

# WMO Antarctic Ozone Bulletin #3/2004

Issued on 16 September 2004

- 1. Meteorological conditions:** The 2004 Antarctic vortex continues to be of moderate size, having decreased slightly during the past two weeks. The vortex remains centred over the pole, although no longer circular as in previous weeks, and occasionally extends toward the southern tip of South America. Minimum stratospheric temperatures are generally higher than observed in recent years although temperatures currently remain sufficiently low to form polar stratospheric cloud (PSC) over 40-60% of the vortex area.
- 2. Ozone observations:** All Global Atmosphere Watch (GAW) Antarctic stations reporting daily column ozone during September have measured values that represent 30% to 50% ozone depletion (i.e. 30% to 50% below pre-ozone hole period of 1964-76), for at least a few days of September. Except for 2002, when the ozone hole split into two and dissipated much earlier than usual, ground based stations have measured less ozone depletion than observed in recent years. Satellite observations have confirmed these ground-based measurements. They show that less than 15 M km<sup>2</sup> (million square kilometres) of the vortex area is more than 30% depleted, and less than 1 M km<sup>2</sup> of the vortex area has more than 50% depletion. This compares with more than 25 to 30 M km<sup>2</sup> with 30% depletion and more than 5 M km<sup>2</sup> with 50% depletion by mid September in three out of the four previous years.
- 3. Ozone hole:** Although most of the Antarctic continent is presently under the ozone hole, the hole is nearly identical in size to the very small hole in mid September 2002. Using the historical record as a guide, one would expect that the ozone hole will continue to increase in size (area) and deepen (greater column depletion) during late September and into October. However, this did not happen in 2002, instead it split into two roughly equal parts and abruptly dropped in size during late September. A measure of the depth of the ozone hole is the "ozone mass deficit" (OMD), the mass of ozone destroyed within or near the ozone hole region, and is expressed in millions of tons (Mt) of ozone. OMD is estimated from the daily column ozone data available from satellites and ground stations and is described in more detail in "Background information about the Antarctic ozone hole" ([http://www.wmo.ch/web/arep/O3\\_summaries/ozone\\_background\\_sum.html](http://www.wmo.ch/web/arep/O3_summaries/ozone_background_sum.html)). This year the OMD through mid September has risen to about 50 Mt, well above the maximum of 34 Mt observed in 2002, but typical of all other years in the past decade. The UV intensity over Antarctica is low and will remain low until the sun rises higher during the Southern Hemisphere spring. The size, depth and persistence of the ozone hole, along with the UV radiation within and near Antarctica are expected to vary substantially from year to year, and as we have emphasised, these variations are strongly influenced by variations in the meteorological conditions in the stratosphere. Considering that the year 2000 ozone hole was the largest on record and it was matched in size by the 2003 ozone hole, and in 2002 the smallest ozone hole was observed since 1988, it is clear that a single year should not be used to infer a general trend in ozone hole size, depth or persistence.
- 4. The Secretariat of the World Meteorological Organization (WMO)** distributes Bulletins providing current Antarctic ozone hole conditions during August-December each year. Bulletins are distributed via the WMO-Global Telecommunication System (GTS) and are also available through the Atmospheric Research and Environment Programme web page ([www.wmo.ch/web/arep/ozone.html](http://www.wmo.ch/web/arep/ozone.html)). In addition to the National Meteorological Services, the information in these Bulletins should be made available to the national bodies representing their countries with UNEP and that support or implement the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol.
- 5. Acknowledgements:** These Bulletins use provisional data from the WMO Global Atmosphere Watch (GAW) stations operated within or near Antarctica by: Argentina (Comodoro Rivadavia, Ushuaia), Argentina/Finland (Marambio), Argentina/Italy/Spain (Belgrano, San Martin), Australia (Macquarie Is), France (Dumont D'Urville and Kerguelen Is), Japan (Syowa), New Zealand (Arrival Heights), Russia (Mirny, Novolazarevskaya, Vostok), Ukraine (Vernadsky), UK (Halley, Rothera), and USA (South Pole). Satellite ozone data are provided by NASA/TOMS, NOAA/TOVS and NOAA/SBUV/2. Potential vorticity maps are provided by ECMWF and their ERA-15 and daily T106 meteorological fields are analysed by the Norwegian Institute for Air Research (NILU) Kjeller, Norway, to provide vortex extent and extreme temperature information (<http://www.nilu.no/projects/nadir/o3hole>). Ozone data analyses are prepared in collaboration with the WMO World Ozone and Ultraviolet Data Centre (WOUDC) in Toronto, Canada through the co-operation and support of the Meteorological Service of Canada (<http://exp-studies.tor.ec.gc.ca/cgi-bin/selectMap>). UV data are provided by the U.S. National Science Foundation's (NSF) UV Monitoring Network.

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