NSF HIAPER POLE-TO-POLE OBSERVATIONS (HIPPO) of carbon cycle and greenhouse gases

Will measure cross sections from the surface to the tropopause, at 5 times of year in a 3-year period, for a comprehensive suite of tracers: CO_2, CH_4 , O_2:N_2 ratio, CO, N_2O, $^{13}CO_2$:$^{12}CO_2$, H_2 , SF_6 , H_2O, PAN, O_3 , CFCs, HFCs, HCFCs, CH_3X (X=Cl, Br, I), COS, CS_2 , black carbon

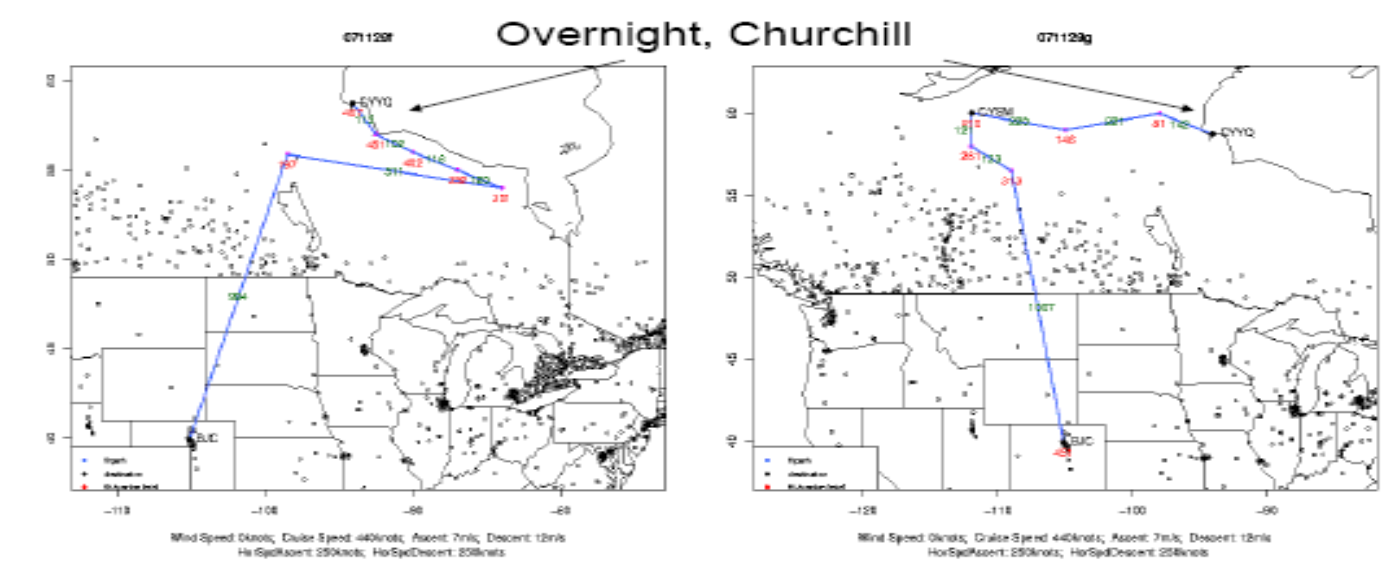
Mission scientist: Steve Wofsy, Harvard

Pre-HIPPO (April-June 2008): test aircraft payload in flights out of Jeffco and take opportunity for Arctic/subarctic boundary layer sampling; combined with NCAR's Stratosphere-Troposphere Analyses of Regional Transport (START08) campaign.

ARCTIC SCIENCE IN PRE-HIPPO

- Two Pre-HIPPO deployments: Apr 21 – May 6 and June 16-28
- Will include two pairs of Arctic/subarctic boundary layer flights (30 h total) focused on:
  - seasonal sources of methane;
  - pollution transport from Europe and Asia;
  - providing continuity with ARCTAS over April-July window, with particular focus on methane, black carbon, PAN, ozone…
- Intercomparison with ARCTAS DC-8 is critical for continuity objective; timing implies intercomparison on ARCTAS transit flights.

Pre-HIPPO nominal Arctic flights



Pre-HIPPO/START08: *Arctic CH_4 source flights*

INTERCOMPARISON WILL INVOLVE LARGE # OF SPECIES

Pre-HIPPO/HIPPO/START08 G-V Payloads

- **HAIS/HARVARD Quantum Cascade Laser Spectrometer (QCLS)** *(CO_2, CH_4, CO, N_2O)*
- **NOAA UCATS** GC-ECD (*CO, CH_4, H_2, N_2O, SF_6*); uv-O_3; TDL-H_2O
- **NOAA PANTHER** GC (*PAN, CFCs, HCFCs, H1211, CH_3X, COS, CS_2*)
- **NCAR** *in situ* **O_2:N_2**
- **NOAA Ozone**
- **NCAR/Scripps MEDUSA flasks** (O_2:N_2, Ar:N_2, CO_2, $^{12/13}C^{16/18}O_2$)
- **HAIS/Miami whole air** (CO, CH_4, hydrocarbons, halocarbons, COS, many other species) §
- **HAIS/NCAR NO/NOy** §
- **CU CLH Laser Hygrometer** H_2O §

- **HARVARD CO** *(VUV CO sensor)*¶
- **NOAA SP2** *(Black Carbon)*¶
- **NOAA flasks (NWAS)** (*CFCs, $^{13/12}CO_2$, HCFCs, HFCs, COS, CS_2, CH_3X*)¶
- **HARVARD CO_2** *(IRGA-based CO_2 sensor)*¶

§**START:** Omitted on HIPPO global ¶**HIPPO:** Omitted on START08

Need wingtip-to-wingtip boundary layer legs followed by vertical profiling; two intercomparisons (April transit back and June transit out)