



## Does bromine chemistry make a difference to pre-industrial ozone simulations?

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Standard model simulations of pre-industrial surface ozone concentrations, using pre-industrial emissions, show a 5-25 ppbv higher level than observations. According to previous model sensitivity studies, this significant gap could be reduced to some extent by changing the emission strength of ozone precursors such as NO<sub>x</sub> and hydrocarbon from both natural and anthropogenic sources and by altering dry deposition rates, etc. However, the discrepancy between model and observation still could not be fully explained. Here by using a global chemistry transport model p-TOMCAT, in which a detailed bromine chemistry is included, we study the effect of bromine chemistry on the preindustrial ozone level and find that inclusion of bromine chemistry can reduce surface ozone by several ppbv and may cause up to 10 ppbv ozone difference in the southern hemisphere. Halogens played a role in the preindustrial atmosphere.