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Total Ozone Changes in the 1987 Antarctic Ozone Hole

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The development of the Antarctic ozone minimum was observed in 1987 with the Nimbus 7 TOMS instrument. In the first half of August the near-polar (60 and 70 deg S) ozone levels were similar to those of recent years. By September, however, the ozone at 70 and 80 deg S was clearly lower than any previous year including 1985, the prior record low year. The levels continued to decrease throughout September until October 5 when a new record low of 109 DU was established at a point near the South Pole. This value is 29 DU less than the lowest observed in 1985 and 48 DU less than the 1986 low. The zonal mean total ozone at 60 deg S remained constant throughout the time of ozone hole formation.

The ozone decline was punctuated by local minima which formed away from the polar night boundary at about 75 deg S. The first of these, on August 15-17, formed just east of the Palmer Peninsula and appears to be a mountain wave. The second major minimum formed on September 5-7 again downwind of the Palmer Peninsula. This event was larger in scale than the August minimum and initiated the decline of ozone across the polar region. Possible under-estimation of ozone due to high clouds associated with the mountain wave is treated in a separate paper at this symposium.

The 1987 ozone hole was nearly circular and pole centered for its entire life. In previous years the hole was perturbed by intrusions of the circumpolar maximum into the polar regions, thus causing the hole to be elliptical. The 1987 hole also remained in place until the end of November, a few days longer than in 1985, and this persistence resulted in the latest time for recovery to normal values yet observed.