

Brominated VSLS and their influence on ozone under a changing climate

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Abstract. Very short-lived substances (VSLS) contribute as source gases significantly to the tropospheric and stratospheric bromine loading. At present, an estimated 25% of stratospheric bromine is of oceanic origin. In this study, we investigate how climate change may impact the ocean–atmosphere flux of brominated VSLS, their atmospheric transport, chemical transformations, and evaluate how these changes will affect stratospheric ozone over the 21st century.

- 5 Under the assumption of fixed ocean water concentrations and RCP6.0 scenario, we find an increase of the ocean–atmosphere flux of brominated VSLS of about 8–10% by the end of the 21st century compared to present day. A decrease in the tropospheric mixing ratios of VSLS and an increase in the lower stratosphere are attributed to changes in atmospheric chemistry and transport. Our model simulations reveal that this increase is counteracted by a corresponding reduction of inorganic bromine. Therefore the total amount of bromine from VSLS in the stratosphere will not be changed by an increase in upwelling. Part of
- 10 the increase of VSLS in the tropical lower stratosphere results from an increase in the corresponding tropopause height. As the depletion of stratospheric ozone due to bromine depends also on the availability of chlorine, we find the impact of bromine on stratospheric ozone at the end of the 21st century reduced compared to present day. Thus, these studies highlight the different factors influencing the role of brominated VSLS in a future climate.