WMO Antarctic Ozone Bulletin #6/2003

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1. **Meteorological conditions:** The lower stratospheric vortex area has decreased by about 20% from its maximum size of 34 million square kilometres (M km^2) reached in September, and continues to cover most of the Antarctic continent. The vortex has become more elongated and presently stretches toward the southern tip of Africa. The lower stratosphere over Antarctica has warmed significantly during the past two weeks, reaching temperatures too high to produce polar stratospheric clouds (PSCs) except at the lowest levels, where PSCs cover less than 10% of the vortex area. Warming of the stratosphere is normal for October, but this year, it is warming more slowly than the record pace of last year. Still it is faster than the average of recent years. PSCs have now essentially disappeared, paralleling what happened in the year 2000.

2. **Ozone observations:** All reporting WMO Global Atmosphere Watch Antarctic stations have measured higher column ozone values during late October than in early October. In recent days Belgrano, South Pole and Syowa stations have reported ozone values that indicate 35-50% depletion overhead. However, reports from stations at Arrival Heights, Rothera, San Martin and Vernadsky show no more than 25% depletion, with some reporting normal "pre-ozone hole" values. Integrated satellite and ground-based measurements show that the area with ozone column more than 30% depleted has decreased from its maximum of 31 M km^2 in late September, to 15 M km^2 by late October. Antarctic balloon-borne ozone measurements at Marambio station on the Antarctic peninsula indicate exceptionally high values of ozone in recent days and is clearly outside of the ozone hole. In contrast, farther south at Neumayer and Syowa stations very low ozone values are found at altitudes from 15 to 21 km.

3. **Ozone hole:** The sharp decrease in area of the ozone hole that was reported for the first two weeks of October, continues into late October. Presently the ozone hole measures only about 11 M km^2, or about 40% of its maximum size, 28 M km^2, observed during late September. The development of the hole this year has been very similar to the year 2000, with an early rapid growth observed during August, and a record size observed in September. Although during late September the ozone hole remained near its maximum size longer than in 2000, the rapid decrease during October again matches 2000. It is interesting to note that, although the ozone hole has now decrease in size by 60% to 11 M km^2, the vortex area has decreased much less dramatically, to 27 M km^2, representing only a 20% decrease from its maximum. Column ozone and ultraviolet radiation levels have been normal during the past two weeks in the city of Ushuaia, Argentina, located on the southern tip of South America, although it was under the ozone hole on four occasions in September and early October.

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 and are also available through the Atmospheric Research and Environment Programme web page (www.wmo.int/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 stations operated within or near Antarctica by: Argentina (Comodoro Rivadavia, San Martin, Ushuaia), Argentina/Finland (Marambio), Argentina/Italy/Spain (Belgrano), France (Dumont D'Urville and Kerguelen Is), Germany (Neumayer), Japan (Syowa), New Zealand (Arrival Heights), Russia (Mirny, Novolazarevskaya), Ukraine (Vernadsky), UK (Halley, Rothera) and USA (McMurdo, 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 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 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 UV Monitoring Network.

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