WMO Antarctic Ozone Bulletin #2/2002

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1. **Background information:** Very low temperatures activate chemical processes, which in the presence of sunlight, result in rapid ozone depletion in the stratosphere. 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. It is this region of the stratosphere over Antarctica where the lowest temperatures and most rapid ozone losses are found.
2. **Meteorological conditions:** Meteorological data show that the vortex remains one of the smallest observed during the past decade, and that minimum stratospheric temperatures during August have been somewhat lower than recent years, continuing to reach down below –93 C each day. During this period, temperatures low enough for PSC formation have covered 60% to 70% of the vortex area, or about 20 million square kilometres. This area appears to have reached a maximum and is now expected to decrease as the sun rises and begins to warm the stratosphere over Antarctica.
3. **Ozone observations:** The region of very low ozone near the Antarctic Peninsula reported in the first Bulletin two weeks ago, intensified and then drifted eastward around the perimeter of Antarctica. This was followed by a second region of very low ozone appearing on 13 August near the southern tip of South America. By 16 August this second region had expanded northward over much of Argentina. During the next few days it moved slowly eastward over the Atlantic and Southern Oceans. When compared to the pre-ozone hole norms (1964-76), ground-based measurements of ozone over Buenos Aires were as much as 20% deficient, while further South, Comodoro Rividavia and Ushuaia were about 30% below norms. Satellite measurements indicate that on 18-19 August in the southern Atlantic Ocean, the island of South Georgia reached ozone values 35% below norms. During this same 1 week period, ground based measurements along the Antarctic Peninsula showed a similar pattern, with Marambio and Vernadsky reaching 40% below norms, and Rothera briefly reporting nearly 50% ozone depletion. Moving away from the South American side of Antarctica eastward around the Antarctic perimeter we find that Syowa station was 20% below norms while Dumont d'Urville on the Australian side was as much as 30% above the pre-ozone hole norms.
4. **Ozone hole:** As is expected, the annually occurring ozone hole is again forming over Antarctica. The ozone hole is still small, but will expand and deepen during the next 4 to 6 weeks. Although the vortex is smaller than usual, the size of the ozone hole is normal for this time of year. The low ozone observed over Argentina may not be entirely due to the ozone hole but have a meteorological component, although the progression of the low ozone region from the Antarctic perimeter northward suggests ozone loss has contributed.
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).

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