Chapter XIII

World Meteorological Organization (WMO)

In 1993, the World Meteorological Organization (WMO) continued its activities in accordance with the programmes and budget adopted in 1991 by the World Meteorological Congress for the period 1992-1995. The Congress meets once every four years, but the 36-member Executive Council meets annually to supervise the implementation of WMO's programmes and regulations. At its forty-fifth session (Geneva, 8-18 June 1993), the Council adopted policy and strategy principles for the fourth WMO long-term plan (1996-2005) to ensure that meteorology and operational hydrology contributed to sustainable development, the implementation of Agenda 21 of the 1992 United Nations Conference on Environment and Development (UNCED),[a] the 1992 United Nations Framework Convention on Climate Change[b] and the proposed international convention to combat desertification.[c] The Council approved the Guidelines on the Role of National Meteorological and Hydrological Services in the Implementation of Agenda 21 and the Framework Convention on Climate Change.

During the year, WMO continued to contribute to the International Decade for Natural Disaster Reduction (1990-2000) (IDNDR)[d] with activities focused on risk assessment and technology.

Nine States—the Czech Republic, Eritrea, Georgia, Kazakhstan, Slovakia, Tajikistan, the former Yugoslav Republic of Macedonia, Turkmenistan and Uzbekistan—acceded to the WMO Convention in 1993, bringing WMO's membership to 169 States and 5 Territories (see Annex I).

World Weather Watch

The World Weather Watch Programme (WWW), the core programme of WMO, continued to provide global observational data and processed information required by members for operational and research purposes. Its essential elements were the Global Observing System (GOS), which provided observational data for weather analysis, forecasts and warnings; 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 processed information available.

World Weather Watch implementation

GOS, the main source of observational data needed to prepare weather analysis, forecasts and warnings, included 9,800 land stations, 7,360 Voluntary Observing Ships, 620 active drifting buoys at sea, 3,000 aircraft, and a system of at least four polar-orbiting and five geo-stationary satellites. The space-based sub-system of GOS provided valuable and continuous operational satellite data. During the year, WMO extended its cooperative agreements with satellite projects in China, the European Community, India, Japan, the Russian Federation and the United States. The Commission for Basic Systems (CBS) Working Group on Observations, at its sixth session (Geneva, 17-21 May 1993) considered the introduction of new observing technologies such as the Automated Shipboard Aerological Programme, automated aircraft observing and reporting systems and wind-profilers, into GOS.

Satellite-based telecommunications played a central role at all levels of GTS. The data-collection and dissemination missions of meteorological satellites were of utmost importance in areas where commercial telecommunications could not provide member States with cost-effective services, such as those delivered by METEOSAT satellites over Africa. The new Regional Meteorological Telecommunication Network in Region IV (North and Central America) entered its implementation phase during the year and GDPS continued to expand its information processing services. The quality of warnings, forecasts and predictions improved through the introduction of more powerful computers and/or higher-resolution analysis and forecasting systems at GDPS centres. Efforts were made to enhance the parameterization of physical phenomena in numerical models and to define needs and specifications. Activities included the design of data-processing facilities for national meteorological centres to bridge the technology gap between GDPS centres in developing countries and those in more developed countries. WMO members were invited to state their requirements for numerical weather prediction (NWP) products at

[a] YUN 1992, p. 672.

[b] Ibid., p. 681.

[c] Ibid., p. 686.

[d] GA res. 44/236, 22 Dec. 1989.

the International Workshop on Users' Requirements (Montreal, Canada, 14-17 September) with the aim of improving the quality of warnings, forecasts and predictions. The CBS Working Group on Data Processing reviewed those requirements during its eighth session (Geneva, 15-19 November) with a view to establishing procedures for experimental distribution of those products. A training seminar on the use of NWP products from advanced GDPS centres was held at Toulouse, France (20-25 September).

Instruments and methods of observation

Data quality, the development of composite observing systems and long-term data homogeneity were major objectives of the Instruments and Methods of Observation Programme. Several instrument intercomparisons were started or completed in 1993. Among those completed were the seven-year WMO Solid Precipitation Measurement Intercomparison made in 13 countries, and the WMO Wind Instrument Intercomparison in France. Canada and France started the WMO Intercomparison of Present Weather Sensors/System during the year to provide better performance characteristics and to enhance the use of automatic weather stations.

