WMO Antarctic Ozone Bulletin #1/2003

Issued on 14 August 2003

1. **Background information:** The early meteorological conditions in the Antarctic stratosphere found during late July and early August of each year, set the stage for the annually occurring ozone hole. Low temperatures activate chemical processes, which in the presence of sunlight, result in rapid ozone depletion. Temperatures must be sufficiently low to form polar stratospheric clouds (PSCs) and initiate these chemical conditions. Threshold temperatures of -78 C can produce PSCs, while lower temperatures (below –85 C) can further accelerate the chemical processing. The Antarctic polar vortex is a region with high velocity winds in the stratosphere that generally circle the Antarctic continent. This vortex region (the vortex and the area poleward) includes the lowest temperatures and the largest ozone losses that occur anywhere in the world. During early August measurements of meteorological parameters and ozone measurements from ground stations and satellites can provide some insights into the development of the ozone hole. For more background information see: http://www.wmo.ch/web/arep/O3_summaries/ozone_background_sum.html
2. **Meteorological conditions:** The processes that prime the atmosphere for ozone depletion are presently well underway. Meteorological data show minimum stratospheric temperatures have been unusually low when compared to recent years, reaching down to –93 C each day since early June and to –100 C briefly in early August. During the past two weeks, temperatures low enough for PSC formation have generally covered 80% to 90% of the vortex, which currently covers an area of 30 to 35 million square kilometres. The vortex this year is about 20% larger than last year but similar in size to those of the past ten years. Based upon the historical meteorological record it is expected that the extent and frequency of PSC occurrence will begin to decrease now as the sun rises over Antarctica although the vortex will continue to increase in size throughout most of August.
3. **Ozone observations:** Presently much of Antarctica still has no sunrise, so the average rate of ozone loss there remains relatively slow. North of the Antarctic and into the mid-latitudes TOMS satellite data reveal column ozone well below the pre-ozone hole norm period of 1964-76. Ground stations on or near the perimeter of Antarctica have generally reported column ozone values from 10% to 15% below norms during early August while Rothera station reported a brief period with 30% below norms. Ozonesonde data provided from Dumont d'Urville, Marambio, Neumayer, and Syowa stations have confirmed the ground based and satellite data.
4. **Ozone hole:** Temperatures remain sufficiently low within the polar vortex to activate the chemical processes required for the formation of the annually occurring Antarctic ozone hole. In the coming weeks, as the sun rises over Antarctica, chemical ozone loss can be expected with an intensity that will be dependent upon prevailing meteorological conditions in the stratosphere, particularly during the September and October. As we observed in September 2002 when the ozone hole unexpectedly split, the meteorological conditions in the stratosphere strongly influence the extent and persistence of the ozone hole. This situation will continue as long as the stratosphere contains an excess of ozone depleting chemicals.
5. **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.
6. **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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