

## ***Supplementary Material of***

# **Model Evaluation and Uncertainty Analysis of PM<sub>2.5</sub> components over Pearl River Delta Region Using Monte Carlo Simulations**

### **Statistical Metrics**

Notation is as follows:  $M_i$  is the simulations,  $\bar{M}$  is the simulation mean,  $O_i$  is the observations,  $\bar{O}$  is the observation mean and n is the number of data.

Correlation Coefficient:

$$R = \frac{\sum_{i=1}^{i=n}(M_i - \bar{M})(O_i - \bar{O})}{\sqrt{\sum_{i=1}^{i=n}(M_i - \bar{M})^2} \sqrt{\sum_{i=1}^{i=n}(O_i - \bar{O})^2}}$$

(S1)

Root Mean Square Error:

$$RMSE = \sqrt{\frac{1}{n} \sum_{i=1}^{i=n} (M_i - O_i)^2}$$

(S2)

Mean Bias:

$$MB = \frac{1}{N} \sum_{i=1}^N (M_i - O_i)$$

(S3)

Mean fractional error:

$$MFE = \frac{2}{N} \sum_{i=1}^N \left| \frac{M_i - O_i}{M_i + O_i} \right| * 100\%$$

(S4)

Mean fractional bias:

$$MFB = \frac{2}{N} \sum_{i=1}^N \left( \frac{M_i - O_i}{M_i + O_i} \right) * 100\%$$

(S5)