



High sensitivity in situ absorption measurements in simulation chambers: Intercomparison results and application to field and chamber studies

D.S. Venables (1,3), T. Brauers (4), H.-P. Dorn (4), U. Heitmann (1,2), A.A. Ruth (2), E. Schlosser (4), R. Varma (1,2),

(1) Department of Chemistry, University College Cork, Cork, Ireland, (2) Department of Physics, University College Cork, Cork, Ireland, (3) Environmental Research Institute, University College Cork, Cork, Ireland, (4) Forschungszentrum Jülich, ICG-II: Troposphäre, Germany (d.venables@ucc.ie / Fax: +353-21-427-4097 / Phone: +353-21-490-2439)

We describe the design and implementation of an Incoherent Broadband Cavity-Enhanced Absorption Spectrometer (IBBCEAS) across the length of the SAPHIR atmospheric simulation chamber. The 20 m mirror separation of the IBBCEAS system is (to our knowledge) by far the longest optical resonator of this type yet demonstrated. The alignment of the optical system was stable and spectra were recorded continuously over the two weeks of the EUROCHAMP-funded $\text{NO}_3/\text{N}_2\text{O}_5$ intercomparison held in June 2007. We compare the results of our *in situ* NO_3 measurements against other techniques, including cavity ringdown spectroscopy, broadband cavity ringdown spectroscopy, multipass-DOAS, and laser-induced fluorescence. The IBBCEAS system showed excellent sensitivity and the retrieved NO_3 concentrations correlated very well with those of other approaches. The spectral analysis procedure is described and the application of the technique to field and chamber studies is discussed.