

Chapter XIII

World Meteorological Organization (WMO)

In 1991, the World Meteorological Organization (WMO) carried out its activities in accordance with the programmes and budget adopted in 1987 for the period 1988-1991 by its highest governing body, the World Meteorological Congress, which meets at least once every four years.

The Congress held its eleventh session (Geneva, 1-23 May 1991) and adopted the programme and budget of the organization for the period 1992-1995. It reappointed G. O. P. Obasi (Nigeria) as the WMO Secretary-General for a four-year term beginning on 1 January 1992.

The Congress adopted the third WMO long-term plan for 1992-2001, reflecting the importance of major new issues relating to climate change and the environment. It adopted a new Public Weather Services Programme and the WMO Plan of Action for the International Decade for Natural Disaster Reduction (1990-2000). The Congress established the Global Climate Observing System, sponsored initially by WMO, the International Council of Scientific Unions, the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization and the United Nations Environment Programme.

The 36-member Executive Council meets annually to supervise the implementation of programmes and regulations and in 1991 it held its forty-third session (Geneva, 24-29 May).

The membership of WMO as at 31 December 1991 remained at 155 States and 5 Territories (see Annex I).

World Weather Watch

The World Weather Watch (WWW), the basic programme of WMO, continued to provide in 1991 global observational data and processed information required by members for operational and research purposes. Its essential elements were the Global Observing System (GOS), whereby observational data were obtained; the Global Telecommunication System (GTS), which offered telecommunication facilities for the rapid collection, exchange and distribution of observational data and processed information; and the Global Data-Processing System (GDPS), which provided for the processing, storage and retrieval of observational data and made available processed information.

World Weather Watch implementation

In 1991, milestones were reached in three major implementation support activities: the Aircraft-to-Satellite Data Relay (ASDAR), the Composite Observing System for North America (COSNA) and Operational WWW Systems Evaluation (OWSE)-Africa.

The ASDAR system reached maturity when certification was obtained in early 1991 from the United Kingdom and the United States for the use of ASDAR on B-747 and DC-10 aircraft. At the end of 1991, four units were in service, each providing approximately 100 reports daily, including profiles on landing and take-off.

Following the successful completion of the OWSE-North Atlantic in 1988-1989, a coordinating group for COSNA was established. Major achievements in 1991 were: additional studies agreed to by the scientific evaluation group of the coordinating group for COSNA; a major report on ways to make substantial improvements to the North Atlantic observing network; and the Automated Shipboard Aerological Programme attained full deployment of 13 units for the North Atlantic.

Implementation of Phase I of OWSE-Africa was completed in 1991. In total, some 68 data-collection platforms (DCPs) and 13 DCP receiving stations systems were installed in 13 countries in Africa and St. Helena. However, the equipment was either totally destroyed or out of service for long periods because of internal turmoil in four member countries.

Instruments and Methods of Observation Programme

The Commission for Instruments and Methods of Observation (CIMO) conducted surveys of data and accuracy requirements and investigated the capability of instruments to help WMO members produce adequate measurements of sufficiently high quality to meet their national requirements and those of WMO programmes.

At an expert group meeting on operational accuracy requirements (Geneva, 3-6 June), agreement was reached on common accuracy specifications for general WMO operational use. Those specifications enhanced the standardization of techniques and methods of observation, resulting in more cost-effective equipment.

During the year, a large number of meetings of CIMO working and expert groups were organized dealing with in situ and remote-sensing techniques, such as standards of operational meteorological and related measurements; inter-comparisons and evaluations; establishment of international calibration standards; guidance material on new developments and automation; operational, including maintenance, aspects and calibration methods; automatic and non-real-time quality control; technology transfer and specialized training.

Tropical Cyclone Programme

Support for the development of early warning systems for tropical cyclones was provided by the WMO Tropical Cyclone Programme (TCP). TCP also supported programmes for strengthening the response to warnings, public awareness and other aspects of disaster preparedness and prevention.