Meetings held under the Programme included sessions of the Working Group on Surface Measurements (Reading, United Kingdom, 19-23 April) and the Working Group on Upper-air Measurements (Geneva, 10-14 May).

The WMO Radiosonde Intercomparisons which started in 1984 was completed in 1993. Reports of all trials and comparisons were published in the Instruments and Observing Methods Report series.

Tropical cyclones

In 1993, the Tropical Cyclone Programme focused mainly on the transfer of technology to developing countries. As follow-up to the 1990 Special Experiment Concerning Typhoon Recurvature and Unusual Movement (SPECTRUM), China, in cooperation with WMO, organized the Third Technical Conference on SPECTRUM (Shanghai, 25-29 October). Like its predecessors, the conference was designed to transfer research findings from SPECTRUM to meteorologists in the typhoon region. The Global Guide to Tropical Cyclone Forecasting was released during the third international workshop on tropical cyclones (Santa Cruz, Mexico, November/December). The publication provided meteorologists and training institutions with the most up-to-date technique for forecasting tropical cyclones.

World Climate Programme

The World Climate Programme (WCP) consisted of the World Climate Data and Monitoring Programme (WCDMP), the World Climate Applications and Services Programme (WCASP), the World Climate Impact Assessment and Response Strategies Programme (WCIRP) and the World Climate Research Programme (WCRP).

The Intergovernmental Meeting on WCP (Geneva, 14-16 April), convened by WMO and cosponsored by the United Nations Environment Programme (UNEP), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Intergovernmental Oceanographic Commission (IOC), the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the International Council of Scientific Unions (ICSU), adopted guidelines for national and international climatological activities.

The Commission for Climatology (CC1) had the lead role in implementing the WCDMP and WCASP. The eleventh session of CC1 (Havana, Cuba, 15-26 February) emphasized members' responsibility for processing climate data and for submitting it to international centres and archives. WCDMP continued to expand its capacity to help member States and to improve the availability of timely climate data for research, climate change detection, impact assessment and other applications. New Climate Computing (CLICOM) software and manuals were distributed to more than 80 members and international organizations during the year. New CLICOM training tutorials were near completion and CLICOM training seminars were organized in a number of countries.

The Data Rescue in Regional Association I (Africa) (DARE) project was operational in 28 African countries in 1993. UNEP provided funding for equipment and the International Data Rescue Coordination Centre (IDCC) (Brussels), operated by the Royal Meteorological Institute of Belgium, provided training in data management. There were more than 1,300 DARE I microfilms in the IDCC inventory at the end of the year. An expert meeting on Data Rescue in Regional Association IV (North and Central America) (DARE IV) (Barbados, August) developed plans to rescue climate data in the Caribbean.

The WMO Technical Conference on Tropical Urban Climates (Dhaka, Bangladesh, 28 March-2 April) was held in cooperation with the International Council for Building Research, Studies and Documentation, the International Federation for Housing and Planning, the International Geographical Union, UNEP and the World Health Organization. The conference recommended activities to reinforce the Tropical Urban Climate Experiment, and follow-up to the Second World Climate Conference and the sustainable development agenda of UNCED.

WMO continued its collaboration with other organizations, especially in assessing the impact of

energy production and use on climate. Activities included the International Atomic Energy Agency-initiated joint project on databases and methodologies for the comparative assessment of energy sources for electricity generation, the energy efficiency 2000 project coordinated by the United Nations Economic Commission for Europe and the global energy efficiency 21 project.

World Climate Research Programme

WCRP, undertaken jointly by WMO, IOC/UNESCO and ICSU, continued to organize research into the basic physical processes that determine the Earth's climate, including the refinement of models to quantify changes related to the buildup of greenhouse gases in the atmosphere.

The Global Energy and Water Cycle Experiment (GEWEX) Scientific Steering Group held its sixth session at San Diego, United States, from 1 to 5 February. Its first major field experiment was the GEWEX Continental-Scale International Project to study the energy budget and hydrological cycle of the Mississippi river basin. Proposals for similar large-scale studies were also under consideration for the catchments of rivers flowing into the Baltic Sea, the Amazon basin, several Arctic river basins, and the region influenced by the Asian monsoon.

