WORLD METEOROLOGICAL ORGANIZATION

UNITED NATIONS ENVIRONMENT PROGRAMME

REPORT OF THE FIFTH MEETING OF THE OZONE RESEARCH MANAGERS OF THE PARTIES TO THE VIENNA CONVENTION FOR THE PROTECTION OF THE OZONE LAYER

(GENEVA, 25-27 MARCH 2002)

WMO Global Ozone Research and Monitoring Project

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TABLE OF CONTENTS

1. OPENING OF THE MEETING 1

2. ADOPTION OF THE AGENDA 1

3. ELECTION OF THE CHAIRMAN 1

4. REVIEW OF THE REPORT OF THE FOURTH MEETING OF THE OZONE RESEARCH MANAGERS, HELD IN GENEVA, 28 TO 30 APRIL 1999 (WMO GLOBAL OZONE RESEARCH AND MONITORING PROJECT, REPORT NO. 45) 2

5. REPORT ON THE 2002 SCIENTIFIC ASSESSMENT, THE 2002 ENVIRONMENTAL EFFECTS ASSESSMENT AND ON ASPECTS OF ATMOSPHERIC OZONE SCIENCE AND RESEARCH BY THE CO-CHAIRS OF THE SCIENTIFIC AND ENVIRONMENTAL EFFECTS ASSESSMENT PANELS OF THE MONTREAL PROTOCOL 3

6. CURRENT STATUS OF THE GLOBAL OBSERVING SYSTEM AND MONITORING OF UV-B RADIATION 3

7. COORDINATION 4
   - 7.1 Network for the Detection of Stratospheric Change (NDSC) 4
   - 7.2 Intergovernmental Panel on Climate Change (IPCC) 4
   - 7.3 Stratospheric Processes and their Role in Climate (SPARC) 5

8. NATIONAL REPORTS ON ONGOING AND PLANNED OZONE RESEARCH AND MONITORING AND ON CALIBRATION AND ARCHIVING OF MEASUREMENTS 5

9. REPORT OF THE OZONE SECRETARIAT ON DEVELOPMENTS IN THE IMPLEMENTION OF THE VIENNA CONVENTION AND THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER 5

10. ADOPTION OF RECOMMENDATIONS 6
    - 10.1 Introduction 6
    - 10.2 Systematic observations 7
    - 10.3 Data archiving 7
    - 10.4 Research needs 8
    - 10.5 Capacity building 9

11. OTHER MATTERS 9

12. CLOSURE OF THE MEETING 9

ANNEX A List of participants
ANNEX B Agenda
ANNEX C National reports

REPORT OF
THE FIFTH MEETING OF THE OZONE RESEARCH MANAGERS OF THE PARTIES TO THE VIENNA CONVENTION FOR THE PROTECTION OF THE OZONE LAYER

(GENEVA, 25-27 March 2002)

1. OPENING OF THE MEETING

1.1 Mr Nelson Sabogal, Senior Scientific Affairs Officer, Ozone Secretariat, speaking on behalf of Dr Klaus Töpfer, Executive Director of the United Nations Environment Programme (UNEP), opened the meeting at 10:00 am on Monday 25 March and welcomed the participants (see Annex A). He recalled that the aim of the meeting was to review ongoing national and international research and monitoring programmes in order to ensure their proper co-ordination and implementation, and to identify gaps in these efforts that need to be addressed. To this end, the meeting would be expected to produce a report with recommendations for future ozone research, requirements to improve regional and global ozone monitoring, and ways to expand co-operation between developed and developing countries. These recommendations would be presented to the forthcoming Sixth meeting of the Conference of the Parties to the Vienna Convention to be held in conjunction with the Fourteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (Rome, 25 to 29 November, 2002).

1.2 Prof. Yan Hong, Assistant Secretary-General of WMO, welcomed participants on behalf of Prof. G. O. P. Obasi, Secretary-General of WMO who was unable to attend the meeting. He began by expressing pleasure at the continuous collaboration between WMO and UNEP in the organization of meetings of the Ozone Research Managers, as well as in ozone matters in general that stretches back into the 1970s. He recalled that the Vienna Convention calls for extensive cooperation between Parties on research and systematic observation, with emphasis on systematic measurements of the ozone layer, as well as in the promotion of training, taking into account the particular needs of developing countries and those countries with economies in transition.

1.3 Prof. Yan underlined the importance of the WMO Global Atmosphere Watch (GAW) Programme in providing essential data for the study of ozone depletion, and in forming a bridge between the advanced monitoring and research capabilities of developed countries on the one hand, and the expert help and financial assistance needed by developing countries on the other. Noting that the recovery of the ozone layer has yet to be observed despite falling levels of atmospheric chlorine, he stated that coordination between GAW, the Network for the Detection of Stratospheric Change (NDSC), and national and international agencies would continue to be a high priority for the coming decades. In conclusion, Prof. Yan emphasized that the challenges of protecting the environment for the generations to come could only be met though continuing international co-operative efforts, as exemplified by this meeting.

2. ADOPTION OF THE AGENDA

2.1 The agenda, as reproduced in Annex B, was adopted.

3. ELECTION OF THE CHAIRMAN

3.1 Dr Michael Kurylo (USA) was elected Chairman of the meeting by acclamation. He urged delegates to work towards producing practical recommendations, which would be presented to the Sixth meeting of the Conference of the Parties to the Vienna Convention. These recommendations should take into account progress made on the recommendations from previous Ozone Research Managers meetings, decision V/3 of the Fifth meeting of the Conference of the Parties to the Vienna Convention, and focus on those items of highest priority.

