

Review of Comprehensive Pole-to-Pole Airborne Survey of Greenhouse Gases

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The collaborative research project: “HIAPER Pole-to-Pole Observations” (HIPPO) of carbon cycle, greenhouse gases study, and black carbon has measured cross sections of atmospheric concentrations approximately pole-to-pole, from the surface to the tropopause, three times during different seasons, with two more transects planned for 2011, to span a 2.7 year period. A typical survey comprises 10-12 flights over a 27-30 day period, traveling over 30,000 miles, and sampling the air from ~500 to 45,000 feet. A comprehensive suite of tracers of climate-forcing and ozone-depleting species are measured including CO₂, O₂:N₂ ratio, CH₄, CO, N₂O, δ¹³C and δ¹⁸O in CO₂, PAN, H₂, SF₆, COS, CFCs, HFCs, HCFCs, halogenated solvents, organic nitrates, and selected hydrocarbons from 24 instruments. HIPPO transects the mid-Pacific ocean with some excursions to its eastern and western coasts. HIPPO provides a unique and comprehensive global survey of atmospheric trace gases and black carbon covering the full troposphere in all seasons and multiple years. This campaign has achieved a “snapshot” of the atmosphere through measurements of temperature, pressure, humidity, and aerosol, black carbon, water vapor and ice crystals, and chemical composition, dramatically enhancing our understanding of our changing atmosphere and that of our model representations. This talk highlights the findings of the first three surveys, and plans for the final two surveys. These airborne profiles also bridge the information gap between ground-based networks and satellites.

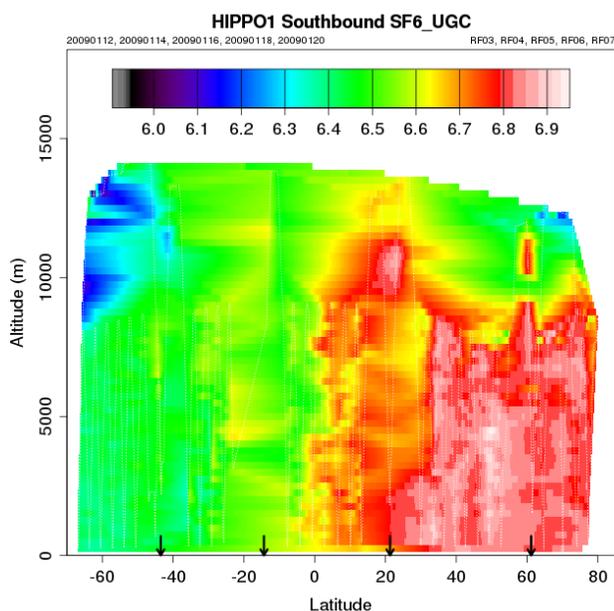


Figure 1. Cross section of SF₆ (ppt) from NOAA's UCATS instrument on the first southbound survey of HIPPO.

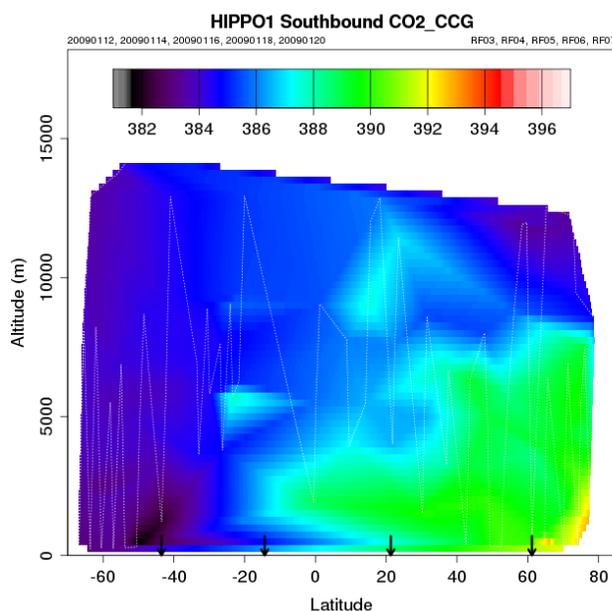


Figure 2. Cross section of CO₂ (ppm) from NOAA's PFP flasks on the first southbound survey of HIPPO.