Ozone Profiles Measured at South Pole Station During the 2003 Ozone Hole

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The minimum total column ozone measured by ozonesondes at Amundsen-Scott South Pole Station in 2003 was 106 ± 5 Dobson Units (DU) on September 26. This was slightly higher than the 10-year average minimum of 104 ± 18 DU. The record minimum total ozone at South Pole station of 89 DU was measured on October 6, 1993.

The development of the 2003 ozone hole over South Pole followed a typical pattern leading to severe ozone depletion (Figure 1). Cold stratospheric temperatures, 182 to 179 K in the 20-24-km layer observed from June to early August, provided favorable conditions for the formation of polar stratospheric clouds that act as reaction sites for the chemical transformation of chlorine and bromine species. Selected ozonesonde profiles from August 6 through September 26 showed ozone in the 14- to 21-km layer was nearly completely destroyed. Total column ozone dropped by 60%, which is equal to the 10-year average loss of 60 ± 6%. For comparison, the ozonesonde measurements in 2002 showed a large increase in temperature and ozone over South Pole on September 25 when a rare stratospheric warming event in the Southern Hemisphere forced an early breakup of the ozone hole. The minimum total column only dropped to 152 DU over South Pole. Therefore, with the return of average ozone hole conditions in 2003 there appears to be no significant indication of long-term recovery of the ozone hole, and the 2002 ozonesonde observations at South Pole showed the results of an anomalous event.

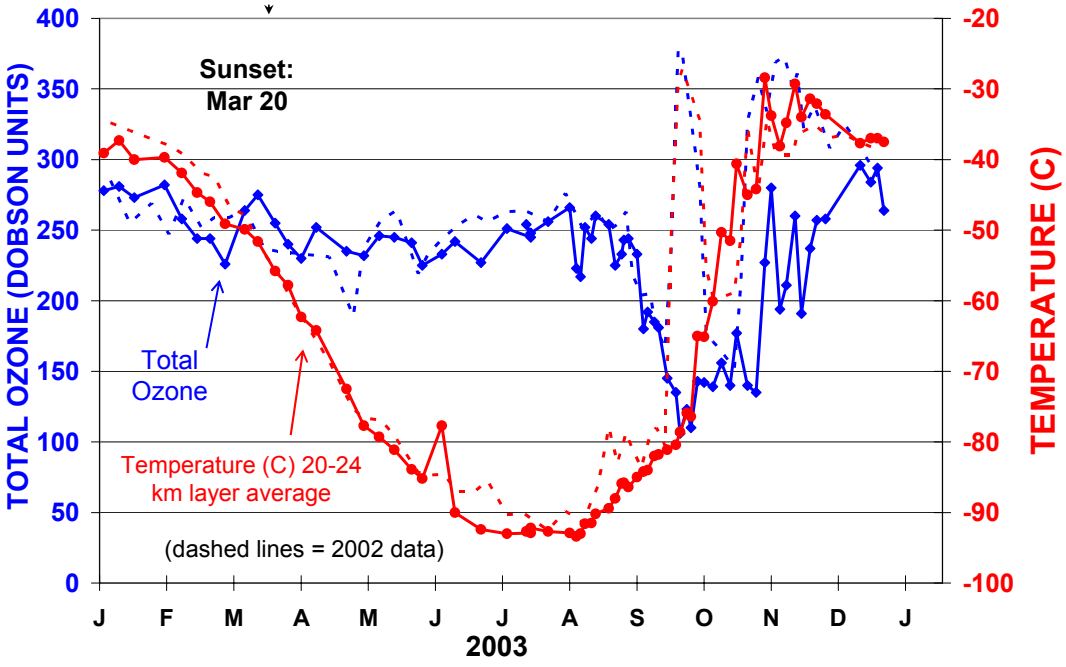

Figure 1. Summary of CMDL ozonesonde measurements at South Pole Station in 2002 and 2003.