Trend of Acid Rain Over China Since the 1990s

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Acid rain was first observed in Southern China in the late 1970s, and became a serious nationwide environmental problem as a result of the energy consumption growth of China in the past decades. China Meteorological Administration (CMA) started monitoring acid rain in 1992 by measuring precipitation pH at selected meteorological stations, known as the Acid Rain Monitoring Networks (ARMN), numbering 74 at the beginning and 365 by the end of 2012. In this paper, the trends in precipitation acidity from 1992 to 2012 were studied based on the long-term data set of CMA/ARMN, along with data collected at 4 Global Atmosphere Watch stations. The results show that there was no remarkable change or extension of the acid rain area (i.e., with annual mean of precipitation pH<5.6) during the past two decades. The largest and most severe acid rain area (annual mean pH < 4.5) exists south of the Yangtze River, while the acid rain areas north of the Yangtze River remain separate and variable. The overall precipitation acidity showed different trends in three periods of 1992-1999, 2000-2007, and after 2007. So far, national SO_2 emission amounts are recognized as the controlling factor for precipitation acidification over China. However, as the number of people driving vehicles increased in the last decade, annual NO_x emission amounts exceeded SO_2 emissions in 2012 and is going to replace the dominate role of SO_2 in precipitation acidification.

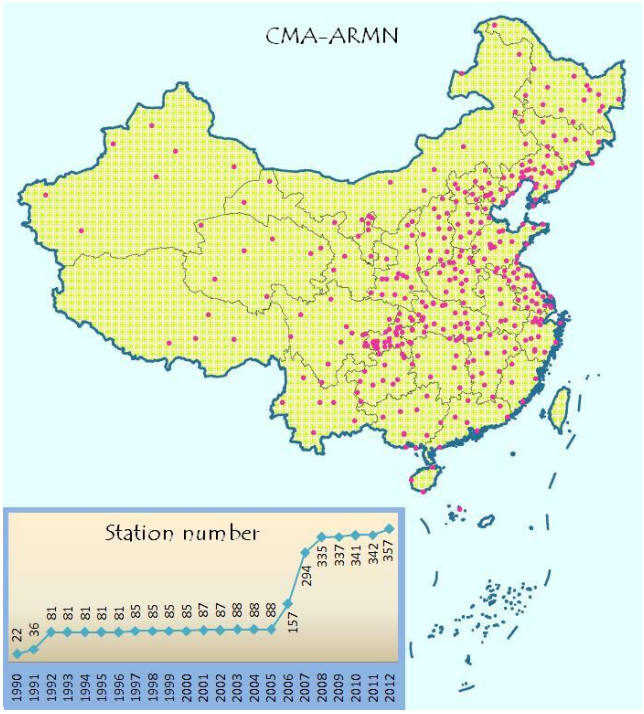

Figure 1. The station map for CMA-ARMN.

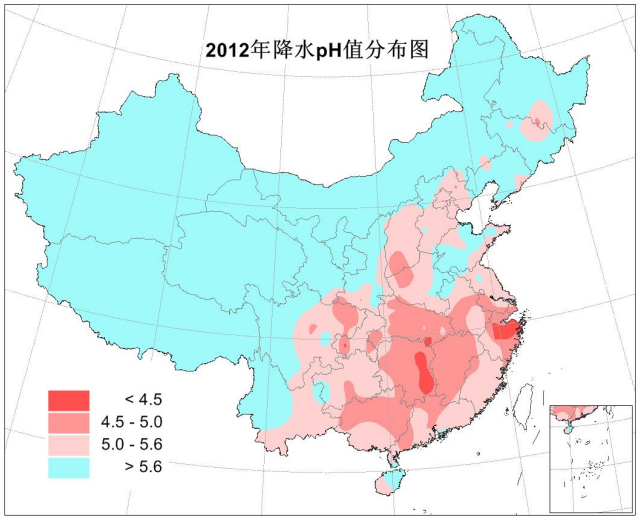

Figure 2. The pH map for 2012.