WMO Antarctic Ozone Bulletin #2/2004

Issued on 3 September 2004

1. **Meteorological conditions:** Since mid-August, the polar vortex has been near the average size of recent years, presently having an area of about 35 million square kilometres (M km^2). The vortex is still remarkably circular and centred over the Antarctic continent. Temperatures remain sufficiently low to form polar stratospheric clouds (PSCs) over a wide altitude range, and PSC's presently cover about 65% of the vortex area. This is a decrease from the 75% reported in mid-August, and is typical of the decrease expected to occur during the late winter period. As the sun rises over Antarctica, it brings an end to months of Winter darkness and a warming of the stratosphere, and will result in a continued decrease in PSC area during the coming weeks .
2. **Ozone observations:** During the past two weeks, four Global Atmosphere Watch (GAW) stations in Antarctica have reported a few days with the ozone hole overhead. These are Marambio (Argentina) for 6 days with a minimum ozone value of 35% ozone depletion (i.e. 35% below pre-ozone hole period of 1964-76), Rothera (UK) for 3 days with a minimum ozone value of 40% depletion, Syowa (Japan) for one day with near 30% ozone depletion, and Vernadsky (Ukraine) for 4 days with minimum ozone value of 30% depletion. Other stations within or near the Antarctic continent that have reported data during this period (Arrival Heights, New Zealand; Comodoro Rividavia, Argentina; Dumont dUrville and Kerguelen Island, France; Macquarie Island, Australia; Ushuaia, Argentia) were within 20% of the historical norms. Compared to the recent history of the ozone hole, this is less depletion than expected for early September. When considering the global view provided by satellite observations, ozone loss this year also appears to be slower than the average of the past 5 years. This is at least partially the result of the very circular vortex that restricts solar exposure to its interior.
3. **Ozone hole:** Average ozone values from satellite observations over the last 10 days of August indicate that most of Antarctica was within 15% of pre-ozone hole norms, which is not sufficiently low to be within the ozone hole. It is important to consider that an elongated vortex allows an increase in solar exposure to the vortex region that extends into sunlight, and this accelerates ozone loss. One year ago and in 2000 when the vortex was elongated, the ozone hole was 25 M km^2 in area by 1 September, but this year it is less than half that size. However, the size, depth and persistence of the ozone hole are expected to vary substantially from year to year and are strongly influenced by the natural variability in meteorological conditions, such as stratospheric temperatures and the shape of the vortex. 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 size, depth or persistence of the ozone hole.It is too early to tell if the relatively small size of the ozone hole this year will continue throughout September and October, or if the meteorological conditions will again provide a new surprise.
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: e-mail MProffitt@wmo.int

END of WMO Antarctic Ozone Bulletin 2/2004