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Balloon-borne ozonesonde profile measurements at South Pole Station, Antarctica during the 2015 ozone hole

B. Johnson (1), P. Cullis (2), C. Sterling (2), J. Booth (1), J. Milton (1), I. Petropavlovskikh (2), and G. McConville (2)

(1) NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, United States (bryan.johnson@noaa.gov), (2) Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder

Balloon-borne ozonesondes released by NOAA (National Oceanic Atmospheric Administration) from South Pole Station, Antarctica showed the 2015 ozone hole was average in ozone loss with no signs of long term recovery. Total column ozone dropped from a winter time average of 260 Dobson Units (DU) during June 1- August 15 to a minimum of 112 DU on October 15, 2015 (15th lowest minimum in 30 year record). However, this season was unique in the record number of days the stratospheric vortex air over South Pole remained undisturbed, especially within the main ozone altitude layer from 14-21 km. Since 1991, ozonesondes have shown a typical linear column ozone loss rate of 3.4 $\pm$ 0.3 DU/day at 14-21 km during September 1 to the minimum date in early October. This is followed by several days to a few weeks of slight ozone increases then a rapid influx of high ozone and warm temperature filaments (usually within the 18-26 km altitude layer) arriving over South Pole sometime during October or later in November. The 2015 year showed a nearly average loss rate of 3.2 DU/day at 14-21 km during September reaching a minimum of 5 DU on October 12 with zero ozone from 14-18 km. For the next 2 months, ozone slowly increased at a linear rate of 0.55 DU/day with no sudden increases in ozone or stratospheric temperatures until after December 8 when total column ozone increased abruptly to 288 DU, indicating the late arrival of midlatitude air over South Pole. A consistent decrease in the year-to-year September ozone loss rate within the 14-21 km layer, dropping back to the 1986-1990 average rate of 2.4 $\pm$ 0.2 DU/day, will be an indicator of long term ozone recovery over South Pole.