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# Ambient aerosols remain highly acidic despite dramatic sulfate reductions

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The pH of fine particles has many vital environmental impacts. By affecting aerosol concentrations, chemical composition and toxicity, particle pH is linked to regional air quality and climate, and adverse effects on human health. Sulfate is often the main acid component that drives pH of fine particles (i.e. PM2.5) and is neutralized to varying degrees by gas phase ammonia. Sulfate levels have decreased by approximately 70% over the Southeastern United States in the last fifteen years, but measured ammonia levels have been fairly steady implying the aerosol may becoming more neutral. Using a chemically comprehensive data set, combined with a thermodynamic analysis, we show that PM2.5 in the Southeastern U.S. is highly acidic (pH between 0 and 2), and that pH has remained relatively unchanged throughout the past decade and a half of decreasing sulfate. Even with further sulfate reductions, pH buffering by gas-particle partitioning of ammonia is expected to continue until sulfate drops to near background levels, indicating that fine particle pH will remain near current levels into the future. These results are non-intuitive and reshape expectations of how sulfur emission reductions impact air quality in the Southeastern U.S. and possibly other regions across the globe.