4. REVIEW OF THE REPORT OF THE FOURTH MEETING OF THE OZONE RESEARCH MANAGERS, HELD IN GENEVA, 28 TO 30 APRIL 1999 (WMO GLOBAL OZONE RESEARCH AND MONITORING PROJECT, REPORT NO. 45)

4.1 Mr Sabogal introduced the report of the Fourth Meeting of the Ozone Research Managers. The report had been discussed and endorsed at the Fifth meeting of the Conference of the Parties to the Vienna Convention (Beijing, 29 November to 3 December 1999), resulting in the adoption of decision V/3. This decision calls on all Parties:

(a) To continue to maintain instruments and develop the monitoring, calibration and archiving of measurements of stratospheric and tropospheric ozone, including measurements of vertical ozone profiles and of other trace species and aerosols that are essential and to pursue the development and implementation of new observational capabilities such as aircraft and satellite-based measurement, hand-in-hand with an accelerated programme for ground-bases instrument calibration;

(b) To expand the ground-based ozone stations, especially in the continental part of Asia (e.g. Siberia), as well as in the Caribbean and Central American region;

(c) To increase investigation and quantification of stratospheric and tropospheric processes through routine monitoring and experimental campaigns in order to understand current changes, and to further develop and implement predictions of stratospheric change, both for the short and long term;

(d) To continue giving high priority to research into the interactions between ozone and climate and into the impact of aircraft emissions on ozone;

(e) To request the World Meteorological Organization to continue to work towards improving the quality and compatibility of UV-B measurements and their archiving;

(f) To enhance substantially research on the effects of ultraviolet radiation (UV-B), and efforts to monitor such effects;

(g) To request the World Meteorological Organization and the United Nations Environment Programme to pursue ways of enhancing training and baseline monitoring of ozone and UV-B radiation and related research in developing countries, bearing in mind that these goals can only be accomplished with assistance from international funding organizations such as the Global Environment Facility and with the direct support of the Parties to the Convention to such programmes, through the appropriate mechanisms;

4.2 With regard to the implementation of decision V/3, Mr Sabogal highlighted the request to Parties to give high priority to research on the interactions between ozone and climate, and on the continuation of quality measurements of ozone, including vertical profiles, ultraviolet radiation, aerosols and trace species like CFCs, HCFCs and new substances. He also reported that, despite strenuous efforts, UNEP and WMO had been unable to secure funding from international funding organizations such as the Global Environment Facility (GEF), to finance training, monitoring and related research activities in developing countries, as requested by decision V/3.

4.3 Responding to Mr Sabogal's presentation, the Chairman warned of a growing sense among policy-makers that ozone depletion was becoming a solved problem, and that research on the issue should therefore be cut back. In this context, he called for a new focus on achievements to date and on the emerging research questions raised by those achievements, noting that the recovery of the ozone layer would be taking place at a time when the composition of the Earth's atmosphere will have been changed considerably by high concentration of greenhouse gases.

5. REPORT ON THE 2002 SCIENTIFIC ASSESSMENT, THE 2002 ENVIRONMENTAL EFFECTS ASSESSMENT AND ON ASPECTS OF ATMOSPHERIC OZONE SCIENCE AND RESEARCH BY THE CO-CHAIRS OF THE SCIENTIFIC AND ENVIRONMENTAL EFFECTS ASSESSMENT PANELS OF THE MONTREAL PROTOCOL

5.1 Dr Kurylo, on behalf of the Co-Chairs of the Scientific Assessment Panel of the Montreal Protocol, outlined the contents, structure and status of preparation of the 2002 Scientific Assessment of Ozone Depletion. The Assessment, expected to be available by the beginning of 2003, will include an executive summary, answers to frequently asked questions on ozone and contain chapters that specifically address issues raised by governments. These issues concern:

- Observed trends in controlled substances and consistency with reported production of Ozone Depleting Substances;
- Ozone-depleting impacts of new (short-lived) halogen-containing substances;
- Update on Methyl Bromide (sources, sinks, implications of new results for the ozone layer);
- Characterization of the known relations between ozone depletion and climate change (including feedbacks);
- Description and interpretation of observed changes in global and polar ozone and UV radiation (including future projections and expected impacts of climate change).

5.2 Prof. Jan C. van der Leun, Co-Chair of the Environmental Effects Assessment Panel of the Montreal Protocol, outlined the contents, structure and status of preparation of the 2002 Environmental Effects Assessment. In doing so, he highlighted that special attention would be given to the consequences of interactions between ozone depletion and climate change. One example of such interactions was that of skin cancer. Stratospheric cooling triggered by climate change was expected to delay recovery of the ozone layer, which could delay the peak of excess skin cancer cases by 10 years and increase that peak by 60%. Experimental work with mice also suggested more effective induction of cancer by UV-B at higher temperatures. These effects combined could mean ~100,000 extra skin cancer patients per year around the peak, although the incidence would decline with recovery of the ozone layer. Increased temperatures, however, could also impact on the baseline incidence of skin cancer, with excess cases rising as long as temperatures continued to increase. In conclusion, Prof. Jan der Leun called for priority to be given to research on environmental effects, especially given the interactions between ozone depletion and climate change.

6. CURRENT STATUS OF THE GLOBAL OZONE OBSERVING SYSTEM AND MONITORING OF UV-B RADIATION

6.1 Dr Michael Proffitt, Senior Scientific Officer, Atmospheric Research and Environment Department, WMO, provided an overview of the WMO Global Atmosphere Watch (GAW) Programme and its activities, noting that discussions at this meeting would help influence the direction of the Programme's work. GAW, he continued, constituted the primary global network of ozone monitoring stations, backed up by an infrastructure designed to maintain measurements of known quality and to make this date widely available to all users. He urged participants to continue submitting their ozone data to the World Ozone and Ultraviolet Data Centre in Toronto. Dr Proffitt reported that the current GAW network of Global and Regional Stations comprised about 300 sites. While some stations only measured a single parameter, others, particularly Global stations, had a full suite of observations measuring ozone, greenhouse gases, UV and other parameters. He introduced development within the new GAW Station Information System (GAWSIS) which, as its name implies, is being designed as an internet-based searchable database containing much information on each of the GAW stations. GAWSIS is expected to be operational soon. Concerning Dobson intercomparisons, Dr Proffitt highlighted the need for increased funding to avert deterioration of the calibration network, and in particular to enable continuing intercomparison of instruments in Latin America and Africa. Dr Proffitt reported that preliminary Standard Operating Procedures (SOPs) for the preparation of ECC ozonesondes had recently been developed and that a balloon campaign was planned for 2002/2003 to validate these.

6.2 Dr Proffitt also reported on the completion of WMO/GEF/United Nations Development Programme (UNDP) project in developing countries which saw the establishment of six new GAW Global Stations in developing countries. He also described a five-year proposal prepared by GAW in response to decision V/3, on Capacity Building for Detection of Stratospheric Ozone Recovery in Developing Countries. This proposal includes, among other elements, five new ozonesonde stations and associated development of scientific capacity in developing countries, along with two new regional centres for ground-based total ozone calibrations in Africa and South Americas. In conclusion, Dr Proffitt emphasised that the problem of ozone depletion was not yet over, and that availability of reliable measurements remained critically important.

