WMO Antarctic Ozone Bulletin #1/2002

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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 annual formation then development of the ozone hole. It is low temperatures that 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 (the polar night jet) 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.
2. **Meteorological conditions:** The processes that prime the atmosphere for ozone depletion are presently well underway. Meteorological data show minimum stratospheric temperatures are similar to recent years, reaching down to –93 C each day since early July. During this period, temperatures low enough for PSC formation have covered 65% to 85% of the vortex area, which is up to 22 million square kilometres. However, the vortex area is smaller than found during the last three years and one of the smallest in the past two decades. It is expected that the extent and frequency of PSC occurrence will begin to decrease as the sun rises over Antarctica.
3. **Ozone observations:** By the end of the first week of August much of Antarctica still has no sunrise, so the ozone loss there is minimal. The latest observations reveal that even though a region of very low ozone has appeared in the past few days near the Antarctic Peninsula, when compared to the pre-ozone hole period of 1964-76, the sunlit ring surrounding Antarctica has an average decrease of only about 10% in the total amount of ozone overhead. During the month of July, measurements also show ozone to be near normal farther north, including the middle latitudes.
4. **Ozone hole:** It appears that the conditions necessary for rapid ozone depletion over Antarctica are now in place, with temperatures sufficiently low to have chemically primed the vortex regions for ozone loss. In the coming weeks, as the sun rises over Antarctica, chemical ozone loss can be expected to occur with an intensity that will dependent upon prevailing meteorological conditions in the stratosphere, particularly during the September and October, when these conditions will also strongly influence the extent and persistence of the ozone hole.
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 Julian, Sobral, Ushuaia), Argentina/Finland (Marambio), Argentina/Italy/Spain (Belgrano), Australia (Macquarie Island), France (Dumont D'Urville and Kerguelen Island), Germany (Neumayer), Japan (Syowa), New Zealand (Arrival Heights), Russia (Mirny), Ukraine (Vernadsky), UK (Halley, Rothera), Uruguay (King George Island), and USA (South Pole). Satellite ozone data are also used and provided by NASA – Total Ozone Mapping Spectrophotometer (TOMS) and by the National Oceanic and Atmospheric Administration (NOAA) – TIROS Operational Vertical Sounder (TOVS). 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 graphics and information go to http://exp-studies.tor.ec.gc.ca/cgi-bin/selectMap (MSC) and http://www.nilu.no/projects/nadir/o3hole (NILU).

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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