The highlight of the Tropical Ocean and Global Atmosphere Programme during 1993 was the successful completion in February of the intensive observing period of the Coupled Ocean-Atmosphere Response Experiment (COARE) above the warm water pool in the western tropical Pacific. COARE, the largest atmospheric and oceanic field study carried out in the tropical zone since 1974, involved some 11,000 atmospheric soundings, 700 days of ship observations, 45 aircraft missions, continuous profiles of wind and temperature from four sites, and the measurement of oceanic temperature, salinity and currents from 20 moorings. A broad spectrum of atmospheric weather conditions was observed, including the behaviour of convective systems and their interaction with the ocean.

The World Ocean Circulation Experiment (WOCE), to observe global oceanic circulation at all depths during the period 1990-1997, peaked during 1993. Of the 62 hydrographic sections planned, almost half had been surveyed at least partially and 10 were completed. The successful launching of the United States-French TOPEX/POSEIDON satellite was a milestone for WOCE. The satellite's altimeter instruments provided the most accurate measurements to date of changes in global sea level.

Progress was made during the year with the Arctic Climate System Study (ACSYS) to investigate Arctic Ocean circulation and its impact on global climate. The second session of the ACSYS Scientific Steering Group was held at Hamburg, Germany (4-8 October). In the Antarctic, WCRP initiatives led to the launching of the International Programme for Antarctic Buoys, an activity to measure surface air pressure, air temperature and buoy position over an area of the southern ocean and Antarctic marginal seas.

The Atmospheric Model Intercomparison Project was conducted under WCRP auspices by the United States Department of Energy's Programme for Climate Model Diagnosis and Intercomparison. By the end of 1993, 30 groups from around the world had completed simulations of the ten-year period (1979-1988) under specified standard conditions. A range of diagnostic projects examined the ability of the current generation of atmospheric models to represent mean climate and a wide variety of climate statistics on global and regional scales.

Other meetings under the WCRP included the fifth session of the Working Group on Radiative Fluxes (San Diego, 8-12 February) and the fourteenth session of the Joint Scientific Committee for WCRP (Hamilton, Bermuda, 15-20 March).

Atmospheric research and environment

A total of 33 meetings and training courses were organized under WMO's Atmospheric Research and Environment Programme in 1993. They included the Fourth International Conference on Southern Hemisphere Meteorolgy and Oceanography (Hobart, Australia, 29 March-2 April); the WMO consultation of experts to complete the assessment of world-wide atmospheric acid deposition (Egbert, Canada, 1-5 June); the fifth meeting of the Steering Committee for Long-term Asian/African Monsoon Studies (Yokohama, Japan, 20 and 21 July); the WMO Meeting of Experts on CO_2 Measurements (Rome, Italy, 7-10 September); the International Conference on CO_2 Measurements and Analysis (Carqueiranne, France, 13-17 September); a training course on weather forecasting (Nanjing, China, 20 September-15 October); a training workshop on background atmospheric composition monitoring for the Global Atmospheric Watch (GAW) (Halkidiki, Greece, 11-15 October); and a training course on background atmospheric composition measurements (Budapest, Hungary, 1-27 November).

During the year, new GAW global observatories were established in Algeria, Argentina, Brazil, China, Indonesia and Kenya, and stations in the Global Ozone Observing System continued to provide near-real time data for WMO's periodic bulletins on the state of the Antarctic Layer during the austral spring period.

Several member States focused on the development or improvement of monthly, seasonal, and

other long-period weather forecasts. The western Pacific workshop on seasonal to interannual climate variability (Melbourne, Australia, June) noted promising preliminary experiments for tropical regions that suggested the potential for improved coupled ocean-atmosphere models to capture phenomena such as the El Niño/Southern Oscillation (ENSO), which could lead to useful seasonal or even longer-term forecasts.

The Register of National Weather Modification Projects for 1991, the Proceedings of the WMO Workshop on Cloud Microphysics and Applications to Global Change and the Report of the Third International Cloud Modelling Workshop were published in 1993.