7. COORDINATION

7.0.1 The meeting was informed of a number of programmes, other than WMO's GAW, that complement or are linked to the global effort to research and monitor atmospheric ozone. Brief reviews of these programmes are given below.

7.1 Network for the Detection of Stratospheric Change (NDSC)

7.1.1 Dr Kurylo, speaking as Co-Chairman of the NDSC, gave a brief synopsis of the goals, structure and work of the Network. He recalled that the NDSC consists of a set of high-quality, remote-sensing research stations, which measures ozone, key ozone-related species and parameters, and tracers of chemistry and of atmospheric motions. He emphasised that the NSDC is a major component of the international upper atmosphere research effort, contributing actively to GAW and enjoying broad international participation and endorsement. He drew the attention of delegates to further information on the NDSC available from a newly published brochure and the Network's internet site (http://ndsc.ws). In his presentation, Dr Kurylo highlighted the need for more stations in the southern hemisphere, along with the paucity of stations in the equatorial regions and efforts to expand measurement capability there. He underlined that a commitment to data quality lay at the heart of the NDSC, and that continuous monitoring was necessary to uphold this quality.

7.2 Intergovernmental Panel on Climate Change (IPCC)

7.2.1 Dr N. Sundararaman, Executive Secretary of the Intergovernmental Panel on Climate Change (IPCC), reported that the IPCC had recently completed its Third Assessment Report (TAR), which comprised four parts. Concerning the science of climate change, the TAR's key finding was that most of the temperature increase over the last 50 years was attributable to human activities. Regarding impacts, adaptation and vulnerability, the TAR found clear indications of how ecosystems were responding to temperature increase, for example, through early flowering. On the mitigation of climate change, the TAR advocated a basket of mitigation and adaptation options. Finally, the TAR's Synthesis Report presented its conclusions in the form of answers to nine questions posed by governments.

7.2.2 Dr Sundararaman noted that interlinkages between climate change and other environmental problems, although not new scientific questions, were now coming to the fore. The IPCC had already worked collaboratively with other bodies on interlinkage issues, and such collaboration was likely to increase. He reported on an emerging new initiative to bring together the IPCC and the Technology and Economic Assessment Panel (TEAP) of the Montreal Protocol to consider best practice guidelines on hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), an issue which would likely be taken up by the IPCC at its 19th plenary session in April 2002. He concluded by reporting that the IPCC would prepare a Fourth Assessment Report, although its timing was still uncertain.

7.3 Stratospheric Processes and their Role in Climate (SPARC)

7.3.1 Dr Pablo Canziani, speaking as a member of the SPARC Scientific Steering Group, gave an overview of SPARC's aims, structure, and present and future activities. He noted that the principal objective of SPARC was to help the stratospheric research community focus on issues of particular relevance to climate, and to advance understanding of how processes in the stratosphere influence climate. To this end, SPARC was working together with a range of international and national programmes.

7.3.2 Dr Canziani reported that SPARC initiatives were currently focussed on the following key themes: detection of stratospheric trends which indicate climate change or could affect climate; understanding stratospheric processes and their relation to climate; and modelling stratospheric processes and trends and their effects on climate. For further information, he drew attention to the SPARC Office (http://www.aero.jussieu.fr/~sparc/) and to the SPARC Data Centre, whose internet site gives access to a series of datasets (http://www.sparc.sunysb.edu). In conclusion, Dr Canziani emphasised the need for an integrated research focus on stratospheric climate change.

8. NATIONAL REPORTS ON ONGOING AND PLANNED OZONE RESEARCH AND MONITORING AND ON CALIBRATION AND ARCHIVING OF MEASUREMENTS

8.1 The meeting had before it 50 national reports submitted by Parties to the Vienna Convention, as well as a report from the European Union, on their ongoing and planned activities related to ozone research and monitoring, and calibration and archiving of measurements. These reports are reproduced in alphabetical order in Annex C to this report. Delegates from 48 Parties also presented oral summaries of their national reports to the meeting. An opportunity was provided for delegates to pose questions and comment on key issues raised by the national reports, as input to the recommendations developed under agenda item 10.

9. REPORT OF THE OZONE SECRETARIAT ON DEVELOPMENTS IN THE IMPLEMENTATION OF THE VIENNA CONVENTION AND THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER

9.1 Mr Sabogal presented an overview of developments in the implementation of the Vienna Convention and the Montreal Protocol since the last meeting of the Ozone Research Managers. He reported that the Eleventh Meeting of the Parties to the Montreal Protocol (Beijing, China, 29 November to 3 December 1999) had agreed, among other things, on the replenishment of the Multilateral Fund for 2000-2002. He clarified that the mandate of the Multilateral Fund was to enable the phase out of ozone-depleting substances in developing countries, and not to fund research and monitoring activities. He further reported that the Beijing Amendment, adopted at the Eleventh Meeting of the Parties, had entered into force on 25 February 2002. He noted that the Beijing Declaration, adopted at that Meeting, had cautioned that recovery of the ozone layer had not yet been achieved.

9.2 The Twelfth Meeting of the Parties (Ouagadougou, Burkina Faso, 11 to 14 December 2000) had adopted a number of decisions, including a decision to facilitate the transition to CFC-free metered-dose inhalers and on the monitoring and prevention of illegal trade in ozone-depleting substances. He further noted that both the Ouagadougou and Colombo Declarations, adopted at the Twelfth and Thirteenth Meetings respectively, had mentioned that much work remains to be done to ensure the protection of the ozone layer.

9.3 Mr Sabogal reported that the most recent Thirteenth Meeting of the Parties (Colombo, Sri Lanka, 16 to 19 October 2001) had similarly adopted a number of decisions. These included, for example, procedures for assessing the ozone-depleting potential of new substances, a request to the Secretariat to compile precedents in other Conventions for adding new substances, and a request to Parties to urge industry and users to limit the use of n-propyl bromide (nPB). Pursuant to this latter decision, the TEAP will report annually on nPB use and emissions. Ten decisions were also taken to deal with non-compliance and the Secretariat was requested to prepare a report

on the monitoring of international trade and prevention of illegal trade in ODS, a particularly important problem.