Research was carried out on typhoon movement, anomalous typhoon tracks, recurvature, westward movement and interaction with large-scale atmospheric patterns. Over 40 papers were submitted to the Technical Conference on SPECTRUM (Guangzhou, China, 25-29 November 1991), where researchers and operational forecasters discussed scientific studies, progress made and results so far obtained.

Environmental emergencies

In the wake of the nuclear powerplant accident at Chernobyl, Ukrainian SSR, in 19986, WMO, in cooperation with the International Atomic Energy Agency and other international organizations, was setting up an early notification scheme and data-exchange mechanisms to be used in cases of environmental emergencies, including the use of GTS and GDPS for the real-time exchange of messages and observational data, as well as for the provision of analysis and forecast products needed for emergency assessment purposes.

In the framework of the United Nations inter-agency action plan to assess the environmental effects of the oil fires in Kuwait, where more than 600 oil wells had been set ablaze as a result of the hostilities in the Persian Gulf, WMO assumed responsibility for the atmospheric component, providing scientific information and advice on the state and behaviour of the global atmosphere.

Among other things, WMO was involved in re-establishing the basic observing and telecommunications systems of the Kuwait Meteorological Service and in coordinating efforts to produce short-term forecasts of atmospheric transport and dispersion of pollutants so as to evaluate the scope of the disaster.

World Climate Programme

In 1991, the Congress renamed three of the four components of the World Climate Programme (WCP) in order to highlight certain aspects: the World Climate Data Programme became the World Climate Data and Monitoring Programme (WCDMP); the World Climate Applications Programme was renamed the World Climate Applications and Services Programme (WCASP); and the World Climate Impact Studies Programme became the World Climate Impact Assessment and Response Strategies Programme (WCIRP). The World Climate Research Programme (WCRP) remained unchanged.

WCDMP aimed at upgrading climate data management systems, providing information on the status of the climate system and developing climate databases. The Commission for Climatology (CCI) working group on climate data (Geneva, 11-15 November) reviewed WCDMP projects. The 1991 Congress continued its strong support of the climate computing (CLICOM) project and noted that systems were operational in nearly 100 countries, and planned in 20 others. The publication CLICOM News served as a medium for exchange of ideas and information between WMO members. Under the Climate System Monitoring (CSM) Project, which received substantial support from UNEP, the monthly WMO Climate System Monitoring Bulletin and the biennial Global Climate System Review continued to be published. An expert meeting (Geneva, 7 and 8 November) proposed improvements to tracking and distribution of climate system monitoring data and products.

Priority activities within WCASP continued to relate to food production, water-resource management and energy. Promotion of the use of climate information in the areas of food and water was closely coordinated with the Agricultural Meteorology and the Hydrology and Water Resources Programmes (see below), Concerning energy meteorology, over 40 climatologists/meteorologists and energy engineers participated in a regional training seminar (Kathmandu, Nepal, 11-23 March). Progress was made in implementing a regional project for Europe on meteorological information for development of renewable energy, the objective of which was to establish the climatological databases required for the development of energy systems, including renewable energy sources. Activities under the project included expert missions, seminars and a training workshop. WMO was one of the organizers of a symposium on electricity and the environment (Helsinki, Finland, 13-17 May), which assessed the impact of various forms of electricity production on human health and the environment. Activities in urban climatology focused on the Tropical Urban Climate Experi-

ment and on a related conference to be held in 1993 to review ongoing studies of the impact of climate, its variation and change on urban areas as well as the potential impact of urban activities on climate on local, regional and global scales. A report on a non-parametric framework for long-range streamflow forecasting and a bibliography of urban climate (1981-1988) were published as technical documents.

Main activities under the WCRP component, for which UNEP was responsible, related to the application of climate impact assessment methods, and to the greenhouse gas/climate change issue. Seminars were held on impact assessment methodologies and on reducing societal vulnerability to drought. Studies of the El Niño/Southern Oscillation and of the effects of sea-level rise in South-East Asia were pursued. A climate impact assessment case-study was carried out in Viet Nam and an International Conference on Global Warming and Sustainable Development was held (Bangkok, Thailand, June). A meeting of the Scientific Advisory Committee for WCRP (Budapest, Hungary, October) drew up detailed proposals for activities in 1992 and 1993.

