



## **Observed and modelled distribution of brominated VSLS species in the extratropical UTLS and implications for the bromine budget of the lowermost stratosphere**

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Brominated very short lived substances (VSLS) have been identified as a source for reactive bromine to the stratosphere. Due to their short lifetimes, the bromine bound in these gases is released quickly once in the stratosphere, making them particularly effective catalysts for destruction of ozone in the lower stratosphere. To quantify the amount of bromine carried into the stratosphere by VSLS gases, observations and modelling at the tropical tropopause have been used. However, for the lowermost stratosphere, i.e. the region of the extratropical stratosphere below 380 K potential temperature, transport via the extratropical tropopause is also important. If this pathway contains different amounts of bromine, this may have an effect on ozone in the lowermost stratosphere.

Here we present airborne observations of brominated VSL source gases from the HALO aircraft during different measurement campaigns in the Northern Hemisphere extratropical UTLS. The data are measured using an airborne GC/MS system operated in chemical ionization mode. The observations are compared to output from the TOMCAT chemical transport model run using different emission scenarios and from the EMAC climate model. We show that the agreement between observations and models is strongly dependent on the emission scenario. We further compare observed vertical gradients and discuss the impact of extratropical troposphere to stratosphere transport on the bromine budget of the lowermost stratosphere.