9.4 With regard to the Fifth Meeting of the Conference of the Parties to the Vienna Convention (held together with the Eleventh Meeting of the Parties to the Montreal Protocol), Mr Sabogal recalled that he had reviewed the implementation of its decision V/3 under agenda item 4 (see above). In addition, the Fifth Meeting had, among other decisions, encouraged collaboration between the Assessment Panels of the Montreal Protocol and the IPCC, the Subsidiary Body for Scientific and Technological Advice under the United Nations Framework Convention on Climate Change, and the International Civil Aviation Organization. It had also acknowledged the important role played by the Scientific Assessment Panel in coordinating its report, and the contributions by WMO, national agencies and international organizations to the report's preparation.

9.5 In conclusion, Mr Sabogal reported that the Sixth meeting of the Conference of the Parties to the Vienna Convention would be held in conjunction with the Fourteenth Meeting of the Parties to the Montreal Protocol in Rome, Italy, from 25 to 29 November, 2002. He invited delegates to visit the Ozone Secretariat internet site for further information (http://www.unep.org/ozone).

10. ADOPTION OF RECOMMENDATIONS

10.0.1 On Wednesday, 27 March, delegates adopted the recommendations reproduced below, to be forwarded to the Sixth Conference of the Parties to the Vienna Convention. The recommendations were developed following extensive discussions on the basis of the national reports and presentations made at the meeting.

10.1 Introduction

10.1.1 Considerable progress has been made over the last decade in understanding the role of halogen chemistry in stratospheric ozone loss, particularly in the polar regions. Over the same time period, we have seen the effectiveness of the provisions of the Montreal Protocol and its Amendments in reducing the production and consumption of man-made, halogen-containing compounds, which is now yielding a gradual decline in the atmospheric halogen burden**.** Stabilization and recovery of the stratospheric ozone layer, however, has yet to be detected, and the problem of ozone depletion is still far from over. This implies prolonging the effects of increased UV radiation on human health and ecosystems. Hence, there is a strong need to maintain our current observational capabilities for tracking the decline of halogen concentrations and for detecting and tracking the stabilization and expected recovery of stratospheric ozone.

10.1.2 New scientific questions are also emerging. At the time of expected ozone recovery, the Earth's atmosphere will have been considerably altered by high concentrations of greenhouse gases, while there is growing recognition of a strong coupling between climate change, ozone production and loss, and accompanying changes in UV radiation at the ground. Such coupling places growing demands on long-term research and measurement needs, as well as those for delineating the various responses and effects among ozone, UV radiation at the ground and climate change.

10.1.3 The considerable advances achieved in scientific understanding have been used by some to suggest a lessening need for long-term observational systems. On the contrary, the new demands presented by climate interactions require the continuation, and even expansion, of systematic measurement capabilities, integrated with measurement activities conducted with increased temporal and spatial resolution.

10.1.4 The Fifth Meeting of the Ozone Research Managers, in recognition of the above issues, adopted the following recommendations. In doing so, they noted that international funding and cooperation will be required for their implementation, given that past recommendations have not received sufficient attention in the absence of such funding and cooperation. This has exacerbated problems associated with the maintenance of existing instruments and networks, and with the

implementation of new capabilities. The full implementation of the recommendations will require intensified capacity building in developing countries and countries with economies in transition (CEITs). Capacity building is in the interests of all Parties since a comprehensive understanding of ozone change, and the associated impacts, can only be obtained if global databases are available for research.

10.2 Systematic observations

Evaluation of the state of the ozone layer and an understanding of ground-level UV radiation require an integrated global observing system consisting of ground-based, satellite and in situ measurements. The continuity of these highly complementary measurements is crucial, since they are necessary to assess the onset of ozone layer recovery, to monitor its evolution and to track the associated changes in ground-level UV radiation.

- Provide financial support to maintain and expand well-calibrated ground-based measurement networks for column ozone (e.g. Brewer, Dobson, M-124, SAOZ). This includes the maintenance and preservation of ageing instruments, and the deployment of unused instruments in developing countries and CEITs, whenever possible. In addition, the application of new technologies, such as Microtops II, should be explored.

- Maintain and expand UV networks, including both spectrally resolved and broadband instruments. This will require identifying mechanisms to provide financial support for the expansion and establishment of calibration facilities, both on a regional and a global scale, as well as world calibration standards.

- Provide financial support to enhance long-term profiling of ozone and ozone- and climate-related trace gases in data-sparse areas, particularly in the tropics and mid-latitudes, and preferably at least once a week.

- Provide resources to continue and extend the long-term global column ozone trends record provided by space instruments. This requires the creation of a homogeneous data record from TOMS, SBUV, GOME and SCIAMACHY.

- Provide financial support to maintain both ground-based and space-borne measurement capabilities for climate- and ozone-related trace gases and atmospheric parameters. This includes ground-based networks, such as the NDSC and the WMO GAW Programme, and existing space instruments and platforms, such as SAGE II, UARS and GOME.

- Continue operations of unique high-latitude measurements and facilities, both in the Arctic and the Antarctic. Many have a severe need for reinvestment, which should not be made at the expense of related scientific activities.

- Continue and complete activities leading to the development of ozonesonde standard operating procedures, and extend such procedures to other ozone and UV instrument types.

- Provide financial support to conduct regularly scheduled intercomparisons of instruments and algorithms in order to maintain long-term data quality and integrity. In addition, the characterization of instrument-specific performance and capabilities is essential.

10.3 Data archiving

The archiving and accessibility of ozone and UV data are as important as the measurements themselves. WMO's World Ozone and Ultraviolet Data Centre (WOUDC), operated by the Meteorological Service of Canada in Toronto, is the primary repository of the world's ozone data. However, additional ozone measurement data are held at individual stations and national data

centre facilities. It is important that efforts are undertaken to transfer such information to the WOUDC as well as conducted re-evalulations of historical ozone and UV data.

- Report near-real-time data for column ozone, ozone profiles, ancillary ozone- and climate-related data, and UV radiation to the appropriate World Data Centres. This will require institutional, national and international funding commitments.

- Urge all data centres to develop procedures for the prompt submission of their ozone, UV and ancillary ozone- and climate-related data to the World Ozone and Ultraviolet Data Centre (WOUDC).

- Provide resources for the rapid dissemination of campaign data.

- Provide funding for archiving raw data from various observational networks, either at the local institution or at the WOUDC, as appropriate. It is understood that archiving raw data does not replace the archiving of final data products.

- Provide continued support for the re-evaluation of the historical ozone and UV data archives, in order to preserve and improve the long-term records.

