A Significant and Substantial Decrease in Tropospheric Organic Bromine

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Tropospheric bromine from the most abundant halons and methyl bromide (CH_3Br) reached a peak in 1998 and declined thereafter at a mean rate of 0.25 ± 0.09 ppt yr^{-1} (~1% y^{-1}) (Figure 1). This reduction, driven entirely by the decrease in CH_3Br, is substantial compared to the change in chlorine. Tropospheric Cl from long-lived gases was decreasing at 22 ppt yr^{-1} in 2000, whereas the observed rate of change in tropospheric, organic Br since 1998 corresponds to a decline of about 11 ppt yr^{-1} in Cl equivalents. A recalculation of tropospheric equivalent chlorine with these results shows an overall decline by 2002 that is 25–30% larger than that of the most recent assessment (e.g., *Scientific Assessment on Ozone Depletion, 2002*).

The rapid decrease in the burden of CH_3Br since 1998 also suggests a greater contribution of agricultural emissions to its atmospheric burden, a smaller discrepancy between identified sources and sinks, and a longer atmospheric lifetime than previously indicated. By contrast, bromine from the longer-lived halons continues to increase slowly in the atmosphere because of ongoing use of remaining stocks, and because of continued production allowed under the Montreal Protocol. In the absence of large changes in natural fluxes of CH_3Br, continued adherence to restrictions in the Montreal Protocol should result in sustained declines of Br to levels lower than projected previously.

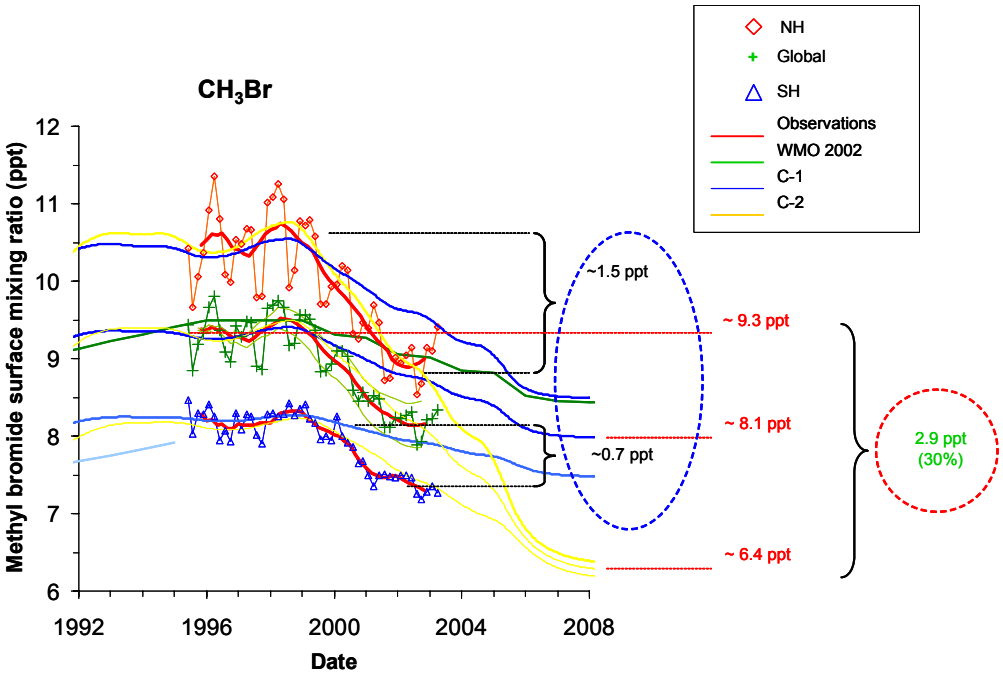

Figure 1. Recent atmospheric history of CH_3Br from CMDL measurements. Solid red lines are running means of CMDL monthly averaged data for the two hemispheres and the global atmosphere. The green line is from the *2002 Scientific Assessment on Ozone Depletion*, the blue lines are similar model outputs for the northern and southern hemisphere, and global atmosphere. The yellow lines are modeled estimates that can explain the actual measurements.