Title:

Detection of Sulfur Dioxide by Broadband Cavity Enhanced Absorption Spectroscopy (BBCEAS)

Body:

Sulfur dioxide (SO2) is an important precursor for formation of atmospheric sulfate aerosol and acid rain. We present an instrument using Broad Band Cavity Enhanced Absorption Spectroscopy (BBCEAS) for the measurement of SO2 with a minimum limit of detection of 0.75 ppbv (3-σ) using the spectral range 305.5 – 312 nm and an averaging time of 5 minutes. The instrument consists of high reflectivity mirrors (0.9984 at 310 nm) and a deep UV light source. The effective absorption 5 path length of the instrument is 610 m with a 0.966 m base length. Published reference absorption cross-sections were used to fit and retrieve the SO2 concentrations and were compared to standard measurements for SO2. The comparison was well correlated, R2 = 0.9998 with a correlation slope of 1.00. Interferences for other techniques were tested and the BBCEAS showed no interference, while ambient measurements with supplemented SO2 correlate well with standard measurements.