

Atmospheric Burden of Some Ozone-Depleting Compounds Continues to Increase

D.J. Mondeel^{1,2}, S.A. Montzka², J.H. Butler², B.D. Hall², and J.W. Elkins²

¹Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder 80309; 303-497-6013; Fax: 303-497-6290 E-mail: Debra.J.Mondeel@noaa.gov

²NOAA Climate Monitoring and Diagnostics Laboratory, Boulder CO 80305

With the signing of the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987, the international community began a series of steps to reduce the emission of ozone-depleting compounds into the atmosphere. The contribution of these gases to the atmospheric burden of ozone-depleting halogen continued to increase until 1993-1994, when, as a result of these efforts, their collective trend reversed and began to decline [Montzka et al., *Geophys. Res. Lett.*, 23, 169-172, 1996] (Figure 1). This decline has continued over the past decade as anticipated by models of expected emissions. Not all contributing gases, however, are decreasing in atmospheric concentration. Mixing ratios of chlorofluorocarbon-12 (CFC-12), for example, have leveled off, but the turnover is slow as a result of the long lifetime and continued release of this gas from reservoirs such as older automobile air conditioners. Mixing ratios of the two major halons (H-1301 and H-1211) continue to increase, albeit much slower than in the past. H-1301, with an atmospheric lifetime of 65 years, is still used worldwide for lack of a suitable replacement, although its production ceased in developed countries in 1994 and was frozen in developing countries in 2002. Growth rates of shorter-lived (16 years) H-1211, which has replacements for some uses, has dropped some, but remain positive. The atmospheric mixing ratios of hydrochlorofluorocarbons (HCFCs), the temporary replacements for CFCs, have been increasing rapidly over the past decade but some are showing signs of leveling off. We examine the current and potential future contribution of all of these gases to the burden of ozone-depleting halogen in the atmosphere focusing on why they continue to increase.

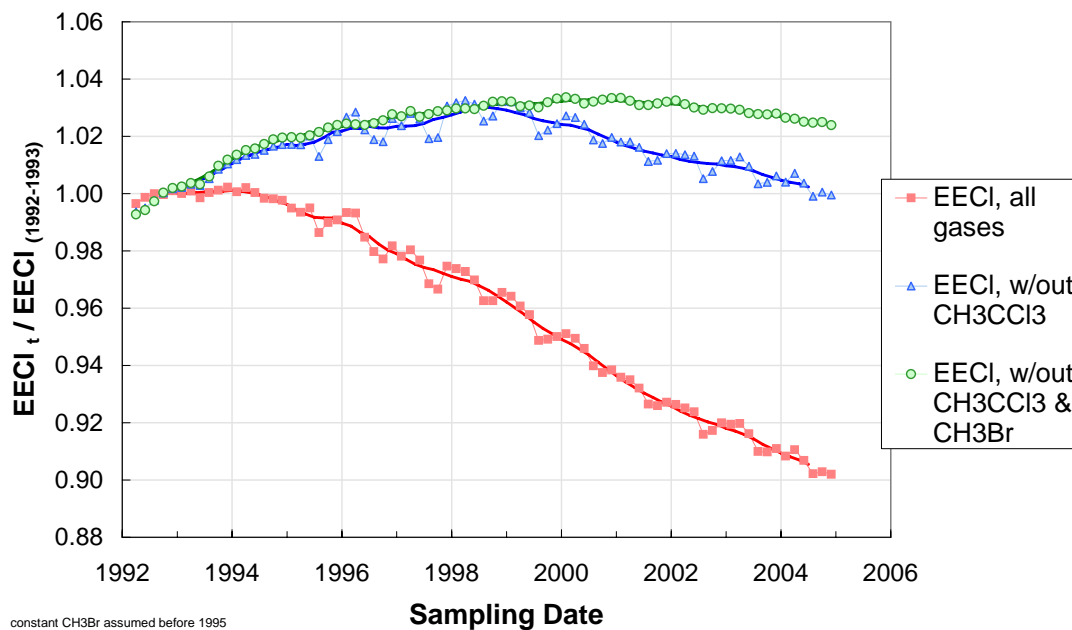


Figure 1. The decline in ozone-depleting chlorine and bromine (expressed as Effective Equivalent Chlorine or EECI) has resulted primarily from rapid decreases in short-lived gases. Measured changes in EECI are shown normalized to 1992-1993 for all ozone-depleting gases (red) and for only long-lived gases (without methyl chloroform = blue; without methyl chloroform and methyl bromide = green).