WCRP, undertaken jointly by WMO and the International Council of Scientific Unions (ICSU), organized a range of research activities directed at understanding the basic physical processes determining climate, including interactions between the different components of the climate system (atmosphere, ocean, land surface and cryosphere), and refining the models required for predicting climate variations and quantifying climate change related to the increase in atmospheric concentrations of greenhouse gases. In 1991, consideration was given to a WCRP climate variability and prediction research programme, intended to lay down a framework for studies of climate prediction and variability on time-scales from a few months to a few decades, and the Arctic climate system study to investigate, model and eventually predict the circulation of the Arctic Ocean, the volume of sea ice, the freshwater budget of the Arctic region and the exchange of fresh water with the global ocean.

Progress in the Global Energy and Water Cycle Experiment (GEWEX) was made in elaborating the scientific plan for the GEWEX Continental-scale International Project, aimed at reproducing the hydrology of a continent-size river basin (the Mississippi) with daily precipitation and evaporation estimates as main inputs. Progress was also made towards implementing the Baseline Surface Radiation Network which provided high quality measurements of surface radiation fluxes in contrasting climatic zones, together with co-located surface and upper-air meteorological data.

The Advisory Committee on Climate Applications and Data (ACCAD) was re-established by the Executive Council with expanded terms of reference. At its first session (Geneva, 19 and 20 November), ACCAD emphasized the need to continue encouraging the free exchange of climate data and to give due attention, along with climate change impact assessments, to applications of knowledge of current climate.

Atmospheric Research and Environment Programme

The 1991 Congress changed the name of the Research and Development Programme to the Atmospheric Research and Environment Programme, to highlight activities relating to environmental issues.

The Programme consisted of four major components: the Global Atmosphere Watch (GAW); Weather Prediction Research; Tropical Meteorology Research; and Physics and Chemistry of Clouds and Weather Modification Research. Development of these activities was the responsibility of the Commission for Atmospheric Sciences (CAS).

Activities under GAW centred on establishing Background Air Pollution Monitoring Network (BAP-MON) stations for global measurements and on issues concerning the Global Ozone Observing System. Close links were maintained with the Economic Commission for Europe European Monitoring and Evaluation Programme particularly regarding its workshop on analysis of measurements and model results with emphasis on NO_x/VOC/oxidants (Halifax, Canada, 16-20 September). Among the most important meetings held were those relating to further developing GAW and the Steering Group of the WMO-led Group of Experts on the Scientific Aspects of Marine Pollution Working Group 32 on Global Change and Air/Sea Exchange of Chemicals (Norwich, United Kingdom, 22-26 July).

Under Weather Prediction Research, a training workshop on the interpretation of numerical weather prediction (NWP) products in terms of local weather phenomena and their verification was organized (Wageningen, Netherlands, 29 July-9 August) to enhance the quality of weather forecasts. A meeting of the Steering Group on Mediterranean Cyclone Studies (Sofia, Bulgaria, 25-28 March) covered not only prediction and other traditional topics, but also their application to the long-range transport of pollutants and favourable conditions for weather modification. The International Centre for Theoretical Physics/International Centre for Science/ WMO International Conference on Long-range Weather Forecasting Research (Trieste, Italy, 8-12 April) was convened to review progress made in NWP modelling and in understanding the mechanisms controlling atmospheric circulation variability; exchange re-

search results and their applications; and identify key problems requiring further research.

Various Tropical Meteorology Research activities were developed, based on field experiments carried out in 1990 by the Economic and Social Commission for Asia and the Pacific (ESCAP)/WMO Typhoon Committee, the USSR and the United States, to study tropical cyclones in the North-West Pacific. A major outcome of the West African Monsoon Experiment (WAMEX) was the publication of the WAMEX Atlas. The continuing efforts of the Activity Centres for Asia/Africa Monsoon studies and other research activities were reported on and discussed at the Third Regional Workshop on the Asian/African Monsoon (Puna, India, 4-8 February). National research studies in tropical meteorology, with focus on cold-front intrusion into low-latitude and tropical rain-producing systems, were compiled and published. A workshop on interaction between tropical and mid-latitude weather systems (Reading, United Kingdom, 16-20 December) discussed interactive phenomena on various time and space scales.