10.4 Research needs

There are still a number of unanswered questions with respect to the expected recovery of ozone in the lower stratosphere. The most important are concerned with understanding cross-tropopause transport of water vapours, short-lived halogen species and ozone, the nucleation of denitrifying polar stratospheric clouds, and the effects of climate change on ozone depletion and recovery. Biological vulnerability to increased levels of UV radiation also requires much further research.

- Support epidemiological and experimental studies to check and specify the possibility of a marked increase in UV-induced skin cancer caused by rising temperature.

- Support studies on the consequences of interactions between ozone depletion and climate change on human health and ecosystems, including longer exposure to increased UV radiation due to a delayed recovery in the stratospheric ozone layer.

- Maintain the radiosonde network, and expand it into areas with inadequate coverage to support process studies. Provide funding to accommodate the reporting of higher-resolution radiosonde data to the World Data Centres. Encourage the recovery, reprocessing and archiving of historical radiosonde records.

- Support studies investigating the upper troposphere/lower stratosphere region and cross-tropopause transport, particularly as the latter applies to water vapour, short-lived halogen species and ozone.

- Support studies to quantify the chemical and dynamical components of polar and mid-latitude ozone loss.

- Support studies examining the effects of climate change on ozone depletion and recovery, as well as possible feedbacks.

- Support studies of aerosol microphysics as it applies to the nucleation of denitrifying polar stratospheric clouds, water vapour transport into the stratosphere, and the connection between aircraft contrails and cirrus formation.

- Support studies aimed at understanding the budgets of ozone- and climate-related trace gases. This includes studies of the effects of climate change on the sources, sinks and lifetimes of these gases.

10.5 Capacity building

Many of the world's ozone measuring stations are located in developing countries and CEITS. The instruments used (M-124 filter instruments, Dobson spectrophotometers, Brewer spectrophotometers, ozonesondes and UV meters) require sophisticated calibration and maintenance, much of which is unavailable without international resources. It is therefore vitally important that sufficient resources for spare parts, calibrations, advanced technical and scientific training is made available to maintain the current global network of observations.

- Provide resources for scientific and technical training, at and beyond the instrument-operation level, thereby allowing instrument operators and other scientific personnel in developing countries and CEITs to use their data, other available data and models, in both regional and international research areas.

- Support regional cooperation and encourage bilateral cooperation and collaboration among developed and developing countries and CEITs.

- Provide resources to establish systems for public dissemination of information about the effects of ozone and UV changes on human health and the environment. This dissemination, which includes education and outreach programmes, is especially important in developing countries and CEITs. Network facilities such as those of the UNEP Division of Trade, Industry and Economics (UNEP/DTIE), could be utilized for this purpose.

- Provide resources for the exchange of visits amongst personnel from monitoring stations in developed, CEITs and developing countries in order to ensure technology transfers and sustained measurement programmes.

- Provide resources to permit the participation of representatives from developing countries and CEITs in regional and international validation and intercomparison campaigns.

- Provide funding from the Parties directly, or via GAW, to developing countries and CEITs for capacity building, and for maintaining and modernizing operational support at GAW global, regional and associate stations.

11. OTHER MATTERS

11.1 No other matters were raised for discussion.

12. CLOSURE OF THE MEETING

12.1 Dr Kurylo, after thanking all participants for their attendance and hard work, declared the meeting closed at 17:15 on Wednesday, 27 March, 2002.

ANNEX A

WMO/UNEP FIFTH MEETING OF THE OZONE RESEARCH MANAGERS OF THE PARTIES TO THE VIENNA CONVENTION FOR THE PROTECTION OF THE OZONE LAYER

(GENEVA, 25-27 March 2002)

LIST OF PARTICIPANTS

Argentina
Dr Pablo O. Canziani
Professor
Departmento de Ciencias de la Atmósfera y los Océanos, Facultad de Ciencias Exactas de la Universidad de Buenos Aires
Ciudad Universitaria – Pabellón II, 2* piso
(1428) Buenos Aires, Argentina
Tel: (54-11) 4576-3364 int. 19
Fax: (54-11) 4831-8862
E-mail: canziani@ic.fcen.uba.ar

Armenia
Dr Davit Melkonyan
Main Expert in Geophysics
Department of Hydrometeorology in Armenia and the Scientific Manager of WMO/GAW Dobson Station #410
Ministry of Nature Protection
35 Moskovian St.
Yerevan 375002, Armenia
Tel: (374-1) 534982 / 531861
Fax: (374-1) 538187 / 531861
E-mail: interdpt@rambler.ru, asya@nature.am

Belarus
Dr Aliaksandr Krasouski
Director
National Ozone Monitoring Research Centre
Belarussian State University
45-47, K. Marx Str.
220030 Minsk, Republic of Belarus
Tel/Fax: (375-172) 784700
E-mail: krasovsky@bsu.by

Belgium
Dr Rodolphe Zander
National Delegate
Institute of Astrophysics and Geophysics
17, allée du 6 Août
B-4000 Liege, Belgium
Tel: (32-4) 366 9756
Fax: (32-4) 366 9747
E-mail: R.Zander@ulg.ac.be

Bulgaria
Dr Staytcho Ivanov Kolev
Scientific Secretary
National Institute for Meteorology and Hydrology-BAS
66, Tzarigradsko shosse
1784 Sofia, Bulgaria
Tel: (359) 275 1018
Fax: (359) 2988-0380
E-mail: stayko.kolev@meteo.bg

Canada
Dr David Wardle
Chief, Experimental Studies
Climate and Atmospheric Research
Meteorological Service of Canada
Environment Canada, 4905 Dufferin Street
Downsview, Ontario, Canada, M3H 5T4
Tel: (1-416) 739-4632
Fax: (1-416) 739-4281
E-mail: David.Wardle@ec.gc.ca

Chile
Dr Claudio Casiccia
Director
Depto. Geofísica Espacial
Laboratorio de Ozono y RUV
Universidad de Magallanes
Casilla 113-D.-UMAG
Punta Arenas, Chile
Tel: (56-61) 207181
Fax: (56-61) 219276
E-mail: casiccia@ona.fi.umag.cl

Costa Rica
Mr Alfonso Liao Lee
Meteorólogo y Coordinador
Comisión Gubernamental del Ozono
Ministerío del Ambiente y Energía
Instituto Meteorologico Nacional
5583-1000 San José, Costa Rica
Tel: (506) 222-2980 / 222-5616 Ext. 130
Fax: (506) 223-1837
E-mail: aliao@meteoro.imn.ac.cr

