Nitrogen oxides (NO and NO₂, collectively NOₓ) are critical intermediates in atmospheric chemistry. NOₓ abundance controls the levels of the primary atmospheric oxidants OH, NO₃, and O₃, and regulates the ozone production which results from the degradation of volatile organic compounds. NOₓ are also atmospheric pollutants in their own right, and NO₂ is commonly included in air quality objectives and regulations. In addition to their role in controlling ozone formation, NOₓ levels affect the production of other pollutants such as the lachrymator PAN, and the nitrate component of secondary aerosol particles. Consequently, accurate measurement of nitrogen oxides in the atmosphere is of major importance for understanding our atmosphere.

The most widely employed approach for the measurement of NOₓ is chemiluminescent detection of NO₂⁺ from the NO + O₃ reaction, combined with NO₂ reduction by either a heated catalyst or photoconvertor. The reaction between alkenes and ozone is also chemiluminescent; therefore alkenes may contribute to the measured NOₓ signal, depending upon the instrumental background subtraction cycle employed. This interference has been noted previously, and indeed the effect has been used to measure both alkenes and ozone in the atmosphere.

Here we report the results of a systematic investigation of the response of a selection of NOₓ analysers, ranging from systems used for routine air quality monitoring to atmospheric research instrumentation, to a series of alkenes ranging from ethene to the biogenic monoterpenes, as a function of conditions (co-reactants, humidity). Experiments were performed in the European Photoreactor (EUPHORE) to ensure common calibration, a common sample for the monitors, and to unequivocally confirm the alkene (via FTIR) and NO₂ (via DOAS) levels present. The instrument responses ranged from negligible levels up to 10 % depending upon the alkene present and conditions used. Such interferences may be of substantial importance for the interpretation of ambient NOₓ data, particularly for high-VOC, low-NOₓ environments such as remote forests.