Provision of information and advice formed a significant part of the Physics and Chemistry of Clouds and Weather Modification Research. The 1989 Register of National Weather Modification Experiments was prepared and an expert mission travelled to the Syrian Arab Republic to assess the possibility of conducting a precipitation enhancement project there. A meeting of experts on the role of clouds in the chemistry, transport, transformation and deposition of pollutants (Obninsk, USSR, 30 September-4 October) considered aspects of interaction between clouds and pollution.

In 1991, the WMO Technical Library acquired some 2,180 publications, most of which were gifts or exchanges. It answered 2,310 enquiries and loaned 1,300 publications to readers.

Applications of Meteorology Programme

The WMO Applications of Meteorology Programme focused on agricultural, aeronautical and marine meteorology. Beginning in 1992, as decided by the Congress in 1991, the Programme would also include a public weather services component.

Agricultural meteorology

The tenth session of the Commission for Agricultural Meteorology (Florence, Italy, 2-13 December) discussed, among other things, climate change and agriculture, environmentally friendly activities, combating locusts and drought and desertification. The Commission approved texts of additional chapters, annexes and appendices for the Guide to Agricultural Meteorological Practices. At three regional workshops on the preparation of practical agrometeorological

information (Algiers, Algeria, 20-29 April; Aleppo, Syrian Arab Republic, 6-17 October; Niamey, Niger, 7-18 October), participants worked with CLICOM and INSTAT software, the latter being an interactive statistics package especially adapted for agroclimatological information. Participants at an international workshop on soil-water balance in the Sudano-Sahelian zone (Niamey, 18-23 February) proposed specific measures to help achieve the goal of soil-water balance to assist farmers in improving agricultural production. A workshop on the use of meteorological information in forest-fire management (Rabat, Morocco, 25-30 November) dealt with conditions in the western Mediterranean region. Seminars on the application of meteorological data for effective planning and management of water for sustainable irrigated crop production (Jakarta, Indonesia, 25 November-7 December; Ankara, Turkey, 2-13 December) provided practical training for meteorologists, hydrometeorologists, agrometeorologists, hydrologists and other officials involved in water-resource management and planning on the calculation of water requirements of crops using meteorological data and irrigation management and scheduling. Collaboration with the Joint Research Centre of the European Community continued on the use of agrometeorological models to monitor crop production and to provide crop forecasts. A number of publications were issued, including a trilingual Glossary of Agrometeorological Terms; a practical manual on meteorological information to combat agents of sticky cotton; case-studies of meteorology and desert locust control; a guide for the INSTAT software package (French, Spanish); and the Proceedings of the Symposium Meteorology and Crop Protection. Since March 1991, a monthly Drought M&R Bulletin was issued by the Drought Monitoring Centres (DMCs) established in Nairobi, Kenya, and Harare, Zimbabwe, under a joint United Nations Development Programme/WMO regional project. A meeting of experts/scientists on DMC activities (Harare, 9 and 10 August) reviewed the Bulletin.

Aeronautical Meteorology

As interest in automated air reporting continued to increase, the Aeronautical Meteorology Programme aimed at assisting members in planning, establishing and operating aeronautical services required to ensure the safety, efficiency and economy of air navigation—was carried out in close cooperation with the International Civil Aviation Organization and other international organizations.

During the year, three major training events took place. A seminar on aeronautical forecasting, briefing and documentation (Singapore, 21-25 Oc-

tober) emphasized broadening knowledge of aeronautical forecasting and improving standardization procedures for pre-flight meteorological information. A regional seminar on weather hazardous to air navigation in South-East Asia (Hanoi, Viet Nam, 28 October-1 November) helped participants increase their knowledge of weather hazards, learn new techniques in forecasting, remote sensing, centralization and automation and use the new aeronautical meteorological codes. A training seminar on new forecasting techniques in aeronautical meteorology (18 November-20 December) visited Lesotho, Malawi, the United Republic of Tanzania, Zambia and Zimbabwe with a view to strengthening aeronautical meteorological services by ensuring better qualified forecasters.

