Collection and Analysis of Firn Air from the South Pole, 2001

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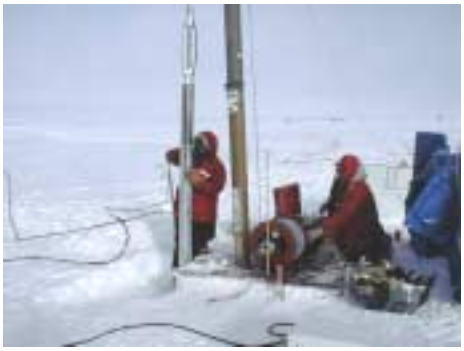
In January 2001, CMDL scientists joined investigators from Bowdoin and Princeton Universities to collect an archive of 20th century air from the firn (snowpack) at the South Pole. Samples were collected into separate pairs of 3-L glass flasks for measurements of O_2/N_2 (Bowdoin/Princeton) and carbon cycle gases (CMDL/CCGG). Individual 3-L stainless steel and glass flasks were filled for measurements of halocarbons, N_2O, SF_6, and COS (CMDL/HATS). Large (33 L) stainless steel canisters were filled to build an archive of air for future analyses. Finally, a few canisters, each for measurement of $^{14}CH_4$ (NIWA/CSIRO) and very low levels of SF_6 (SIO), were collected. All samples are being analyzed this spring including initial analyses of the archive canisters. Although it was hoped to obtain air dating back to the turn of the century, the analyses suggest that the earliest date was 1925 for CO_2 and the mid- to late teens for heavier gases such as methyl bromide or methyl chloride.



This talk will compare some of the analyses of these recently collected samples to those of air from firn sampled at the South Pole in 1995 [Battle, et al., *Nature*, 383, 231-235, 1996; Butler, et al., *Nature*, 399, 749-755, 1999]. Some results will also be presented for compounds not measured in the 1995 South Pole samples, owing to a paucity of air. Measurements made of the same gases in the firn air at both ends of this 6-year interval, along with real-time atmospheric measurements of the same gases, will be useful in evaluating assumptions about diffusion in the firn and may allow for the direct calculation of diffusion coefficients at low temperatures. This, in turn, would improve age estimates for firn air samples. New measurements will add to our existing 100-year histories established from analyses of firn air samples collected in both Greenland and Antarctica.