Three Decades of Continuous Monitoring of Long-lived Halocarbons

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In the mid-1970s, the National Oceanic and Atmospheric Administration's (NOAA) Geophysical Monitoring for Climate Change (GMCC) program made a commitment to measure and monitor trace gases including carbon dioxide, methane, nitrous oxide (N_2O) and chlorofluorocarbons (CFCs). Over the next three decades GMCC grew into a division of NOAA/ESRL, and many trace gas measurement programs evolved into separate projects with different instrumentation. Multiple measurements of the same gases at identical locations (e.g., using both *in situ* instruments and grab samples) can sometimes lead to confusion when determining what measurement to use for analysis. We present a statistical method developed to combine measurements from independent NOAA measurement programs to construct continuous long-term global records for the following ozone-depleting substances: CFC-11, CFC-12, CFC-113, methyl chloroform (CH_3CCl_3) and CCl_4. The combining technique takes advantage of co-located measurements and accounts for systematic differences between measurement programs. We also use two different statistical approaches to characterize uncertainties in hemispheric and global means. The combined data sets and uncertainties can be used in global growth rate and top down emission estimates of these important gases.

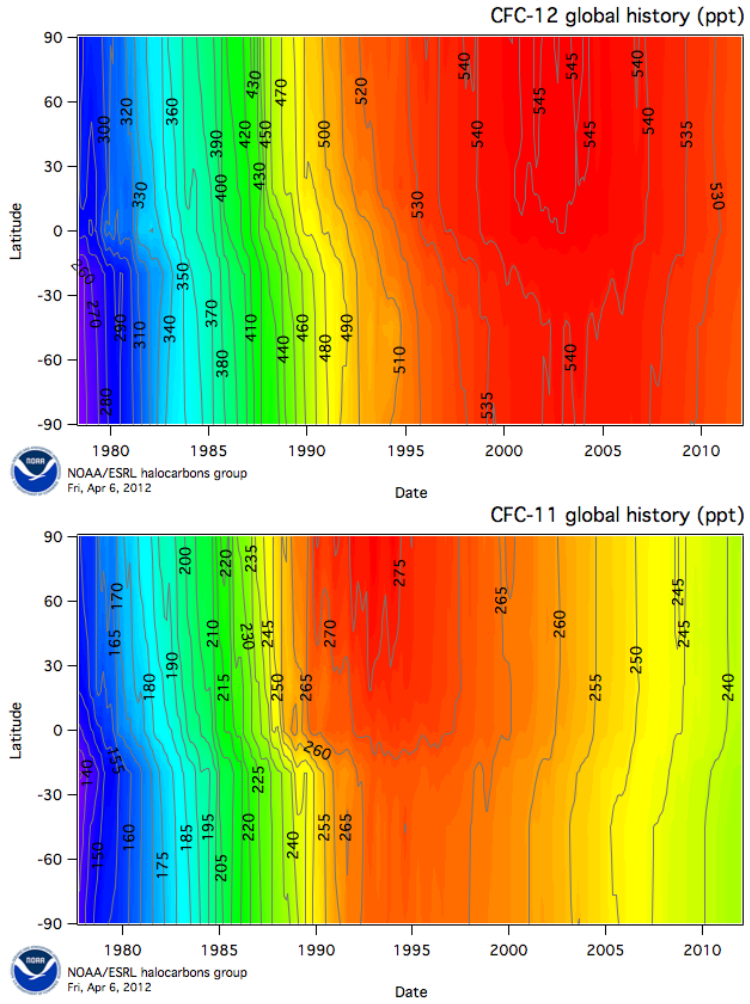

Figure 1. Contour maps of CFC-12 and CFC-11 global histories show the predominate sources in the northern hemisphere. As the mixing ratios were growing in the 1970s to 90s the southern hemisphere lagged behind the north. As the gases have been phased out the growth rates are now in decline.