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Reactive nitrogen emissions from point and regional sources using visible spectroscopy measurements from aircraft

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Accurate measurements of nitrogen dioxide, a key trace gas in the formation and destruction of tropospheric ozone are important in studies of urban air pollution. Nitrogen dioxide column abundances were measured during the Texas Air Quality Study 2000 using visible absorption spectroscopy from an aircraft. The spectrograph has zenith and nadir fields of view allowing for quantification of the integrated total number of nitrogen dioxide molecules in the polluted atmosphere. The total column abundance measurements can be used to obtain information on the fluxes of nitrogen dioxide into the atmosphere with unique flexibility in terms of the aircraft altitude and the height and uniformity of the boundary layer. Observations of nitrogen dioxide plumes downwind of power plants were used to estimate the flux of nitrogen oxide emitted from several power plants in the Houston and Dallas, Texas metropolitan areas and in North Carolina. Measurements taken over the city of Houston, Texas were also employed to infer the total flux from the city as a whole.