

### **Additional File 1. Power Transformation Analysis.**

The Hinkley  $d_\lambda$  statistic, defined as  $\frac{|mean - median|}{IQR}$ , provides information on the normality of a transformation for a given choice of  $\lambda$ , where  $\lambda = 0$  represents a log transformation and  $\lambda = 1$  represents untransformed data. The smaller  $d_\lambda$ , the closer the data transformation is to a normal distribution. Hinkley  $d_\lambda$  statistics are shown for daily measurements at the central monitoring site over the period 1999-2004.

Table S1. Hinkley  $d_\lambda$  statistics for  $\lambda = 0$  and  $\lambda = 1$ .

| <b>Pollutant</b>                         | <b><u><math>d_\lambda</math> Measurement Data</u></b> |                                        |
|------------------------------------------|-------------------------------------------------------|----------------------------------------|
|                                          | <b><u><math>\lambda = 0</math></u></b>                | <b><u><math>\lambda = 1</math></u></b> |
| 1-hr max NO <sub>2</sub>                 | 0.069                                                 | 0.079                                  |
| 1-hr max NO <sub>x</sub>                 | 0.058                                                 | 0.376                                  |
| 8-hr max O <sub>3</sub>                  | 0.121                                                 | 0.095                                  |
| 1-hr max SO <sub>2</sub>                 | 0.050                                                 | 0.271                                  |
| 1-hr max CO                              | 0.080                                                 | 0.388                                  |
| 24-hr PM <sub>10</sub>                   | 0.018                                                 | 0.140                                  |
| 24-hr PM <sub>2.5</sub>                  | 0.038                                                 | 0.134                                  |
| 24-hr PM <sub>2.5</sub> -SO <sub>4</sub> | 0.0009                                                | 0.252                                  |
| 24-hr PM <sub>2.5</sub> -NO <sub>3</sub> | 0.043                                                 | 0.333                                  |
| 24-hr PM <sub>2.5</sub> -NH <sub>4</sub> | 0.024                                                 | 0.179                                  |
| 24-hr PM <sub>2.5</sub> -EC              | 0.019                                                 | 0.233                                  |
| 24-hr PM <sub>2.5</sub> -OC              | 0.002                                                 | 0.204                                  |

$$T_1(x) = \begin{cases} x^\lambda, & \lambda > 0 \\ \ln(x), & \lambda = 0 \end{cases}$$

where  $x$  is a daily measurement of pollutant concentration