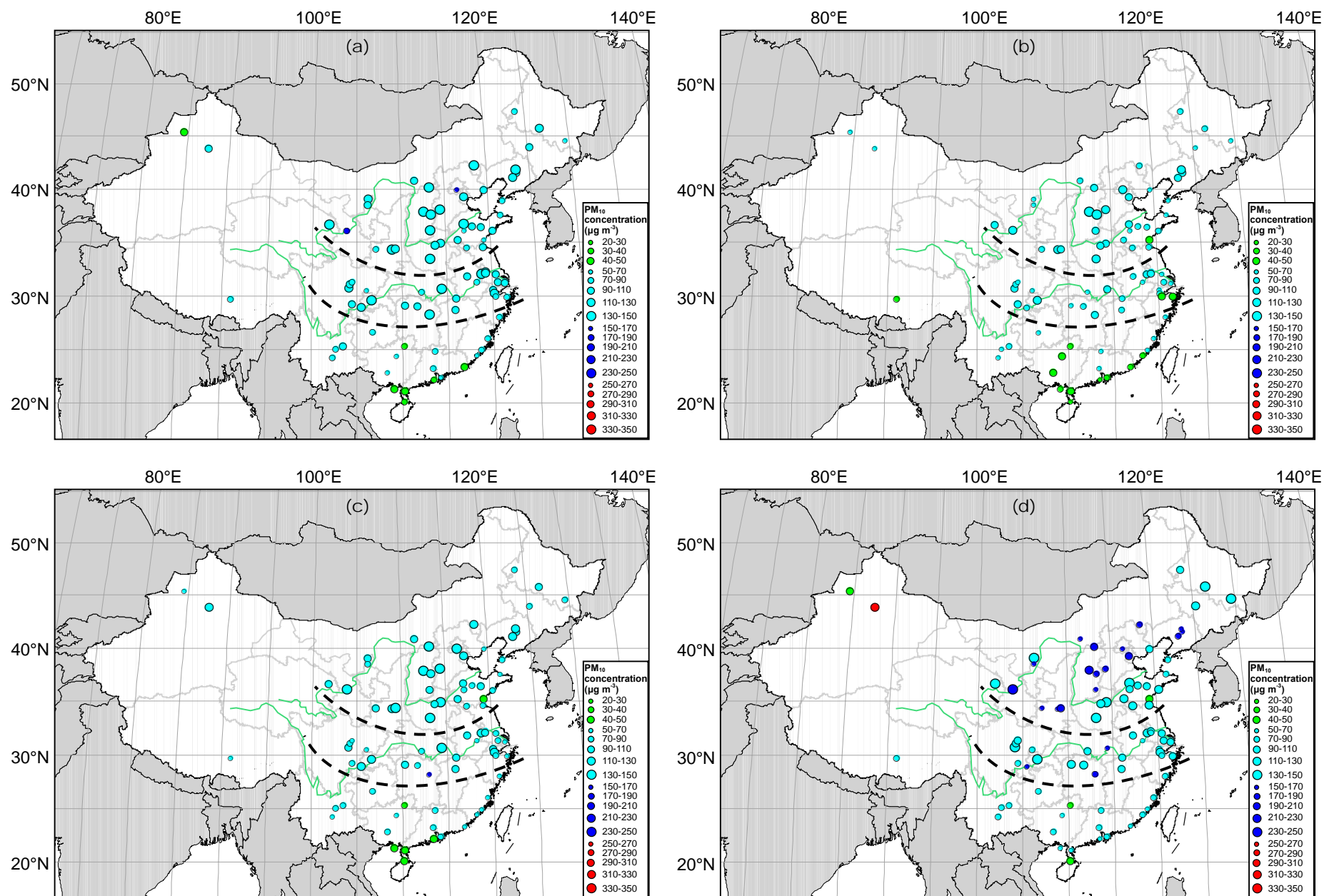


### **Supplementary material 3—Seasonal patterns of PM<sub>10</sub> spatial distribution**

Fig. S2 illustrates seasonal patterns in the multi-year median PM<sub>10</sub> concentrations. One can see that in summer (Fig. S2b), no city had a median PM<sub>10</sub> concentration greater than 150  $\mu\text{g m}^{-3}$ , which is the threshold for the Chinese National Grade II Ambient Air Quality Standard (CNAAQS-GII) classification of “good”; similarly, there are few cities exceeding this PM<sub>10</sub> threshold in spring (Fig. S2a) or autumn (Fig. S2c). Moreover, during summer (Fig. S2b), ten of the nineteen cities in the southern zone had median PM<sub>10</sub> concentrations less than 50  $\mu\text{g m}^{-3}$ ; this is criterion for the Chinese National Grade I Ambient Air Quality Standard (CNAAQS-GI) of “clean”.

For the cities in the northern and middle zones, the summertime PM<sub>10</sub> concentrations (Fig. S2b) are generally the lowest, while the higher PM<sub>10</sub> levels occur during winter and spring (Fig. S2d and S2a). In particular, PM<sub>10</sub> concentrations for the northern cities increased markedly in winter: in that season seventeen of the thirty-eight cities had median PM<sub>10</sub> concentrations exceeding 150  $\mu\text{g m}^{-3}$  (the threshold for CNAAQS-GII, Fig. S2d). High wintertime PM<sub>10</sub> concentrations (>150  $\mu\text{g m}^{-3}$ ) occurred in inland cities in northern China except for those located on Shandong Peninsula (G-7), Henan Province (G-8), the remote Heilongjiang and Jilin Provinces (G-4), Xining (XN) and Shizuishan (SZS) cities.



**Fig. S2.** Spatial distribution of the multi-year median  $PM_{10}$  concentrations during (a) spring, (b) summer, (c) autumn and (d) winter for the 86 cities.