NOAA Measurements at Summit, Greenland: Past, Present and Future

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NOAA began weekly trace gas air sampling in paired glass flasks in 1997 at the Summit, Greenland (72° N, 38° W; 3208 m) ice core drilling camp. Since 1997, the site has been unstaffed for a number of periods ranging up to a seven months in duration. Since the summer of 2003, the site has been staffed continuously. The trends in four trace gases collected at Summit are presented in Figure 1 where it may be observed that CO_2 and SF_6 show steadily increasing concentrations, CH_4 a lesser increasing trend, and no discernable trend in CO concentrations. Continuous surface ozone measurements began in 2000 and firn air trace gas measurements collected in summer 2004 and 2005. Continuous aerosol black carbon measurements began in 2003 that, along with surface ozone measurements, have proven to be excellent indicators of long range transport of air pollution from Europe, and for forest fire smoke from Russia and Alaska. Ozonesonde measurements were initiated at Summit in spring 2005 in response to the formation of an exceptionally cold polar vortex; some of the lowest stratospheric ozone values ever recorded in the Arctic were measured in the spring of 2005 above Summit. In February 2005, NOAA/GMD supplied a staff member for the Summit observatory for a six month period and again for November 2005 through May 2005. Since Summit is the only high altitude polar atmospheric observatory that measures free tropospheric air, Summit is being considered for additional NOAA instrumentation and staffing towards the view of developing a NOAA Atmospheric Baseline Observatory operation in cooperation with the National Science Foundation in the manner of the South Pole Baseline Observatory.

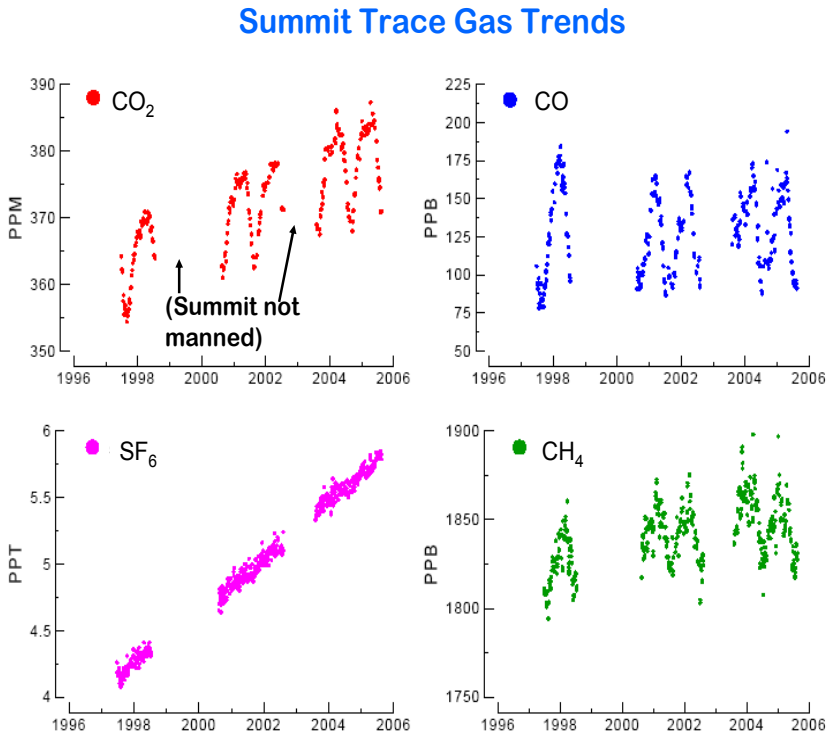

Figure 1. Trace gas trends for CO_2, CO, SF_6, and CH_4 from weekly glass flask air samples collected from the Summit, Greenland station. The blank periods are for times that the station was unmanned or flasks were not collected. CO_2 and SF_6 exhibit steadily increasing concentrations with CO_2 being the largest contributor to total atmospheric radiative forcing from trace gases. SF_6 is the strongest radiative forcing trace gas on a molecule-to molecule basis, but SF_6 concentrations are relatively low in the atmosphere.