**An odd oxygen framework for wintertime ammonium nitrate aerosol pollution in Salt Lake Valley**

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Wintertime particulate matter (PM2.5) pollution is a significant air quality issue in northern Utah, as well as many areas of the world. These pollution episdoes often have large contributions from ammonium nitrate aerosol, formed from gas phase reactions of  NOx, VOCs, and NH3. Using observations from the 2017 Utah Winter Fine Particulate Study in the Salt Lake Valley, we modeled the growth of ammonium nitrate aerosol using the parameter Ox,total, which describes both O3 production and HNO3 production, and demonstrates that the two are closely linked. We show that the traditional NOx-VOC framework for evaluating ozone mitigation strategies can also be applied to ammonium nitrate. Despite being nitrate-limited, ammonium nitrate aerosol pollution in Salt Lake City is responsive to VOC control and, counter-intuitively, not initially responsive to NOx control. We demonstrate simultaneous nitrate limitation and NOx saturation and suggest this phenomenon may be general. This finding may identify an unrecognized control strategy to address a global public health issue in regions with severe winter aerosol pollution.