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Modelling oceanic emissions of brominated very short-lived substances under a changing climate: Stratospheric bromine budget and the impact on ozone.

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Brominated very short lived substances (VSLs), primarily from natural oceanic emissions, contribute significantly to the tropospheric and stratospheric bromine loading. For present day conditions, about 25% of the stratospheric bromine loading is due to oceanic emissions of VSLs. Much progress has been achieved in recent years in advancing our understanding of the emission and transport processes that supply bromine from VSLs to the stratosphere and in implementing these processes in global chemistry climate models. Here we show that the stratospheric bromine loading is consistent with observed concentrations of bromocarbons in surface ocean water. We calculate the impact on ozone and ozone trends and investigate long-term changes in transport and transformation processes of the supply of VSLs to the stratosphere based on chemistry climate model simulations over the period 1950 – 2099. The simulations indicate that brominated VSLs significantly reduce ozone, with the largest impact in the lowermost stratosphere and in the free troposphere, a region where ozone changes have the largest impact on surface climate.