Applications of meteorology

Agricultural meteorology

The Advisory Working Group of the Commission for Agricultural Meteorology (CAgM) (Geneva, 6-10 September) reviewed the draft text of the Fourth Long-term Plan, approved the agenda for the eleventh session of CAgM and made recommendations on scientific lectures to be organized for the session. Scientists from meteorological, agricultural and water resources services attended workshops jointly organized by WMO and FAO on the use of agrometeorological data for effective irrigated crop production, and training in the use of the Interactive Statistics Package was provided to participants from 18 countries in Central and North America.

A joint meeting of Regional Associations III (South America) and IV (North and Central America) Working Groups on Agricultural Meteorology (Guatemala, 8-12 February) discussed the preparation of reports on the agrometeorology of sweet potatoes, oil palm, cocoa beans, date palm, coconut palms and forage maize. Among other items covered were the protection of crops from frost, pests and diseases; the requirements for biological data and the establishment of databanks; crop water requirements for rain-fed and irrigated crops; meteorological inputs to an early warning system on agricultural production; and the effects of meteorological phenomena such as El Niño and global warming on agricultural productivity. A meeting of the Regional Association V (South-West Pacific) Working Group on Agrometeorology (Quezon City, Philippines, 16-19 March) considered problems identified by members, and the impact of ENSO. Subjects recommended for further study included the organization of national services; studies on the agrometeorology of avocado, pineapple, mango and grapefruit; crop protection and production; the impact of tropical cyclones; agrometeorological data management; national drought plans; early warning systems; and training.

An illustrated manual on locusts and codes for transmitting pest data was published in Arabic, English and French and sent to observing stations in all countries affected by locusts.

Aeronautical meteorology

The worldwide implementation of new aeronautical meteorological codes began on 1 July, bringing to fruition years of cooperation between WMO, the International Civil Aviation Organization (ICAO) and user organizations. The new codes followed far-reaching amendments to standards and recommended practices for meteorological reports and forecasts for aviation.

Implementation of the codes required extensive training and WMO organized several training events, including regional training seminars for English-speaking countries in Central America and the Caribbean (Barbados, 4-7 May); for Spanish-speaking countries in Latin America (Bogotá, Colombia, 10-13 May); and for personnel in 15 French-speaking countries in Africa (Niamey, Niger). WMO personnel participated in ICAO regional seminars on the new codes in Nairobi, Kenya, and Cairo, Egypt, in June.

The planned satellite broadcasting of data from Washington and London over the World Area Forecast System (WAFS) also progressed in 1993. Satellite distribution of WAFS data from both cities was expected to begin in 1994.

Marine meteorology

At its eleventh session (Lisbon, Portugal, 19-30 April), the Commission for Marine Meteorology reviewed the main achievements of its programme, including implementation of the new WMO marine broadcast system under the International Maritime Organization (IMO) Global Maritime Distress and Safety System. The Commission also discussed a restructuring of the WMO Marine Climatological Summaries Scheme.

A WMO/IOC Technical Conference on Space-based Ocean Observation (Bergen, Norway, 6-10 September) provided a forum for users and potential users of data and the agencies designing and operating the satellites to exchange information.

Data from in-situ platforms and Voluntary Observing Ships (VOS) in particular, continued to provide essential ground-truthing for satellite observations and real-time reports for immediate use.

The key link between national meteorological services and VOS was provided by the international network of Port Meteorological Officers (PMOs). WMO organized an international seminar/workshop (London, 20-25 September) for about 50 PMOs from 30 countries, to enhance international coordination among the officers and educate them in current shipping

practices, observing requirements and facilities and communications.

Public weather services

A team of experts from five countries was enlisted to prepare initial public weather services programme plans embracing: the content of forecasts and warnings; presentation and dissemination techniques, public information and education; and the exchange and coordination of hazardous weather information between neighbouring countries.

Hydrology and water resources

The first World Water Day was celebrated on 22 March to increase awareness of the need for better management of the world's water resources. Among the problems identified were: increasing water scarcity, water-borne diseases, pollution, flooding, droughts and conflicts in international river basins. The event coincided with the fourth joint UNESCO/WMO/ICSU International Conference on Hydrology Towards the 21st Century: Research and Operational Needs (Paris, 22-26 March). The Conference, which made recommendations in the areas of hydrological research, operational hydrology, interdisciplinary studies and capacity building, followed up on discussions at the ninth session of the Commission of Hydrology (Geneva, 5-15 January). The Geneva session reviewed the Hydrology and Water Resources Programme, planned activities for the next four years and made proposals for the WMO Fourth Long-term Plan. On the Commission's recommendation, WMO intensified its activities in water quality monitoring. It placed more emphasis on technical assistance in water quality assessment and management and initiated regional training workshops on water quality monitoring. A workshop on water quality on small islands was organized for Caribbean countries at St. Joseph, Trinidad and Tobago, in July.

