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Identifying Ammonia Hotspots in China Using a National Observation Network with the Aid of Isotopic Nitrogen

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Please fill in your abstract text. The reduction of NH_3 emissions is urgently needed due to its role in haze pollution and nitrogen deposition. However, the spatio-temporal variations of NH_3 across China are unclear. The observation gaps motivate us to design a study to investigate the atmospheric NH_3 on a national scale. Based on the year round observation at 50 sites in China, we confirm that the abundant concentrations of NH_3 spotted in traditional agricultural regions. We also observed high values at urban sites, which are comparable with those from agricultural sites. To date, debate remains over whether agricultural emissions dominate atmospheric NH_3. After accounting for the isotope exchange between NH_3 gas and aerosol NH_4^+, the $\delta^{15}N$ value of the initial NH_3 during winter hazy days is found to be -14.5‰ to -1.6‰ in urban Beijing, which indicates fossil fuel-based sources. On an annual basis, 40-52% of the "initial NH_3" arise from fossil fuel emissions, which are episodically enhanced by stagnant weather preceding the passage of cold fronts. This work demonstrates the analysis of $\delta^{15}N$ values of aerosol NH_4^+ to be a promising new tool for partitioning atmospheric NH_3 sources. These results provide strong evidence for the contribution of non-agricultural sources to NH_3 in urban regions and suggest the prioritization of controlling these emissions for haze regulation.

Key words: Ammonia; Nitrogen Isotope; Haze; Nitrogen Deposition; Source Apportionment

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