WMO Antarctic Ozone Bulletin #2/2003

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1. **Meteorological conditions:** Unlike the very small polar vortex during early Sept. 2002, the 2003 vortex is typical of the size in recent years, presently with an area of about 34 million square kilometres (M km^2). It has remained centred over the Antarctic continent but somewhat elongated. The extremely low minimum stratospheric mid-August temperatures reported in the last bulletin are no longer observed, with minima now about –93 C. Temperatures remain sufficiently low for polar stratospheric clouds (PSCs) to cover about 70% of the vortex area, down from the 80% to 90% reported in mid-August. This area will further decrease in the coming weeks as the sun continues to rise and to warm the stratosphere over Antarctica.
2. **Ozone observations:** During the past month, Global Atmosphere Watch (GAW) stations in Antarctica have occasionally reported the ozone hole to be overhead. Briefly under the ozone hole were the stations of Marambio and Vernadsky along the Antarctic Peninsula as were DuMont D'Urville and Syowa stations, located well around the Antarctic perimeter. When compared to the pre-ozone hole period (i.e. norms of 1964-76), ozone was from 30% to nearly 50% below norms during these brief periods. Average ozone values during the last 10 days of August indicate that most of Antarctica was from 10% to 20% below norms, and therefore not generally considered to be within the ozone hole. However, values of ozone more than 50% below norms have been measured over a substantial area of the Southeast Pacific Basin of the Pacific Ocean by satellites. This sunlit region of the vortex with very low column ozone is presently contained within the elongated vortex and is slowly rotating toward the tip of South America. Balloon-borne instruments at Marambio, Neumayer, and Syowa stations all show substantial ozone loss from 18 to 25 kilometres.
3. **Ozone hole:** Satellite measurements during late August and early Sept. show near normal ozone values on the Australian side of the continent perimeter, and that much of Antarctica was not within the boundary of the ozone hole until the last few days in August. This is usual for late August and early Sept. as the sun rises over Antarctica and triggers the accelerated ozone loss. However, during the past 1-2 weeks the ozone hole has grown more rapidly than usual. This is at least partly due to the elongated vortex allowing an increase in solar exposure to its interior, thus accelerating ozone loss. The early period of the 2003 ozone hole is in this way very similar to that observed in 2000. The ozone hole now appears to be 25 M km^2 in area, 10% below the record size recorded in mid-Sept. 2000. The ozone mass deficit (a measure of the depth of the ozone hole) has reached 50 million tons, which is also 10% below the record set in mid-Sept. 2000. The size, depth and persistence of the ozone hole are expected to vary substantially from year to year and are strongly influenced by meteorological changes. As was the case in 2000 when the ozone hole was the largest on record and in 2002 when it was the smallest since 1988, a single year cannot be used to infer a general trend in the ozone hole parameters. Note that background information, earlier bulletins, yearly ozone hole summaries, and the "The Scientific Assessment of Ozone Depletion: 2002" are now available at the WMO ozone website given below.
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 at 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, San Martin, Ushuaia), Argentina/Finland (Marambio), Argentina/Italy/Spain (Belgrano), Australia (Macquarie Is), France (Dumont D'Urville and Kerguelen Is), Germany (Neumayer), Japan (Syowa), New Zealand (Arrival Heights), Russia (Mirny), 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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