WMO completed a UNDP-funded project to strengthen the overall capacity of the Water Resources Bureau of Papua New Guinea. The project trained personnel, set up computerized databases for water quantity and quality, undertook watershed management studies to evaluate land use and the impact of pollution from mining, and installed a pilot satellite-based telemetry station.

Meetings held under the Hydrology and Water Resources Programme included an international workshop on sea-level changes and their consequences for hydrology and water resources (Noordwijkerhout, Netherlands, 19-23 April); a workshop on global environmental change and land surface processes in hydrology, which discussed modelling and measuring problems (Tucson, United States, 17-21 May); a conference on water and environment issues (Delft, Netherlands, 3 and 4 June); and an international symposium on precipitation and evaporation (Bratislava, Slovakia, 20-24 September).

Education and training

During the year, instructors under WMO's Education and Training Programme participated in the second meeting of the Working Group on Distance and Computer-aided Learning (Boulder, United States, 10 July); the third meeting of the Standing Conference of Heads of Training Institutions of National Meteorological Services (Boulder, 11 and 12 July); and the First International Conference on Computer-aided Learning and Distance Learning in Meteorology, Hydrology and Oceanography (Boulder, 5-9 July). The Korean Meteorological Administration hosted a regional training seminar for national instructors (Seoul, 6-17 December) and the Third International Conference on School and Popular Meteorological and Oceanographic Education was held at Toronto, Canada, from 14 to 18 July.

Some 536 persons participated in 24 training events organized by WMO in 22 countries during 1993. The Organization also co-sponsored or supported 30 training events organized by members or by national institutions. The number of the WMO Regional Meteorological Training Centres (RMTCs) increased to 19 with the addition of the Nanjing Institute of Meteorology for Class I Training in Chinese and English and the Advanced Meteorological Sciences Training Centre of the Iran Meteorological Organization in Tehran for Class I, II, III and IV Training in Farsi and English. The RMTC global network trained more than 3,000 students during the 1992-1993 biennium.

Drawing on funds from various sources, WMO awarded 32 long-term and 147 short-term fellowships. The WMO Training Library continued to strengthen and expand its holdings of audiovisual training and computer-assisted learning materials to meet the increasing needs of WMO members.

Technical cooperation

In 1993, countries received technical assistance valued at $26.3 million, financed by UNDP (27.8 per cent), the WMO Voluntary Cooperation Programme (VCP) (29.2 per cent), trust funds (38.3 per cent) and the WMO regular budget (4.7 per cent). Donors contributed some $7 million to VCP, while member States provided equipment, expert services and fellowships. Some 80 countries received support for 141 VCP projects, 69 of which were completed in 1993. Eighty-one countries received assistance totalling $1.23 million from the regular budget.

The resource mobilization unit of the WMO secretariat became operational on 1 March. It

initiated negotiations with major financial institutions, transnational companies, large consulting engineering firms and others, for financial support for technical cooperation projects.

Secretariat

As at 31 December 1993, the total number of full-time staff employed by WMO (excluding 26 professionals on technical assistance projects) on permanent and fixed-term contracts stood at 289. Of these, 134 were in the Professional and higher categories (drawn from 52 nationalities) and 155 in the General Service and related categories.

Budget

The year 1993 was the second year of the eleventh financial period (1992-1995), for which the 1991 WMO Congress had established a maximum expenditure of 236,100,000 Swiss francs (SwF). The budget was based on zero real growth in programmes, but for the first time, the Congress made provision for cost increases due to inflation. This afforded more stable purchasing power for programmes. Of the assessed contributions totalling SwF 55,943,762 for the year, SwF 12,069,882 remained unpaid. Total unpaid contributions due from members stood at SwF 17,634,766.