Marine meteorology

In 1991, the Integrated Global Ocean Services System (IGOSS) entered a new phase with the production of the first IGOSS Products Bulletin; the sixth session of the Joint Committee of WMO and the Intergovernmental Oceanographic Commission (IOC) for IGOSS took place (Geneva, 18-27 November); and IOC launched the Global Ocean Observing System (GOOS) in cooperation with WMO. A joint IOC/WMO seminar/workshop on IGOSS products demonstrated the feasibility of undertaking synoptic analyses of the physical state of the oceans on virtually a global basis.

Other activities were directed towards providing services to the marine user community and the operation of a variety of marine observing, data collection and processing system components. In the area of ocean observations, 1991 saw the completion of a project to quantitatively assess the quality of ships; meteorological reports for climate study purposes; the development of new data handling and quality control procedures for drifting buoy data; and the initiation of a global digital sea-ice databank.

Hydrology and water resources

The Hydrology and Water Resources Programme (HWRP) continued to assist and support the activities of bodies responsible for operational hydrology. The International Glossary of Hydrology, published jointly with UNESCO in 1974, was updated in 1991. It contained some 1,800 words, terms and definitions in English, French, Russian and Spanish, and was revised with a view to publishing another edition in 1992 that was also to contain words and terms important in water resources.

Collection of river flow data continued at the Global Runoff Data Centre at the Federal Institute of Hydrology (Koblenz, Germany). At the end

of 1991, the Centre's database contained records for 2,930 stations from 131 countries. The data were to be used for developing and verifying global models of atmospheric circulation and for other purposes. A regional postgraduate diploma course in hydrology was launched in September at the WMO Regional Meteorological Training Centre in Nairobi for 14 postgraduate students from nine African countries. The Delft International Course for Hydrologists, organized annually by the International Institute for Hydraulic and Environmental Engineering (Delft, Netherlands) for students from developing countries, covered a wide range of subjects from the hydrological uses of aerial photographs to the design of wells. WMO, the World Health Organization (WHO) and UNEP convened a meeting of experts (Bratislava, Czechoslovakia, 26-30 August) to assess information needs for water quality assessment and management, as part of the preparatory process leading to the 1992 International Conference on Water and the Environment.

The 1991 Congress renamed the Hydrological Operational Multipurpose Subprogramme the Hydrological Operational Multipurpose System (HOMS) and decided that it should be a permanent feature of the Operational Hydrology Programme, with increased emphasis on water quality and environmental aspects. HOMS continued to provide technological support to the hydrological services of WMO members. The WMO/UNESCO Report on Water Resources Assessment Progress in the Implementation of the Mar del Plata Action Plan and a Strategy for the 1990s, containing a series of regional in-depth assessments undertaken under the aegis of the United Nations Intersecretariat Group for Water Resources, was published in 1991. The following reports were prepared: progress on water-resource assessment (WMO/UNESCO); agricultural water use (the Food and Agriculture Organization of the United Nations); water quality issues (WHO); and economic aspects (United Nations). WMO cooperated in the World Bank/UNDP Sub-Saharan Africa Hydrological Assessment Project which focused on the state of hydrological services in that region.

At the regional level, support continued to be provided to the working groups on hydrology of the regional associations responsible for implementing HWRP. The six groups were composed of some 150 experts and 55 rapporteurs. One of many regional activities was a training seminar on secondary data processing for WMO members in South, North and Central America (Santo Domingo, Dominican Republic, 22-26 April) covering theory and practical applications. The seminar concluded by adopting a number of recommendations aimed at improving secondary data processing and analysis.

Under the aegis of the United Nations Inter-Agency Task Force for International Cooperation to Address and Mitigate the Consequences of the Accident at the Chernobyl Nuclear Power Plant (see PART THREE, Chapter III), established in March 1991, WMO continued to contribute to efforts on an international response system for nuclear accidents. In addition, WMO prepared an operational hydrology report, *Hydrological Aspects of Accidental Pollution of Water Bodies*, which provided guidance to hydrological services and water authorities on how to minimize the impact of accidental pollution.

