



Long term seasonal variation of stratospheric BrO and NO₂ from ground based Zenith Sky DOAS observations at Kiruna, Sweden

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Stratospheric BrO and NO₂ have an important influence on the stratospheric ozone depletion. Several studies have proved the performance of field measurements of stratospheric trace gases. In particular, ground-based zenith-sky Differential Optical Absorption Spectroscopy (DOAS) has successfully monitored BrO and other trace gases related to stratospheric ozone chemistry such as O₃, NO₂ and OCIO. In this study, we investigated the characteristics of stratospheric BrO and NO₂ in polar region using zenith-sky DOAS. The instrument was conducted on the Swedish Institute for Space Physics in Kiruna (Sweden, 68.84°N, 20.41°E) since 1996. We present the seasonal variation of BrO and NO₂ for the period 1997-2009 and focus on their averaged seasonal trends with respect to different years. The retrieved NO₂ and BrO columns are also compared to ECMWF analysis data for investigating the dependence of the NO₂ and BrO enhancements on meteorological parameters like stratospheric temperatures, potential vorticity, and PSC area. Also, the NO₂ column densities are compared with OMI satellite data. Recently, the instrument was equipped with a new detector which ensures continuous operation in the future. Being one of the longest measurements of spectroscopic measurements of trace gases in the Arctic, the Kiruna observation will contribute to a better understanding of the impacts of stratospheric trace gases and insights of their chemical reactions.