

2.5. NITROUS OXIDE AND SULFUR HEXAFLUORIDE

Measurements of N_2O and SF_6 from all sites in the global cooperative air sampling network continued during 1998 and 1999. A significant analysis problem was found at the end of 1999. Measurements of N_2O and SF_6 appeared too high in network samples, but the problem was hardly noticeable in the record of daily test flasks. After a detailed investigation into the problem, the screens installed between the Valco sample valve body and the end of the 1.6 mm (1/16") OD tubing connected to the valve were found to be the cause of the problem. These screens are used to prevent particles from entering the valve and destroying the rotor. Over time, it appears that particles from the rotor clogged the screen affecting relaxation of the sample-loop pressure to ambient. Sample-loop pressure for samples was greater than for standards; therefore, measured mole fractions were too large. Once the screens were blown out with 2000 psig pressure, the system began working properly. All samples with analysis dates between November 1, 1999, and March 23, 2000, were flagged with "A.", indicating a problem during analysis. The

end date was easy to assign; it is the date the screens were blown out and the system reassembled and tested. The exact start date of the problem is unknown. November 1 is somewhat conservative and arbitrary, but all data affected by this subtle problem were flagged. Since the magnitude of the error was a function of the pressure in the flask at the time it was analyzed, and this pressure is not measured, it was not possible to apply a correction to the data.

The N_2O and SF_6 latitude gradients are presented as the mean difference in annual means between each site and south pole for 1998 (Figures 2.20 and 2.21). Annual means were determined from a smoothed curve fitted to all data available through mid-May 2000 after outliers had been flagged. The gradients for both species are similar; higher values are observed in the northern hemisphere than the southern hemisphere, and considerable differences are observed at Hungary (HUN) and other relatively polluted continental sites. These gradients are consistent with about two-thirds of total N_2O emissions, and all SF_6 emissions, occurring in the northern hemisphere.

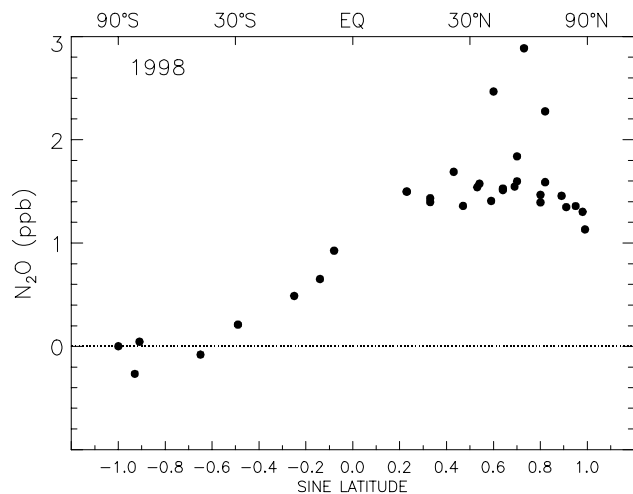


Fig. 2.20. Mean difference in annual mean nitrous oxide mole fractions (in ppb, nmol mol^{-1}) between each site and south pole for 1998, plotted versus sine of latitude. The annual means were calculated from curves fitted to the data.

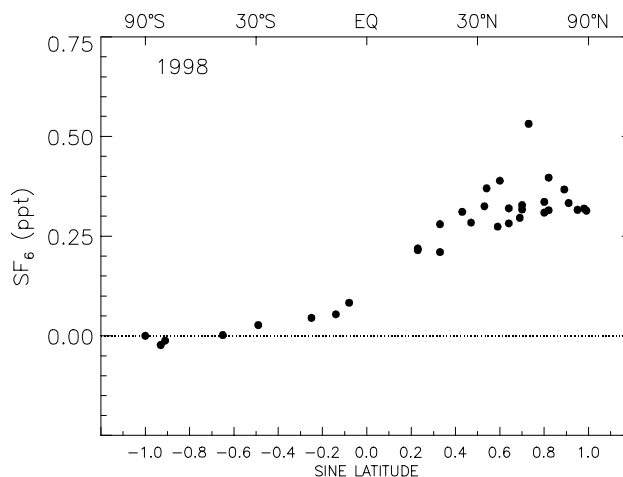


Fig. 2.21. Mean difference in annual mean SF_6 (in ppt, pmol mol^{-1}) between each site and south pole for 1998, plotted versus sine of latitude. The annual means were calculated from curves fitted to the data.