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Observations of the effects of temperature on atmospheric HNO_3, ΣANs, ΣPNs, and NO_x: evidence for a temperature-dependent HO_x source

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Abstract. We describe observations of atmospheric reactive nitrogen compounds including NO, NO_2, total peroxy nitrates, total alkyl nitrates, and HNO_3 and their correlation with temperature. The measurements were made at a rural location 1315 m a.s.l. on the western slope of the Sierra Nevada Mountains in California during summer of 2001. The ratio of HNO_3 to its source molecule, NO_2, and the ratio of HNO_3 to all other higher oxides of nitrogen (NO_z) both increase with increasing temperature. Analysis of these increases suggests they are due to a steep increase in OH of between a factor of 2 and 3 over the range 18–32°C. Total peroxy nitrates decrease and total alkyl nitrates increase over the same temperature range. The decrease in the total peroxy nitrates is shown to be much less than expected if the rate of thermal decomposition were the sole important factor. This observation is consistent with the increase in OH inferred from the temperature trends in the HNO_3/NO_2 ratio.

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