

## PAN and other Trace Hydrohalocarbon ExpeRiment (PANTHER)



PANTHER: 200 lbs, 6-channel GC (gas chromatograph).

\* 3 ECD (electron capture detectors), packed columns (OV-101, Porpak-Q, molecular sieve).

\* *1 ECD* with a TE (thermal electric) cooled RTX-200 capillary column.

\* *2-channel MSD* (mass selective detector). The MSD analyses two independent samples concentrated onto TE cooled Haysep traps, then passed through two temperature programmed RTX-624 capillary columns.

<u>Calibration</u>: With the exception of PAN, all channels of chromatography are normalized to a stable in-flight calibration gas referenced to NOAA scales. The PAN data is normalized to an inflight PAN source of  $\approx 100$  ppt with  $\pm 5$  % reproducibility. This source is generated by efficient photolytic conversion of NO in the presence of acetone. Detector non-linearity is determined by lab calibrations for all molecules.

<u>Co-Investigators</u>: Fred L. Moore (303-497-7068, fred.moore@noaa.gov), Dale F. Hurst, James W. Elkins, Geoffrey S. Dutton, Bradley D. Hall, and J. David Nance, Colorado University-Cooperative Institute for Research in Environmental Sciences (CIRES) and/or NOAA-Earth System Research Laboratory (ESRL), Boulder, CO.



PANTHER mounted on the NASA DC-8 half rack. It has also flown on the NASA WB-57. Our other airborne GC's include ACATS, LACE and UCATS, They have flown on the ER-2, Altair, and high altitude balloon platforms.

## **Compounds Measured on Past Missions:**

**ECD channels:**  $N_2O$ ,  $SF_6$ ,  $CCl_2F_2$  (CFC-12),)  $CCl_3F$  (CFC-11), and  $CBrClF_2$  (halon-1211) injected every 70 seconds, and  $H_2$ ,  $CH_4$ , CO,  $CCl_4$ ,  $CH_3CCl_3$  (methyl chloroform) and PAN (peroxyl acetyl nitrate) injected every 140 seconds. The width of a sample load on an ECD channel is only 3 seconds, allowing this data set to correlate well with other fast measurements.

**MSD channels:** The methyl halides  $CH_3I$ ,  $CH_3Br$ ,  $CH_3Cl$ , the sulfur compounds COS,  $CS_2$ , the hydrochlorofluorocarbons  $CHCIF_2$  (HCFC-22),  $C_2H_3Cl_2F$  (HCFC-141b),  $C_2H_3ClF_2$  (HCFC-142b), and the hydrofluorocarbon  $C_2H_2F_4$  (HFC-134a) are injected every 180 seconds with 150 seconds sample load width. This data set correlates with a time average of other fast measurements



**TDL Channel:** Water Vapor (Currently relocated back in UCATS.)

