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In-situ comparison of the NO>sub>y instruments flown in MOZAIC and SPURT

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Abstract. Two aircraft instruments for the measurement of total odd nitrogen (NO_y) were compared side by side aboard a Learjet A35 in April 2003 during a campaign of the AFO2000 project SPURT (Spurengastransport in der Tropopausenregion). The instruments albeit employing the same measurement principle (gold converter and chemiluminescence) had different inlet configurations. The ECO-Physics instrument operated by ETH-Zürich in SPURT had the gold converter mounted outside the aircraft, whereas the instrument operated by FZ-Jülich in the European project MOZAIC III (Measurements of ozone, water vapour, carbon monoxide and nitrogen oxides aboard Airbus A340 in-service aircraft) employed a Rosemount probe with 80 cm of FEP-tubing connecting the inlet to the gold converter. The NO_y concentrations during the flight ranged between 0.3 and 3 ppb. The two data sets were compared in a blind fashion and each team followed its normal operating procedures. On average, the measurements agreed within 7%, i.e. within the combined uncertainty of the two instruments. This puts an upper limit on potential losses of HNO_3 in the Rosemount inlet of the MOZAIC instrument. Larger transient deviations were observed during periods after calibrations and when the aircraft entered the stratosphere. The time lag of the MOZAIC instrument observed in these instances is in accordance with the time constant of the MOZAIC inlet line determined in the laboratory for HNO_3.

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