

## Intercomparison of NO<sub>3</sub> and N<sub>2</sub>O<sub>5</sub> Detection Techniques at the Atmosphere Simulation Chamber SAPHIR

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The nitrate radical and its equilibrium partner N<sub>2</sub>O<sub>5</sub> are of central importance for the chemistry and the loss of nitrogen oxides in the nighttime atmosphere. Since the first atmospheric detection of NO<sub>3</sub> by Differential Optical Absorption Spectroscopy (DOAS) in the early eighties no other technique was available for about twenty years. Within the last decade new complementary techniques have been developed which allow sub-ppt in-situ measurements of NO<sub>3</sub> with high time resolution on mobile platforms. A striking advantage of most of these instruments is their capability to concurrently measure the concentration of N<sub>2</sub>O<sub>5</sub> via thermal conversion to NO<sub>3</sub> in an additional heated inlet. Several instruments have already been deployed to field campaigns; however, there has been no systematic comparison so far.

In order to strengthen the community's confidence in the ability to measure atmospheric NO<sub>3</sub> and N<sub>2</sub>O<sub>5</sub> accurately an intercomparison campaign was conducted in June 2007 at SAPHIR. It allows the controlled production and destruction of NO<sub>3</sub> and N<sub>2</sub>O<sub>5</sub> and it provides a large, well mixed gas volume for simultaneous operation of multiple instruments. All participating instruments applied optical spectroscopy for NO<sub>3</sub> detection: four techniques based on Cavity Ring-Down Spectroscopy, three using Cavity Enhanced Absorption Spectroscopy, two Laser-Induced Fluorescence instruments, and one folded long-path DOAS took part. All instruments have measured simultaneously during ten chamber experiments covering different chemical scenarios. The experiments were selected to test the specific instrumental performance as a function of varying trace gas concentrations (O<sub>3</sub>, NO<sub>2</sub>, and reactive hydrocarbons), humidity, and aerosols. We present an overview and selected results of the campaign discussing accuracy, precision, and time response of the different instruments.