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Volatile organic compound ratios as probes of halogen atom chemistry in the Arctic

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Abstract. Volatile organic compound concentration ratios can be used as indicators of halogen chemistry that occurs during ozone depletion events in the Arctic during spring. Here we use a combination of modeling and measurements of [acetone]/[propanal] as an indicator of bromine chemistry, and [isobutane]/[n-butane] and [methyl ethyl ketone]/[n-butane] are used to study the extent of chlorine chemistry during four ozone depletion events during the Polar Sunrise Experiment of 1995. Using a 0-D photochemistry model in which the input of halogen atoms is controlled and varied, the approximate ratio of [Br]/[Cl] can be estimated for each ozone depletion event. It is concluded that there must be an additional source of propanal (likely from the snowpack) to correctly simulate the VOC chemistry of the Arctic, and further evidence that the ratio of Br atoms to Cl atoms can vary greatly during ozone depletion events is presented.

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