Education and training

Three education and training meetings sponsored by WMO and hosted by the Atmospheric Environment Service took place at Toronto, Canada: a symposium on methods of meteorological education and training including the use of new relevant technologies (19-23 August); a meeting of directors or principals of Regional Meteorological Training Centres (RMTCS) (24 August); and the second meeting of the standing conference of heads of training institutions of national meteorological services (26 August).

The Executive Council Panel of Experts on Education and Training held its fourteenth session (Geneva, 9-13 December) and discussed many aspects of scientific and technical education and training in meteorology and operational hydrology.

Under fellowship funds from various sources administered by WMO in 1991, a total of 80 long-term and 228 short-term fellowships were awarded. Assistance was also provided to 708 participants in 26 training events organized by WMO in 23 different member countries. WMO also co-sponsored or jointly supported 26 training events which were organized by members or national institutions.

The WMO Training Library continued to strengthen and expand its holdings, mainly in the area of audiovisual training aids to meet the increasing needs of WMO members. The Library made available 211 videos and 43 slide sets, totalling more than 5,000 individual slides, in response to requests from members, training institutions and WMO/UNDP projects.

Technical cooperation

In 1991, under the WMO Technical Cooperation Programme, assistance was provided to some 130 WMO member countries at a value of \$32.5 million, financed from UNDP (48 per cent), the WMO Voluntary Cooperation Programme (24 per cent), trust funds (24 per cent) and WMO's regular budget (4 per cent).

Emergency assistance fund

The 1991 Congress decided to establish an emergency assistance fund—the WMO Natural Disaster Assistance Fund for Meteorological and Hydrological Services—to assist members in restoring their meteorological and hydrological observing networks, data-collection and processing facilities and international data exchange, in areas where natural disasters had destroyed or severely disabled the meteorological and/or hydrological infrastructure. The Executive Council established the rules and procedures for the operation of the Fund, as well as its financial rules.

Following the establishment of the Fund, Bangladesh requested help to restore its meteorological observing facilities that had been destroyed by a tropical cyclone in April 1991. China donated instruments for 10 synoptic stations and related telecommunication equipment, Finland provided funds for the re-establishment of an upper-air station and the United Kingdom made available surface weather observing instruments and telecommunication equipment.

Secretariat

As at 31 December 1991, the total number of full-time staff employed by WMO (excluding 20 professionals on technical assistance projects) on permanent and fixed-term contracts stood at 229. Of these, 107 were in the Professional and higher categories (drawn from 66 nationalities) and 122 in the General Service and related categories.

Budget

The year 1991 was the last year of the tenth financial period (1988-1991), for which the Tenth (1987) Congress of WMO had established a maximum expenditure of 170,000,000 Swiss francs (SwF). As at 31 December 1991, WMO's accumulated cash deficit amounted to SwF 1,781,678, which was SwF 7,940,672 less than the deficit carried forward from the ninth financial period (1984-1987). Of the assessed contributions totalling SwF 48,743,441 for the year, SwF 11,980,678 remained unpaid; total unpaid contributions due from members stood at SwF 16,322,541.

Regular budget expenditure during the 1990-1991 biennium was SwF 95,941,000. In addition, there were extrabudgetary activities in respect of technical cooperation projects. WMO also administered several trust funds and special accounts financed by various members and international organizations.

Annex I. MEMBERSHIP OF THE WORLD METEOROLOGICAL ORGANIZATION

(As at 31 December 1991)

Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Australia, Austria, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bolivia, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Costa Rica, Cote d'Ivoire, Cuba, Cyprus, Czechoslovakia, Democratic People's Republic of Korea, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Kuwait, Lao People's Democratic Republic, Lebanon, Lesotho, Liberia, Libyan Arab Jamahiriya, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Republic of Korea, Romania, Russian Federation, Rwanda, Saint Lucia, Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa,* Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United Republic of Tanzania, United States, Uruguay, Vanuatu, Venezuela, Viet Nam, Yemen, Yugoslavia, Zaire, Zambia, Zimbabwe.