Croatia
Ms Sonja Vidic
Chief of Environment Division
Meteorological and Hydrological Service of Croatia
10000 Zagreb, Gric 3
Croatia
Tel: 3851 4565 719
Fax: 3851 4565 630
E-mail: vidic@cirus.dhz.hr

Cuba
Dr Fabio Fajardo-Moros
Deputy Minister
Ministerio de Ciencia, Tecnologia y Medio Ambiente
Capitolio Nacional
Ciudad da Habana, Cuba
Tel: (537) 867 0621
Fax: (537) 867 0600/338054
E-mail: fabio@ceniai.inf.cu

Mr Juan Carlos Peláez Chávez
Instituto de Meteorologia
Apartado 17032
C.P. 11700
C. Habana, Cuba
Tel: (537) 670771
Fax: (537) 338010
E-mail: jcpozone@yahoo.com

Czech Republic
Dr Karel Vanícek
Head
Solar and Ozone Observatory
Czech Hydro-Meteorological Institute,
Hradec Králové 8 Branch, Hvezdárna 456
500 08 Hradec Králové 8, Czech Republic
Tel: (420-49) 526-0352
Fax: (420-49) 526-4127
E-mail: vanicek@chmi.cz

Denmark
Dr Niels Larsen
Head
Middle Atmosphere Division
Danish Meteorological Institute
Lyngbyvej 100
DK-2100 Copenhagen, Denmark
Tel: (45-39) 157-414
Fax: (45-39) 157-460
E-mail: nl@dmi.dk

Egypt
Mr Wafik Morid Sharobiem
Head
Egyptian Ozone Observatories
Member (IO3C)
Egyptian Meteorological Authority
Research Department
Regional Ozone Center
Quobry El-Quobba, P.O. Box 11784,
Cairo, 11331, Egypt
Tel: (202) 6820 790
Fax: (202) 6849857
E-mail: wafiek@yahoo.com

Estonia
Mr Kalju Eerme
Senior Scientist
Department of Atmospheric Physics
Tartu Observatory
61602 Tõravere, Estonia
Tel: (372-7) 410-258
Fax: (372-7) 410-205
E-mail: kalju@aai.ee

European Union
Dr Georgios T. Amanatidis
Scientific Officer
European Commission
DG Research, LX46 2/85
B-1049 Bruxelles, Belgium
Tel : +32-2-2958815 (direct line)
+32-2-2950655 (secretary line)
Fax : +32-2-2995755
E-mail: georgios.amanatidis@cec.eu.int

France
Mr Jean-Pierre Pommereau
Directeur de Recherche CNRS
Service d'Aéronomie
BP 3
F-91371 Verrrieres le Buisson
France
Tel: 33 1 6447 48 88
Fax: 33 1 69 20 2999
E-mail: pommereau@aerov.jussieu.fr

Georgia
Mr Avtandil Amiranashvili
Chief
Department of Atmospheric Physics, M. Nodia Institute
of Geophysics of Georgia Academy of Sciences
1 M. Aleksidze str.
380093 Tbilisi, Georgia
Tel: (995-32) 333-936
Fax: (995-32) 332-867 / 333-952
E-mail: Avto_Amiranashvili@hotmail.com
airdept@caucasus.net

Germany
Mr Hans Claude
Deutscher Wetterdienst
German Meteorological Service
Meteorologisches Observatorium
Albin-Schwaiger-Weg 10
82383 Hohenpeissenberg, Germany
Tel: (49) 8805-954-170
Fax: (49) 8805-954-230
E-mail: hans.claude@dwd.de

India
Dr S. Satapathy
Joint Director
Ozone Cell
Ministry of Environment and Forests
Government of India
Core IV B, 2nd Floor
India Habitat Centre, Lodhi - Road
New Delhi - 110003, India
Tel: (91-11) 464-2176
Fax: (91-11) 461-2175
E-mail: ozone@del3.vsnl.net.in /
satapathy@mantramail.com

Islamic Republic of Iran
Mr Shahmir Eghtesadi
Representative
Iran's Meteorological Organization
Ozone National Committee
Tehran, I.R. Iran
Fax: (98-21) 670-4176
E-mail: ozone@accir.com

Italy
Dr Gianluca Redaelli
INFM-University of L'Aquila
Department of Physics
Atmospheric Physics Group
Via Vetoio
I-67010 Coppito-L'Aquila, Italy
Tel: (39-0862) 433-076
Fax: (39-0862) 433-033
E-mail: gianluca.redaelli@aquila.infn.it

Japan
Mr Yukio Makino
Director
Atmospheric Environment Division
Observations Department
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
Tokyo, Japan
Tel: (81-3) 3287-3439
Fax: (81-3) 3211-4640
E-mail: y-makino@met.kishou.go.jp

Dr Takashi Imamura
Head
Ozone Layer Modeling Research Team
The National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki
Japan
Tel: (81-298) 50-2406
Fax: (81-298) 50-2579
E-mail: imamura@nies.go.jp

Kenya
Mr Wilson Kimani
Senior Meteorologist
Kenya Meteorological Department
Dagoretti Corner, Ngong Road
P.O. Box 30259
Nairobi, Kenya
Tel: (254-2) 567880 Ext. 2099
Fax: (254-2) 576955 / 577373 / 567888
E-mail: wilson.kimani@lion.meteo.go.ke

Kuwait
Dr Saud Al-Rashied
Director of Air Pollution and Chairman of National Ozone Committee
Environment Public Authority (EPA)
P.O. Box 17366
Al-Khaldyia, Kuwait
Tel: (0965) 4821278
Fax: (0965) 4820 599
E-mail: Noor@epa.org.kw

Kyrgyz Republic
Mr Gennady Desyatkov
Head
Department of Information and Computational Technologies
The Kyrgyz-Russian Slavic University
44 Kievskaya Str.
720000 Bishkek, Kyrgyzstan
Tel: (996-312) 286492
Fax: (996-312) 286492
E-mail: gendes@istc.kg

Lithuania
Mrs Marija Teriošina
Head
Chemicals Management Division
Ozone Focal Point, Ministry for Environment
A. Jaksto 4/9,
LT-2600 Vilnius, Lithuania
Tel: (370-2) 619617
Fax: (370-2) 619617 / 220847
E-mail: m.teriosina@aplinkuma.lt
marija@nt.gamta.lt

