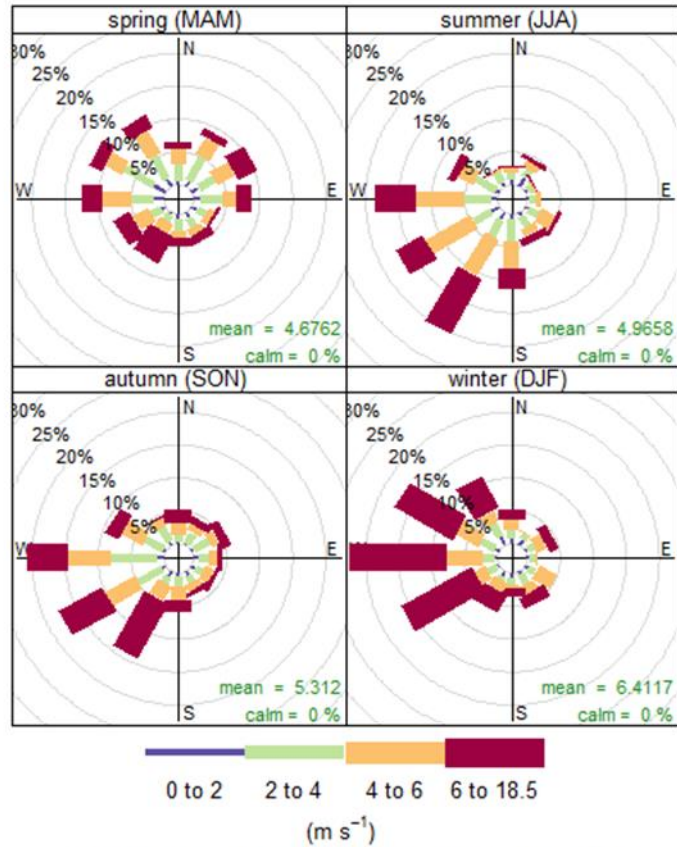


Figure S3 The seasonal wind speed and direction for the year 2012, the plot was produced using the meteorology supplied from the AURN data as extracted using the openair package.