AIRBORNE LIDAR MEASUREMENTS OF AEROSOLS AND OZONE INVESTIGATE POSSIBLE ARCTIC OZONE HOLE FORMATION

In January 1992, an airborne lidar (light detection and ranging) system was operated from the NASA DC-8 aircraft during five flights of the Airborne Arctic Stratospheric Expedition-II (AASE-II) field experiment to investigate the distribution of stratospheric (high altitude) chemical aerosols and ozone across the Arctic vortex, an area of cold air covering the north pole. The lidar uses the differential absorption lidar (DIAL) technique to measure ozone above the aircraft.

The aerosol figure shows the airborne lidar measurements of the Pinatubo Volcano aerosol distributions outside (left) and inside (right) the Arctic vortex on a long-range flight from Alaska to Norway on January 16, 1992. These measurements were made simultaneously with the ozone distributions shown on the companion figure. The edge of the vortex is at approximately below 500 on the horizontal Universal Time (UT) scale at the top of this figure. The aerosol altitude distribution and scattering characteristics change dramatically across the vortex edge. This shows the isolation of the vortex air on the right from the air outside of the vortex on the left. The very high levels of chlorine monoxide and the high potential for ozone depletion are in the region inside the Arctic vortex.

NASA Langley Research Center
Office of Public Affairs (804)864-6123 FTS 928-6123

Photo Credit: NASA or National Aeronautics and Space Administration
ALASKA TO NORWAY
AASE2 FLIGHT 4 1-16-92
AEROSOL DISTRIBUTION

RELATIVE AEROSOL SCATTERING (IR)

330 400 430 500 530

ALTITUDE, KM ASL

65.64 69.47 73.16 76.71 80.07

N LAT

-148.41 -150.63 -149.13 -145.97 -140.85

E LON
AIRBORNE LIDAR MEASUREMENTS OF AEROSOLS AND OZONE INVESTIGATE POSSIBLE ARCTIC OZONE HOLE FORMATION

In January 1992, an airborne lidar (light detection and ranging) system was operated from the NASA DC-8 aircraft during five flights of the Airborne Arctic Stratospheric Expedition-II (AASE-II) field experiment to investigate the distribution of stratospheric (high altitude) chemical aerosols and ozone across the Arctic vortex, an area of cold air covering the north pole. The lidar uses the differential absorption lidar (DIAL) technique to measure ozone above the aircraft.

The ozone figure shows the airborne lidar measurements of ozone distributions outside (left) and inside (right) the Arctic vortex on a long-range flight from Alaska to Norway on January 16, 1992. These measurements were made simultaneously with the Pinatubo aerosol distributions shown on the companion figure. The edge of the vortex is at approximately below 500 on the horizontal Universal Time (UT) scale at the top of this figure. The ozone distribution shows a general downward trend below approximately 10 miles (20 kilometers) from outside to inside the vortex. This is due to the natural dynamics of the vortex and the general descent that occurs within the vortex during the winter. At this time (mid January), the ozone distribution inside the vortex does not show any evidence of the onset of ozone depletion. If the vortex stays together into the middle of February, it is expected that there will be a substantial level of ozone depletion in the vortex. The next flights of the airborne lidar into the vortex will begin February 12, 1992.

Photo Credit: NASA or National Aeronautics and Space Administration

NASA Langley (Oct. 1991)