



## **SURE Research Publication Service**

### **1) Reference of your publication:**

Han L., Zhou W., and Li W., 2016. Fine particulate (PM<sub>2.5</sub>) dynamics during rapid urbanization in Beijing, 1973-2013. *Scientific Reports*, 6: 23604.

### **2) Hyperlink to the publication:**

<https://www.nature.com/articles/srep23604>

### **3) Abstract:**

PM<sub>2.5</sub> has been given special concern in recent years when the air quality monitoring station started recording. However, long-term PM<sub>2.5</sub> concentration dynamic analysis cannot be taken with the limited observations. We therefore estimated the PM<sub>2.5</sub> concentration using meteorological visibility data in Beijing. We found that  $71 \pm 17\%$  of PM<sub>10</sub> were PM<sub>2.5</sub>, which contributed to visibility impairment ( $y = 332.26e^{-0.232x}$ ;  $R^2 = 0.75$ ,  $P < 0.05$ ). We then reconstructed a time series of annual PM<sub>2.5</sub> from 1973 to 2013, and examined its relationship with urbanization by indicators of population, gross domestic production (GDP), energy consumption, and number of vehicles. Concluded that 1) Meteorological conditions were not the major cause of PM<sub>2.5</sub> increase from 1973 to 2013; 2) With population and GDP growth, PM<sub>2.5</sub> increased significantly ( $R^2 = 0.5917$ ,  $P < 0.05$ ;  $R^2 = 0.5426$ ,  $P < 0.05$ ); 3) Intensive human activity could change air quality in a short period, as observed changes in the correlations of PM<sub>2.5</sub> concentration with energy consumption and number of vehicles before and after 2004, respectively. The success of this research provides an easy way in reconstructing long-term PM<sub>2.5</sub> concentration with limited PM<sub>2.5</sub> observation and meteorological visibility, and insight the impact of urbanization on air quality.

### **4) Contact details (Name, affiliation, email address)**

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