



VSLS transport from the surface to the stratosphere during the Meteor cruise in Oct/Nov 2002

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Halogenated very short-lived substances (VSLS) provide an important contribution to the stratospheric halogen loading and therefore to the stratospheric ozone depletion. In particular the additional supply of inorganic bromine to the stratosphere by transport of bromine-containing VSLS is known to have a significant impact on stratospheric ozone chemistry. VSLS are characterized by relatively short lifetimes compared to typical atmospheric transport times. Therefore, our understanding of the transport of VSLS from the surface into the stratosphere is crucial to estimate their contribution to stratospheric ozone depletion.

Maximum emissions of bromine-containing VSLS and in particular bromoform (CHBr₃) are observed especially in tropical coastal regions or in areas with strong oceanic upwelling. However, most studies modeling the transport of bromoform assume an oceanic source region with spatially and temporarily uniform bromoform concentration. We use a combined data set for CHBr₃ based on measurements of the oceanic vertical profiles, surface water and boundary layer air from the tropical Atlantic obtained during the R/V Meteor cruise #55 in October/November 2002. Based on this data set, which includes intense emissions in tropical open ocean regions, we have investigated the transport of bromoform from the surface to the lower stratosphere. The transport through the troposphere is carried out by the Lagrangian particle dispersion model FLEXPART, while the transport through the TTL is based on trajectory calculations driven by diabatic heating rates. Implications for the contribution of bromoform to stratospheric bromine and the impact of highly variable emission rates will be discussed.