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Title:
Methyl bromide in the atmosphere—a scientific overview and update

Summary:
Although natural sources and sinks of methyl bromide are abundant and diverse, a portion of industrially-produced methyl bromide reaches the stratosphere and catalyzes ozone depletion. Because of this, production of this chemical was restricted by the Montreal Protocol on Substances that Deplete the Ozone Layer. Here we update our understanding of the atmospheric science of stratospheric ozone and methyl bromide, and show how reductions in methyl bromide production have affected the atmosphere and its composition. The talk will be based primarily on the most recent World Meteorological Organization Scientific Assessment of Ozone Depletion, published in 2011. This recent report re-confirms the significant contribution of methyl bromide to ozone depleting halogen in the stratosphere and the significant benefits to stratospheric ozone that have been realized from reduced emissions. Significant declines in ozone-depleting halogen concentrations have been observed in the atmosphere, and the decrease in atmospheric methyl bromide has accounted for an important fraction of this overall decline. Ozone depletion has not continued to worsen in recent years, and projections suggest that if the atmospheric concentrations of ozone-depleting substances continue to decrease, clear signs of ozone recovery should be observable soon.

Updates to the scientific understanding provided by the recent WMO report will also be presented in this talk, based on updated ongoing NOAA measurements and the published literature. The NOAA observational record shows that background atmospheric concentrations of methyl bromide began decreasing as industrial production declined (Figures 1 and 2). The most recent data, however, also show that this atmospheric decline has virtually stopped since 2009, presumably because industrial production for all purposes (for controlled and non-controlled quarantine-pre-shipment applications) has not decreased substantially since that time. Recent published data regarding the consequent reversal in the net flux of methyl bromide from the oceans will also be discussed.

