

WMO Antarctic Ozone Bulletin #5/2002

Issued on 10 October 2002

- 1. Meteorological conditions:** Meteorological conditions within and around the Antarctic vortex have been most unusual during the past few weeks. During late September and early October a large mass of air separated from the polar vortex, leaving what was previously a very small vortex even smaller. Additionally, stratospheric temperatures sufficiently low to produce polar stratospheric clouds (PSCs) essentially disappeared, although during recent days these cold temperatures have again appeared over a very limited area. Unusual patterns in the atmospheric circulation surrounding the vortex region have contributed to these unusual vortex conditions.
- 2. Ozone and UV observations:** Since late September, ground-based measurements of column ozone in Antarctica have shown a wide station-to-station variability. During early October, only Belgrano, Mirny, South Pole, and Syowa have reported to be within the ozone hole, and these were isolated single day occurrences. Other reporting Antarctic stations (Arrival Heights, Dumont D'Urville, Halley, Marambio, Rothera, San Martin, and Vernadsky) have been outside the ozone hole during this period, most reporting unseasonably high ozone values. The stations in the south of Argentina (Ushuaia and Comodoro Rivadavia) have reported normal or above normal ozone values during October. Satellite measurements show that the area more than 30% below pre-ozone hole norms dropped by more than 75% in late September, and that Southern Hemisphere zonal averages of ozone over the month of September reveal ozone values outside the ozone hole were near the pre-ozone hole norms. Antarctic observations from the US National Science Foundation UV monitoring network have reported that average UV levels for the month of September were well below average for that month, consistent with the ozone measurements.
- 3. Ozone hole:** Using previous years as a guide, one would expect that the ozone hole would increase in size (larger area) and deepen (more ozone loss) during late September and into October. However, the unusual character of the vortex this year has corresponded to the ozone hole splitting in two during late September, as reported in WMO Press Release No. 681 on 1 October 2002 (see www.wmo.ch/web/arep/ozone.html). During the last week of September, one of the two "holes" dissipated, corresponding to the mass of air that separated from the vortex. The area of the ozone hole dropped precipitously from what was already a somewhat low value of 19 million square kilometers on 20 September to less than 5 million one week later, and has remained about this size during early October. Such a small ozone hole in early October has not been observed since the early 1980s. A measure of the depth of the ozone hole is the "ozone mass deficit" (OMD), the mass of ozone destroyed within the ozone hole region each year, and is expressed in millions of tons (Mt) of ozone. This year the OMD peaked during late September at about 34 Mt, and is presently below 15 Mt. The size, depth and persistence of the ozone hole are expected to vary substantially from year to year, and as we have emphasised, are strongly influenced by corresponding natural meteorological variations. The unusual vortex this year has strongly contributed to the correspondingly unusual ozone hole.
- 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), France (Dumont D'Urville and Kerguelen Island), Germany (Neumayer), Japan (Syowa), New Zealand (Arrival Heights), Russia (Mirny), Ukraine (Vernadsky), UK (Halley, Rothera), and USA (South Pole). Satellite ozone data are also used and provided by NASA/TOMS, by NOAA/ TOVS and by ESA/GOME. 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. 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 (MSC). UV data is provided by the U.S. National Science Foundation's (NSF) UV Monitoring Network. For supporting information go to <http://exp-studies.tor.ec.gc.ca/cgi-bin/selectMap> (MSC) and <http://www.nilu.no/projects/nadir/o3hole> (NILU).

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