The approved regular budget for the 1992-1993 biennium was SwF 112,010,000. The accumulated cash surplus for the biennium was SwF 3.3 million. In addition to regular budget expenditure, there were extra-budgetary activities in technical cooperation projects. WMO also administered several trust funds and special accounts financed by various members and international organizations.

NOTE: For further details on WMO activities, see the World Meteorological Organization Annual Report, 1993, published by the agency.

Annex I. MEMBERSHIP OF THE WORLD METEOROLOGICAL ORGANIZATION
(As at 31 December 1993)

Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, 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, Côte d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic, Democratic People's Republic of Korea, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Lao People's Democratic Republic, Latvia, Lebanon, Lesotho, Liberia, Libyan Arab Jamahiriya, Lithuania, 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, Slovakia, Slovenia, Solomon Islands, Somalia, South Africa,* Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Thailand, the former Yugoslav Republic of Macedonia, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United Republic of Tanzania, United States, Uruguay, Uzbekistan, Vanuatu, Venezuela, Viet Nam, Yemen, Yugoslavia, † Zaire, Zambia, Zimbabwe.

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

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

†Refers to the former Socialist Federal Republic of Yugoslavia. The WMO governing body took no legislative action in 1993 on the membership status of the former Yugoslavia.

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), A. A. Algain (Saudi Arabia), I. H. Al-Majed (Qatar) (acting), M. Bautista Pérez (Spain), A. Bedritsky (Russian Federation) (acting), A. Cissoko (Côte d'Ivoire), A. J. Dania (Netherlands Antilles), D.K. Dawson (Canada) (acting), E. Ekoko-Etoumann (Cameroon), G. Faraco (Italy) (acting), H. M. Fijnaut (Netherlands), E. W. Friday (United States), J. Hunt (United Kingdom) (acting), R. L. Kintanar (Philippines), J. C. de Jesus Marques (Brazil), B. Mlenga (Malawi), T. Mohr (Germany) (acting), E. A. Mukolwe (Kenya), L. Ndorimana (Burundi) (acting), K. Ninomiya (Japan) (acting), N. Sen Roy (India) (acting), 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. As at 31 December 1993, three seats in the Executive Council were vacant.

SENIOR MEMBERS OF THE WMO SECRETARIAT

Secretary-General: G. O. P. Obasi.
Deputy Secretary-General: D. N. Axford.
Assistant Secretary-General: A. S. Zaitsev.
Director, World Weather Watch Department: J Rasmussen.
Director, Basic Systems: D. C. Schiessl.
Director, World Climate Programme Department: V. Boldirev.
Director, Joint Planning Staff for the World Climate Research Programme: P. Morel.
Director, Joint Planning Staff for the Global Climate Observing System: T. W. Spence.
Director, Atmospheric Research and Environment Programme Department: F. Delsol.
Director, Hydrology and Water Resources Department: J. Rodda.
Director, Technical Cooperation Department: R. A. de Guzman.
Director, Education and Training Department: G. Necco.
Director, Administration Department: J. K. Murithi.
Director, Languages, Publications and Conferences Department: A. W. Kabakibo.
Regional Director for Africa: W. Degefu.
Regional Director for the Americas: G. Lizano.
Regional Director for Asia and the South-West Pacific: T. Y. Ho.
Special Assistant to the Secretary-General: S. Chacowry.
Secretary, Intergovernmental Panel on Climate Change: N. Sundararaman.
Acting Director, Intergovernmental Negotiating Committee for a Framework Convention on Climate Change: J. L. Breslin.

PRESIDENTS OF REGIONAL ASSOCIATIONS AND TECHNICAL COMMISSIONS

REGIONAL ASSOCIATIONS

I. Africa: K. Konaré (Mali).
II. Asia: H. A. Taravat (Iran).
III. South America: W. Castro Wrede (Paraguay)
IV. North and Central America: N. Kawas (Honduras).
V. South-West Pacific: S. Karjoto (Indonesia) (acting).
VI. Europe: A. Grammeltvedt (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 (Russian Federation).
Climatology: W. J. Maunder (New Zealand).
Hydrology: K. Hofius (Germany).
Instruments and Methods of Observation: J. Kruus (Canada).
Marine Meteorology: R. J. Shearman (United Kingdom).

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