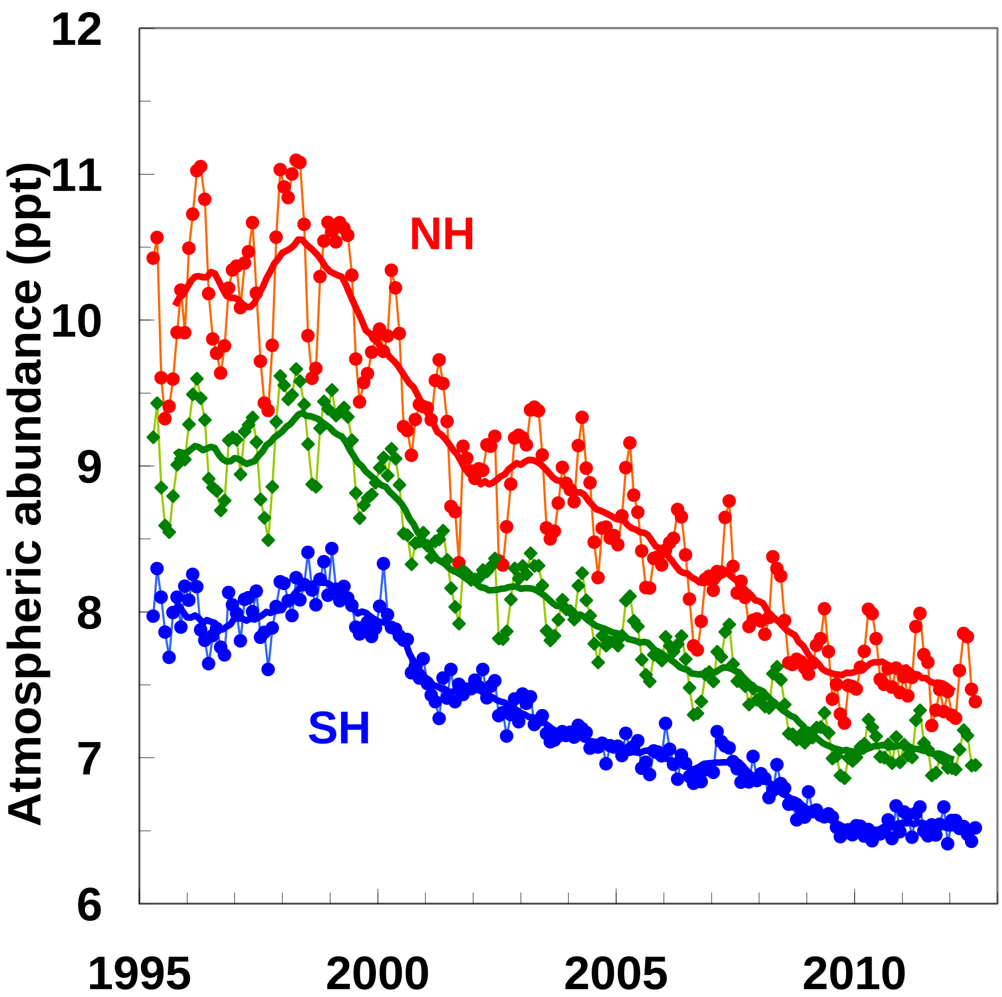

Figure 1. Monthly hemispheric surface mixing ratios of methyl bromide over time as measured by NOAA's Global Monitoring Division (updates to Montzka et al., 2003, original data are available at: ftp://ftp.cmdl.noaa.gov/hats/methylhalides/ch3br/flasks/CH3BR_GCMS_flask.txt). Hemispheric means are derived from a subset of measurement at sites that show only small influences of local sources and sinks (see Montzka et al., 2003). Green points are an average of the monthly means from the northern and southern hemisphere so represent a global surface mean. Lines are monthly means smoothed over annual periods to remove regular seasonal variations.

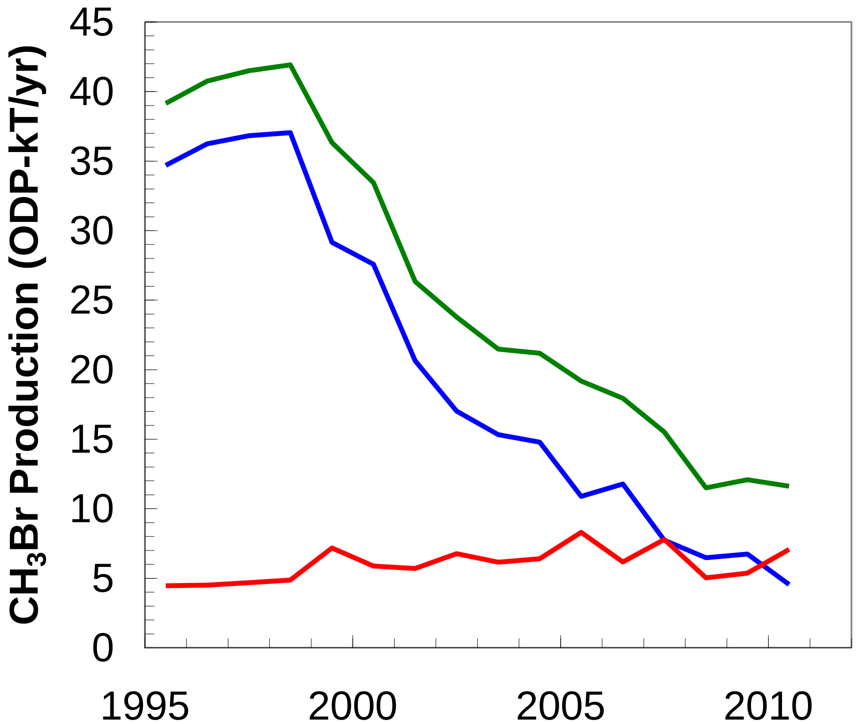

Figure 2. Production of methyl bromide reported to the Ozone Secretariat for non-QPS applications (blue line), QPS applications (red line) and the sum of the two (green line). Data through 2011 were downloaded from http://ozone.unep.org/Data_Reporting/Data_Access/ in September, 2012.

Reference:

Montzka, S.A, J.H. Butler, B.D. Hall, J.W. Elkins, D.J. Mondeel, A decline in tropospheric organic bromine, *Geophy. Res. Lett.*, *30*(15), 1826, doi:10.1029/2003GL017745, 2003.