# WMO Antarctic Ozone Bulletin #3/2003

# Issued on 18 September 2003

1. **Meteorological conditions:** The polar vortex is at or near its maximum size with an area of about 34 million square kilometres (M $km^2$). It has remained nearly centred over the Antarctic continent and the elongated shape reported in the last Bulletin has changed to more circular. The minimum stratospheric temperatures presently over Antarctica are typically –90° C, somewhat higher than observed during the past few weeks. However, temperatures remain sufficiently low for polar stratospheric clouds (PSCs) to form and cover 60% to 70% of the vortex area in the lowest layers of the stratosphere. As expected, the temperatures have warmed to above the PSC formation threshold at higher levels. PSCs will become less common at the lower levels during the coming weeks as the sun continues to rise and warm the stratosphere over Antarctica.
2. **Ozone observations:** The sun has risen over most of Antarctica triggering the anticipated acceleration in ozone loss. A substantial decrease in ozone has been observed at the WMO Global Atmosphere Watch (GAW) Antarctic stations and by satellites. The GAW stations of Arrival Heights, Halley, Marambio, Rothera, San Martin, South Pole, Syowa, and Vernadsky have reported the ozone hole to be overhead during the past week, while the Dumont D'Urville station has been near but not within the hole. The city of Ushuaia, Argentina, was also within the hole, reporting ozone values nearly 50% below the pre-ozone hole norms (i.e. norms of 1964-76) ten days ago. Satellite measurements show that values of ozone more than 30% below norms cover an area more than 25 M $km^2$ while the area 50% below norms is more than 5 M $km^2$. Balloon-borne instruments at Belgrano, Dumont D'Urville, Marambio, Neumayer, South Pole and Syowa stations all show substantial ozone loss in much of the lower stratosphere.
3. **Ozone hole:** The 2003 ozone hole remains similar to that observed in 2000, although more circular and apparently more stable. The size of the ozone hole has increased from the 25 M $km^2$ reported two weeks ago to 28 M $km^2$, matching the record size observed during mid-September 2000. This is larger than the combined areas of Canada, Mexico, and the United States, and contrasts the exceptionally small ozone hole last year that split in two during late September. In recent years, the ozone hole has usually attained its maximum size during mid-September. However, it is too early to predict with certainty whether the area has peaked this year. Although the ozone hole is exceptionally large and the ozone mass deficit (a measure of the depth of the ozone hole) remains at 50 million tons of ozone, the UV intensity over Antarctica is low and will remain low until the sun rises higher later in the Southern Hemisphere Spring. It is important to note that recent variations in size, depth and persistence of the ozone hole are due to year-to-year changes in the meteorological conditions in the lower stratosphere over Antarctica, not to changes in the amount of ozone depleting chemicals present in the ozone layer. Note that background information, earlier Bulletins, yearly ozone hole summaries, and "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.

Questions regarding the scientific content of this Bulletin should be addressed to
Dr. Michael Proffitt, Senior Scientific Officer of WMO: e-mail proffitt@wmo.ch

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