

The Radiatively Important Trace Species Data Recovery Project¹

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Between 1986 and 1990, three-channel Radiatively Important Trace Species (RITS) system gas chromatographs with electron capture detection (GC-ECD) were installed at four CMDL-administered baseline observatories (Barrow, Mauna Loa, Samoa, and South Pole) and a fifth at the University of Colorado site at Niwot Ridge, Colorado. RITS systems provided in situ measurements of N₂O, CFC-12, CFC-11, CFC-113, CH₃CCl₃, and CCl₄. They operated throughout the 1990s with a top atmospheric sample injection rate of one per hour. RITS systems typically alternated sampling from two separate air-intake lines and two calibration tanks. Efforts were made to use tank pairs with gas concentrations very close to those normally found in relatively clean tropospheric air but with enough separation to give a reasonable local estimate of the response curve for the ECD.

From 1999 to 2001 RITS systems were replaced by four-channel Chromatograph for Atmospheric Trace Species (CATS) system GC-ECDs. During this time consolidation efforts were begun on the RITS data set to renew its storage on modern media, to identify and recover data inadvertently lost or degraded during original chromatogram analyses, and to produce a final reckoning of the atmospheric concentrations measured. This poster will focus on the calibration issues and computational methods involved in producing final atmospheric concentration estimates from the RITS data.

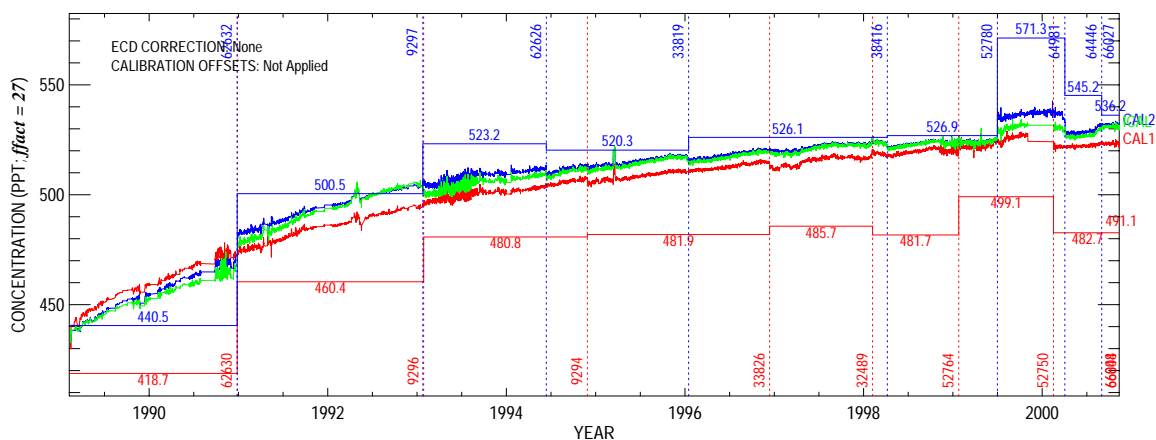


Figure 1. Time series of CFC-12 concentrations at South Pole from 1989 to 2000. Calibration tank transitions are shown as red (CAL1 sample stream) and blue (CAL2 sample stream) vertical dashed lines with vertically oriented numerical tank identifiers shown in the extreme lower (CAL1) and upper (CAL2) regions of the plot just ahead of the transition at which the tank was removed. Calibration tank concentrations of CFC-12 are shown as labeled, horizontal, red (CAL1) and blue (CAL2) solid lines vertically stepped at tank transitions. Atmospheric concentrations based on three independent calibrations of the atmospheric CFC-12 peak height response are shown as red, computed using a CAL1 through zero linear calibration curve; blue, computed using a CAL2 through zero linear calibration curve; and green, computed using a CAL1 through CAL2 response curve. Statistical fluctuations in the measurements were dampened with the application of a simple median filter to highlight the differences between the three calibrations and the effects of tank transitions. No other adjustments or corrections were applied.