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Natural halogens buffer tropospheric ozone in a changing climate

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Reactive atmospheric halogens destroy tropospheric ozone (O_3), an air pollutant and greenhouse gas. The primary source of natural halogens is emissions from marine phytoplankton and algae, as well as abiotic sources from ocean and tropospheric chemistry, but how their fluxes will change under climate warming –and the resulting impacts on O_3– are not well known. Here we use an Earth system model to estimate that natural halogens deplete approximately 13 % of tropospheric O_3 in the present-day climate. Despite increased levels of natural halogens through the twenty-first century, this fraction remains stable due to compensation from hemispheric, regional, and vertical heterogeneity in tropospheric O_3loss. Notably, this halogen-driven O_3 buffering is projected to be greatest over polluted and populated regions, mainly due to iodine chemistry, with important implications for air quality.

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