Morocco
Mr Abdelaziz Ouldbba
Head
Meteorological Section
Department of National Meteorology
Hay Hassani
Casablanca, Morocco
Tel: (212) 2291-3435
Fax: (212) 2291-3699
E-mail: ouldbba@mtpnet.gov.ma

Myanmar
Mr U. Thein Tun
Director
Department of Meteorology and Hydrology
No. (50) Kaba Aye Pagoda Road
Mayangone Township
Yangon, Myanmar
Tel: (951) 665669
Fax: (951) 665944 / 665704
E-mail: dg.dmh@mptmail.net.mm

Netherlands
Mr Jan-Paul Fortuin
KNMI
P.O. Box 201
3730 AE De Bilt
The Netherlands
Tel: +31 30 220 6452
Fax: +31 30 221 0407
E-mail: fortuin@knmi.nl

Panama
Prof. Alfonso Pino Graell
Coordinador
Laboratorio de Física de la Atmósfera
Universidad de Panamá
Aptdo. Postal 9917, Zona 4
Panamá, Rep. De Panamá
Tel: (507) 269-5380
Fax: (507) 227-4258
E-mail: atmosfer@ancon.up.ac.pa
apino@sinfo.net

Peru
Mr Esequiel B. Villegas
Meteorological and Hydrological National Service – SENAMHI
Jr. Cahuide 785 Jesus Maria
Lima 11, Peru
Tel: (51-1)266-0216/(51-1)472-4180 An.181
E-mail evillegas@senamhi.gob.pe
ezvillegas@hotmail.com

Poland
Dr Zenobia Litynska
Institute of Meteorology and Water Management
Centre of Aerology
ul. Zegrzynska 38
05-119 Legionowo, Poland
Tel: +48 22 774 1246
Fax: +48 22 774 2746
E-mail: zenoblit@pol.pl

Romania
Dr Mariana Constantinescu
Deputy Director
National Research & Development Institute
Environmental Protection
Ministry of Water and Environmental Protection
Bucharest, Romania
Tel: (40-1) 221 8564
Fax: (40-1) 221 8564
E-mail: mzglobiu@icim.ro

Samoa
Ms Filomena Nelson
Chief
Ozone Program Officer
Division Environment and Conservation
Department of Lands, Surveys and Environment,
Private Bag,
Apia, Samoa
Tel: (685) 22481/23800
Fax: (685) 23176/25856
E-mail: mena_nelson@yahoo.com

Saudi Arabia
Mr Mohammed Al-Sahafi
Presidency of Meteorology and Environment
P.O. Box 6649
Jeddah 21452, Saudi Arabia
Tel: 966 2 6512312
Fax: 966 2 6517832
E-mail: malsahafi@hotmail.com

Seychelles
Mrs. Rita Ogada - Odongo
Meteorologist
Ministry of Environment and Transport
Division of Policy, Planning and Services
National Meteorological Services
P.O. Box 1145,
Victoria, Seychelles
Tel: (248) 384070
Fax: (248) 384078
E-mail: rogada@pps.gov.sc

Slovak Republic
Dr Miroslav Chmelik
Slovak Hydrometeorological Institute, Centre of Aerology and Ozone Measurements
O58 01 Proprad-Ganovce, Slovakia
Tel: (421-52) 773-1097
Fax: (421-52) 773-1538
E-mail: Miroslav.Chmelik@shmu.sk

Slovenia
Mr Dušan Hrcek
Adviser to the Government
Ministry of Environment and Spatial Planning
Dunajsha c. 48
SI-1000 Ljubljana, Slovenia
Tel: +386 1 478 73 02
Fax: +386 1 478 74 25
E-mail: dusan.hrcek@gov.si

South Africa
Mr Gerrie J.R. Coetzee
Global Atmosphere Watch
South African Weather Service
Room 5070, Forum Building
Private Bag X097
159 Struben Street
Pretoria 0001, South Africa
Tel: (27-12) 309-3052
Fax: (27-12) 323-4518
E-mail: coetzee@weathersa.co.za
agnes@weathersa.co.za

Ms Agnes Phahlane
Meteorologist-GAW
South African Weather Service
Private Bag X097
Pretoria 0001, South Africa
Tel: +27 12 309-3038
Fax: +2712 323 4518
E-mail: agnes@weathersa.co.za

Spain
Dr Emilio Cuevas
Director
Izaña Observatory
Instituto Nacional de Meteorología
C/La Marina, 20, 6^{e} Planta
38001 S/C Tenerife, Spain
Tel: +34 922 151718
Fax: +34 922 574475
E-mail: ecuevas@inm.es

Dr Antonio Labajo
Jefe de Area de Proyectos
Subdirección General de Programas Especiales e Investigación Climatológica
Instituto Nacional de Meteorología
C/ de las Moreras s/n, Ciudad Universitaria
28040 Madrid, Spain
Tel: (34-91) 581-98 69
Fax: (34-91) 581-9767
E-mail: alabajo@inm.es

Sri Lanka
Dr W.L. Sumathipala
Coordinator
Montreal Protocol Unit
Ministry of Environment & Natural Resources
82, “Sampathpaya” Rajamalwatta Road
Battaramulla, Sri Lanka
Tel: (941) 871764
Fax: (941) 887455
E-mail: sumathi2@sri.lanka.net

Sweden
Mr Weine Josefsson
Head
Atmospheric Research Group
(Remote Sensing and Radiation Research)
SMHI, S-601 76 Norrköping, Sweden
Tel: (46-11) 4958183
Fax: (46-11) 4958001
E-mail: weine.josefsson@smhi.se

Switzerland
Dr René Stübi
MeteoSwiss / Aerological Station
CH-1530 Payerne, Switzerland
Tel: (41-26) 662-6229
Fax: (41-22) 662-6212
E-mail:rene.stubi@meteoswiss.ch

Dr Pierre Viatte
Head
Aerological Station
P.B. 316
CH-1530 Payerne, Switzerland
Tel: +41 26 662 62 11
Fax: +41 26 662 62 12
E-mail: pierre.viatte@meteoswiss.ch

Thailand
Ms Sumridh Sudhibrabha
Meteorologist
Atmospheric Turbidity, Solar Radiation and Ozone Observations Subdivision Meteorological Observations Division
Meteorological Department
4353 Sukhumvit Bangna
Bangkok 10260, Thailand
Tel: (662) 361-3640
E-mail: sumridh@metnet.tmd.go.th

