Using Box Models to Quantify Zonal Distributions and Surface Emissions of Halocarbons in the Background Atmosphere

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NOAA's GMD began measurements of the major chlorofluorocarbons (CFC-11, CFC-12, CFC-113) and nitrous oxide in 1977 from flask samples collected at five remote sites around the world. Our program has expanded to over 40 gases at 15 sites, which includes six i*n situ* instruments and 15 flask sites. The Montreal Protocol for Substances that Deplete the Ozone Layer and its subsequent amendments has helped to decrease the concentrations of many of the ozone depleting compounds in the atmosphere. Our goal is to provide zonal emission estimates for these trace gases from multi-box models and their estimated atmospheric lifetimes in this presentation and make the emission values available on our web site. We used our measurements to compare emissions estimated from the Harvard 5-box Model to the Advanced Global Atmospheric Gases Experiment 12-box Model. The emissions do not agree for some gases so our next step is to use our airborne measurements to calibrate the exchange times between the boxes for 5-box and 12-box models using sulfur hexafluoride (SF_6), because its emissions are better understood.

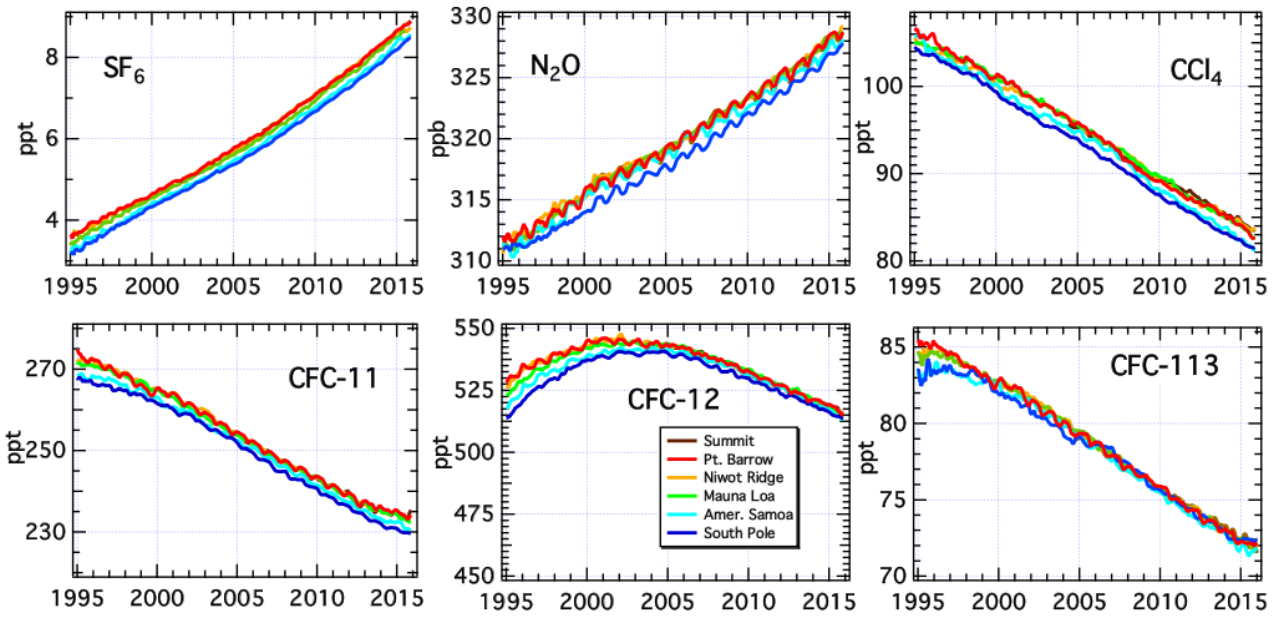

Figure 1. Monthly means of important trace gases from the GMD's halocarbon monitoring network (combined data from flasks and *in situ* gas chromatographs) versus time used to calculate emissions from two box models.