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The contribution of brominated and iodinated VSLS to stratospheric ozone depletion

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Halogenated very short-lived substances (VSLS) are expected to contribute significantly to the stratospheric halogen loading and therefore to the stratospheric ozone chemistry. Our understanding of the highly variable emission of VSLS and their transport from the surface into the stratosphere is crucial to estimate their contribution to stratospheric halogen loading. In this study we investigate the relative impacts of emission rates, large scale and convective transport as well as wet and dry deposition on the contribution of VSLS to stratospheric ozone depletion. Therefore we have simulated the transport, washout and photochemical decay of VSLS with the Lagrangian particle dispersion model FLEXPART. The transport simulations are based on VSLS sea-to-air flux measurements obtained from the tropical Atlantic in October/November 2002 and from the tropical Western Pacific in October 2009. We show, that the spatial and temporal variability of emission rates, convective transport and dehydration processes in the TTL leads to strong variability in the overall transport of VSLS into the stratosphere. We will give estimates of the amount of VSLS and their organic product gases transported into the stratosphere and compare those to measurements form aircraft and balloon campaigns. In particular we will discuss the importance of methyl iodide emitted in the Western Pacific as a carrier of iodine into the upper troposphere and lower stratosphere. We will estimate the ozone depleting potential of the brominated and iodinated VSLS and discuss the relevance of VSLS emissions in the tropical Atlantic and tropical Western Pacific for stratospheric ozone chemistry.