Togo
Mr Amona Kossi Domépha
Coordonnateur
BNO Togo
BP. 4825
Lome, Togo
Tel: (228) 222-6897
Fax: (228) 221-0333
E-mail: d_amona2000@yahoo.fr

Turkey
Mr Bülent Aksoy
Turkish State Meteorological Service
Department of Research
P.O. Box 401
Ankara, Turkey
Tel: (90-312) 302-2687
Fax: (90-312) 361-2040
E-mail: baksoy@meteor.gov.tr

United Kingdom
Dr Sophia Oliver
Scientific Adviser
Global Atmosphere Division
Department of Environment, Food and Rural Affairs (DEFRA)
3/C2 Ashdown House
123 Victoria Street
London SW1E 6DE, United Kingdom
Tel: 020-7944-5232
Fax: 020-7944-5219
E-mail: sophia.oliver@defra.gsi.gov.uk

USA
Dr Michael J. Kurylo
Manager
Upper Atmosphere Research Program Office of Earth Science
NASA Headquarters, Code YS
Washington, DC 20546, USA
Tel: (1-202) 358-0237
Fax: (1-202) 358-3098
E-mail: mkurylo@hq.nasa.gov

Mrs Kathy Thompson
Computer Sciences Corporation
990 Toedtli Drive
Boulder, CO. 80305-6531, USA
Tel: +1 303 494 9360
Fax: +1 303 494 9361
Email: kthompson@al.noaa.gov

Uzbekistan
Dr Raisa Taryannikova
Scientist
Central Asian Hydrometeorological Research Institute (SANIG-MI)
72, K. Makhsumov str.
Tashkent 700052, Republic of Uzbekistan
Tel: (998-71)133-6180 / 136-0758
Fax: (998-71)133-2025
E-mail: uzhymet@meteo.uz

Vietnam
Mr Luong Duc Khoa
ODS Officer
Vietnam National Ozone Unit
National Office for Climate Change and Ozone Protection
Hydrometeorological Service of Vietnam
57 Nguyen Du Str.
Hanoi, Vietnam
Tel: (84-4) 822-8974
Fax: (84-4) 826-3847
E-mail: ozoneoffice@fpt.vn

Environmental Effects Assessment Panel
Prof. Jan C. Van der Leun
ECOFYS
Kanaalweg 16G
NL-3526 KL Utrecht, The Netherlands
Tel: +31 30 280 8361
Fax: +31 30 280 8301
E-mail: j.vanderleun@ecofys.nl

Scientific Assessment Panel
Prof. Ayite-Lo Nohende Ajavon
Atmospheric Chemistry Laboratory
FDS/Universite du Benin
B.P. 1515
Lome, Togo
Tel: (228) 225 5094 Ext. 1305
Fax: (228) 221 8595
E-mail: noajavon@tg.refer.org
sossiayite@hotmail.com

UNEP
Mr Nelson Sabogal
Senior Scientific Affairs Officer
Ozone Secretariat
P.O. Box 30552
Nairobi, Kenya
Tel: (+254 2) 62 3856
Fax: (+254 2) 62 3913/ 62 3601
E-mail: Nelson.Sabogal@unep.org
http://www.unep.org/ozone

Ms Ruth Batten
Administrative/Fund Programme Management Officer
Ozone Secretariat
P.O. Box 30552
Nairobi, Kenya
Tel: (+254 2) 62 4032
Fax: (+254 2) 62 3913/ 62 3601
E-mail: Ruth.Batten@unep.org

Intergovernmental Panel on Climate Change (IPCC)
Dr N. Sundararaman
Secretary of the IPCC
c/o World Meteorological Organization
7bis, avenue de la Paix
Case Postale No. 2300
CH-1211 Genève 2, Switzerland
Phone: (+41-22) 730 82 35
Fax: (+41-22) 730 80 13
Email: sundararaman_n@wmo.ch

WMO
Dr Michael Proffitt
Senior Scientific Officer
World Meteorological Organization
AREP/Environmental Division
7bis, avenue de la Paix
Case Postale No. 2300
CH-1211 Genève 2, Switzerland
Phone: (+41-22) 730 82 88
Fax: (+41-22) 730 80 49
Email: proffitt@wmo.ch

ANNEX B

WMO/UNEP FIFTH MEETING OF THE OZONE RESEARCH MANAGERS OF THE PARTIES TO THE VIENNA CONVENTION FOR THE PROTECTION OF THE OZONE LAYER

(GENEVA, 25-27 March 2002)

AGENDA

1. OPENING OF THE MEETING

2. ADOPTION OF THE AGENDA

3. ELECTION OF THE CHAIRMAN

4. REVIEW OF THE REPORT OF THE FOURTH MEETING OF THE OZONE RESEARCH MANAGERS, HELD IN GENEVA, 28 TO 30 APRIL 1999 (WMO GLOBAL OZONE RESEARCH AND MONITORING PROJECT, REPORT NO. 45)

5. REPORT ON THE 2002 SCIENTIFIC ASSESSMENT, THE 2002 ENVIRONMENTAL EFFECTS ASSESSMENT AND ON ASPECTS OF ATMOSPHERIC OZONE SCIENCE AND RESEARCH BY THE CO-CHAIRS OF THE SCIENTIFIC AND ENVIRONMENTAL EFFECTS ASSESSMENT PANELS OF THE MONTREAL PROTOCOL

6. CURRENT STATUS OF THE GLOBAL OZONE OBSERVING SYSTEM AND MONITORING OF UV-B RADIATION

7. COORDINATION

7.1 Network for the Detection of Stratospheric Change (NDSC)
7.2 Intergovernmental Panel on Climate Change (IPCC)
7.3 Stratospheric Processes and their Role in Climate (SPARC)

8. NATIONAL REPORTS ON ONGOING AND PLANNED OZONE RESEARCH AND MONITORING AND ON CALIBRATION AND ARCHIVING OF MEASUREMENTS

9. REPORT OF THE OZONE SECRETARIAT ON DEVELOPMENTS IN THE IMPLEMENTATION OF THE VIENNA CONVENTION AND THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER

10. ADOPTION OF RECOMMENDATIONS

10.1 Introduction
10.2 Systematic observations
10.3 Data archiving
10.4 Research needs
10.5 Capacity building

11. OTHER MATTERS

12. CLOSURE OF THE MEETING