



Long-term ground-based UV-visible observations of stratospheric BrO at 60° N and 44° S reveal a decline

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A trend analysis has been performed on stratospheric bromine monoxide (BrO) columns derived from ground-based zenith-sky UV-visible observations at the NDACC (Network for the Detection of Atmospheric Composition Change) stations of Harestua, Southern Norway (60° N, 11° E) and Lauder, New Zealand (44° S, 170° E) from 1995 to 2005. The stratospheric BrO vertical column densities have been retrieved by applying a profiling technique to the ground-based UV-visible observations. The thus obtained time series have been fitted using a statistical model including a linear trend and seasonal components represented by polyharmonic functions. The inclusion of such functions in the model enables to fit the strong seasonality of BrO in the stratosphere. At both stations, the polyharmonic fit gives a positive trend for the 1995-2001 period, while a negative trend is found after 2001. The significance of these trends is discussed. Given the mean age of air of about 4 +/- 1 years over Harestua and Lauder, the decline of BrO in the stratosphere after 2001 is consistent with the reported decline of long-lived bromine source gases (mainly methyl bromide) observed since the second half of 1998. This study provides the first clear evidence for a decline of the stratospheric bromine loading in response to the Montreal Protocol limiting the production of brominated and chlorinated source gases.