PHOTOLYSIS OF PEROXYACETYL NITRATE (PAN) STUDIED BY CAVITY RING-DOWN SPECTROSCOPY

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Peroxyacetyl nitrate, commonly called PAN, is an important reservoir of nitrogen oxides. Peroxyacetyl nitrate is formed by reaction of partially oxidized hydrocarbons (oxidized to the peroxyacetyl radical) with NO_2. This reaction is reversible, thus PAN can be a source of NO_2 to regions remote from pollution sources. The strong temperature dependence of the PAN dissociation reaction makes PAN stable with respect to thermal decomposition at low temperatures. The lifetime with respect to thermal dissociation is 1 month at -10°C and 1 year at -25°C. Therefore, other losses of PAN can be the major sink of PAN in regions where the temperature is low. One of these other losses is photolysis of PAN. Photolysis of PAN can produce two major products, NO_2 and NO_3. We have measured the production of NO_3 via pulsed laser photolysis with detection of NO_3 via cavity ring-down spectroscopy. Atmospheric implications of these measurements will be discussed.