

Increased Atmospheric Growth Rates of the CFC Substitutes, the HCFCs, and Their Implications on International Protocols

J.W. Elkins¹, G.S. Dutton², S.A. Montzka¹, and B.D. Hall¹

¹NOAA Earth System Research Laboratory, 325 Broadway, Boulder, CO 80305; 303-497-6224, Fax: 303-497-6290, E-mail: James.W.Elkins@noaa.gov

²Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO 80309

Atmospheric growth rates of the chlorofluorocarbon (CFC) substitutes, the hydrochlorofluorocarbons (HCFCs), started to decrease prior to the January 1, 2004 deadline of a 35% mandated decrease in the consumption of HCFCs in developed countries (US, Europe, Japan, etc.) by the Montreal Protocol. This decline was short lived. By mid-2005, the atmospheric growth rates of HCFC-22, -141b, and -142b started to increase again. NOAA ESRL scientists have flask data, a flask pair almost every week, for three HCFCs (22, -141b, & -142b) dating back to 1992 for ten stations, and in situ hourly measurements of HCFC-22 and -142b since 1998 from the four baseline observatories and Niwot Ridge. The growth rate is highest in the northern hemisphere and most notable at the sea level site located at Cape Kumukahi, Hawaii. Newspaper accounts indicate that consumption in developing countries (China, India) may be the cause of this increase, because the Montreal Protocol timeline for reducing consumption by 99.5% in developing countries is 2040 versus 2020 for developed countries. Since there is some evidence of a large Asian source, we will examine Asian pollution events at the Mauna Loa Observatory to determine sources of this atmospheric increase and their implications to international protocols. Increased levels of HCFCs affect the recovery of stratospheric ozone layer through changes in total organic chlorine. They also affect the climate forcing, because of their global warming potential is as strong as the hydrofluorocarbons (HFCs) that are controlled by the Kyoto Protocol.

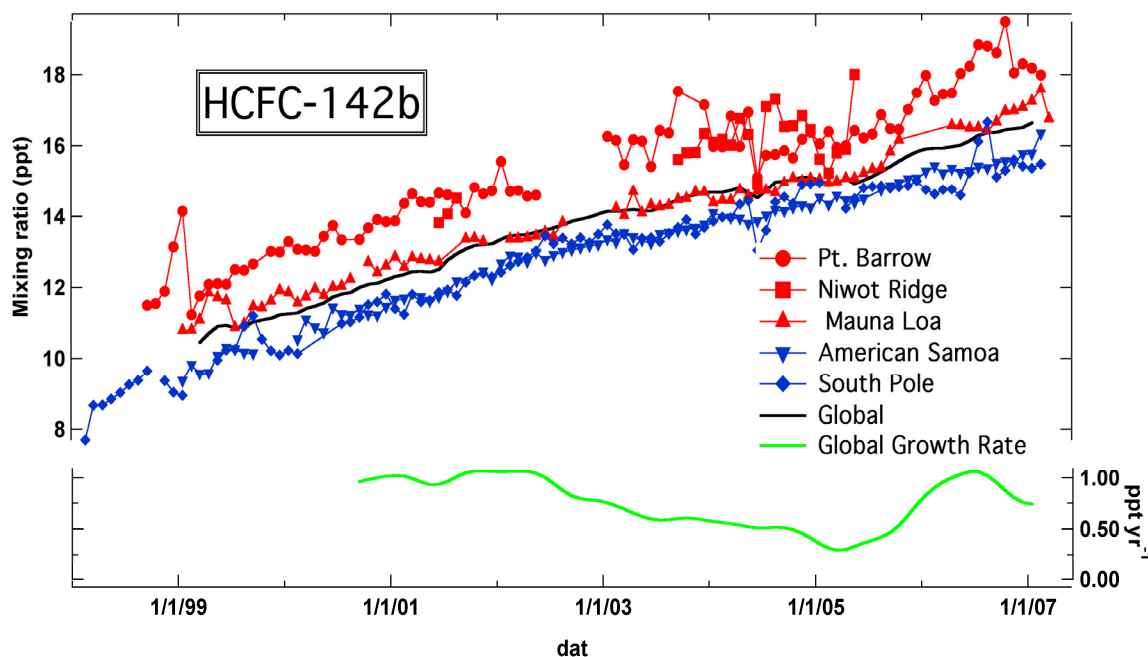


Figure 1. Atmospheric abundances and global growth rates (green) of HCFC-142b. Note that the growth rate was cut by about 2/3 because of the 2004 Montreal Protocol deadline, but the rate of increase has almost returned to prior levels of 2001.