*Suspended by the Seventh (1975) Congress from exercising the rights and privileges of a member.

Territories

British Caribbean Territories, French Polynesia, Hong Kong, Netherlands Antilles, New Caledonia.

Annex II. OFFICERS AND OFFICE OF THE WORLD METEOROLOGICAL ORGANIZATION

MEMBERS OF THE WMO EXECUTIVE COUNCIL

President: Zou Jingmeng (China).

First Vice-President: J. W. Zillman (Australia).

Second Vice-President: S. Alaimo (Argentina).

Third Vice-President: A. Lebeau (France).

Members: M. E. Abdalla (Sudan), J. A. Adejokun (Nigeria), A. A. Algain (Saudi Arabia), D. M. Bautista Pérez (Spain), W. Castro Wrede (Paraguay), A. Cissoko (Côte d'Ivoire), A. J. Dania (Netherlands Antilles), E. Dowdes-

well (Canada), E. Ekoko-Etoumann (Cameroon), F. Fantauzzo (Italy), H. M. Fijnaut (Netherlands), E. W. Friday (United States), J. T. Houghton (United Kingdom), Ju. A. Izrael (USSR), N. Kawas (Honduras), R. L. Kintanar (Philippines), S. M. Kulshrestha (India), J. Marques (Brazil), B. Mlenga (Malawi), E. A. Mukolwe (Kenya), A. M. Noorian (Iran), H. Reiser (Germany), J. Rugirangoga (Rwanda), R. Tatehira (Japan), H. Trabelsi (Tunisia), J. Zielinski (Poland).

NOTE: The Executive Council is composed of four elected officers, the six Presidents of the regional associations (see below), who are ex-officio members, and 26 elected members. Members serve in their personal capacities, not as representatives of Governments.

SENIOR MEMBERS OF THE WMO SECRETARIAT

Secretary-General: G. O. P. Obasi.

Deputy Secretary-General: D. N. Oxford.

Assistant Secretary-General: R. Czelnai.

Director, World Weather Watch Department: J. Rasmussen.

Director, Basic Systems: S. Mildner.

Director, World Climate Programme Department: P. Morel.

Director, World Climate Research Programme: V. Boldirev.

Director, Research and Development Programmes Department: J. P. Labrousse.

Director, Hydrology and Water Resources Department: F. Delsol.

Director, Hydrology and Water Resources: J. Rodda.

Director, Technical Cooperation Department: E. Jatila.

Director, Education and Training Department: G. V. Necco.

Director, Administration Department: J. K. Murithi.

Director, Languages, Publications and Conferences Department: A. W. Kabakibo.

Regional Director for Africa: S. Chacowry.

Regional Director for Asia and the South-West Pacific: T. Y. Ho.

Regional Director for the Americas: G. Lizano Vindas.

Special Assistant to the Secretary-General: R. A. de Guzman.

Executive Assistant to the Secretary-General: J. L. Breslin.

PRESIDENTS OF REGIONAL ASSOCIATIONS AND TECHNICAL COMMISSIONS

REGIONAL ASSOCIATIONS

I. Africa: K. Konare (Ethiopia).

II. Asia: I. Hussain Al-Majed (Qatar).

III. South America: J. I. Valencia Franco (Colombia).

IV. North and Central America: C. E. Berridge (British Caribbean Territories).

V. South-West Pacific: P. Lo Su Siew (Singapore).

VI. Europe: A. Grammeltdt (Norway).

TECHNICAL COMMISSIONS

Aeronautical Meteorology: C. H. Sprinkle (United States).

Agricultural Meteorology: C. J. Stigter (Netherlands).

Atmospheric Sciences: D. J. Gauntlett (Australia).

Basic Systems: A. A. Vasiliev (USSR).

Climatology: W. J. Maunder (New Zealand).

Hydrology: O. Starosolszky (Hungary).

Instruments and Methods of Observation: J. Kruus (Canada).

Marine Meteorology: R. J. Shearman (United Kingdom).

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