

# Commission for Agricultural Meteorology

Abridged Final Report of the Seventeenth Session

Incheon, Republic of Korea

18–20 April 2018



WORLD  
METEOROLOGICAL  
ORGANIZATION



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Chairperson, Publications Board  
World Meteorological Organization (WMO)  
7 bis, avenue de la Paix  
P.O. Box 2300  
CH-1211 Geneva 2, Switzerland

Tel.: +41 (0) 22 730 84 03  
Fax: +41 (0) 22 730 81 17  
Email: [publications@wmo.int](mailto:publications@wmo.int)

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This report contains the text as adopted by Plenary and has been issued without formal editing. Acronyms used in this report may be found in METEOTERM, the WMO terminology database, at <http://public.wmo.int/en/resources/meteoterm>.

# CONTENTS

Page

<b>GENERAL SUMMARY OF THE WORK OF THE SESSION.....</b>	<b>1</b>
<b>APPENDIX 1. AGENDA .....</b>	<b>3</b>
<b>APPENDIX 2. RESOLUTIONS ADOPTED BY THE SESSION.....</b>	<b>4</b>
1 Outputs of the intersessional period (2014–2018) .....	4
2 Gender equality and empowerment of women .....	7
3 Review of previous resolutions and recommendations of the Commission for Agricultural Meteorology .....	9
4 Priorities (2018–2022) of the Commission for Agricultural Meteorology .....	9
5 Commission for Agricultural Meteorology contributions to other World Meteorological Organization activities .....	11
6 Focus areas .....	13
7 Commission for Agricultural Meteorology Management Group .....	15
8 Working structure of the Commission for Agricultural Meteorology .....	18
<b>APPENDIX 3. DECISIONS ADOPTED BY THE SESSION .....</b>	<b>25</b>
1 Organization of the session .....	25
2 Composition and terms of reference for the Selection Committee. ....	25
<b>APPENDIX 4. RECOMMENDATIONS ADOPTED BY THE SESSION .....</b>	<b>27</b>
1 Drought and desertification .....	27
2 Status and progress made in agricultural meteorology .....	30
3 Training and education in agricultural meteorology .....	30
4 Review of relevant resolutions of the World Meteorological Organization governing bodies .	33
5 Continuation and strengthening of the work of the Commission for Agricultural Meteorology	33
<b>APPENDIX 5. LIST OF PARTICIPANTS .....</b>	<b>35</b>
<b>BACKGROUND INFORMATION SUPPORTING THE WORK OF THE SESSION (PART II TO THE PRESENT REPORT)</b>	



## GENERAL SUMMARY OF THE WORK OF THE SESSION

1. The president of the Commission for Agricultural Meteorology (CAgM), Dr Byong-Lyol Lee, opened the seventeenth session of CAgM on 18 April 2018 at 9.30 a.m. in Incheon, Republic of Korea. He welcomed the participants to the Republic of Korea and expressed his pleasure in addressing the seventeenth session of CAgM. He mentioned that the Commission has a vision and mission to provide scientific and technological guidance to the Members in the sectors of agriculture, forestry, livestock and fisheries, not only for food production but also for agricultural meteorological risk governance in terms of agro-ecosystem resilience and sustainability, especially with higher priorities on climate services and capacity development. He noted that CAgM is distinct from other WMO technical commissions since it has a multidisciplinary character that requires close collaborations with non-meteorological institutions and organizations at national and global levels through harmonized partnerships. Also, more emphasis has been given to assist developing countries while encouraging developed countries to strengthen existing activities in the field of agricultural meteorology.

He stated that the pending issues for CAgM are how to secure resources, including future experts, at national and global levels; how to strengthen coordination mechanisms among international institutions; how to develop technological innovations for better use of numerical weather prediction output (S2S) and how to secure supporting infrastructures. He stated that a priority for CAgM has been to provide full support to the implementation of the Global Framework for Climate Services (GFCS), and in the previous intersessional period of CAgM there were many activities that could be related to the GFCS pillars. He expressed his sincere thanks to all the Commission members for their contributions and recognized the various CAgM experts who passed away in recent years. He wished the participants a pleasant stay in the Republic of Korea.

Dr Jaecheol Nam, Administrator of the Korea Meteorological Administration (KMA) and Permanent Representative of the Republic of Korea with WMO, welcomed participants on behalf of the Government of the Republic of Korea. He stated that he was confident that CAgM was taking active measures against the various natural disasters and offering a variety of data, information and relevant products to those in need to make the necessary decisions on time. He stated that KMA was willing to support developing countries in terms of the development of the operational technologies in the field of agricultural meteorology and capacity development through expert exchange and training programmes by taking advantage of Regional Training Centre–Seoul. He wished all of the participants an enjoyable and memorable time during the entire session. He thanked the WMO Secretariat and expressed his gratitude to all the KMA staff members of the local organizing committee for their efforts to organize this important meeting.

Professor Petteri Taalas, Secretary-General of WMO, presented his personal appreciation and that of WMO to the Government of the Republic of Korea for hosting this session along with the Technical Conference on Future Challenges and Opportunities in Agricultural Meteorology. He thanked the president of the Commission, Dr Byong Lee, and the vice-president, Dr Federica Rossi, for their able leadership in guiding the Commission over the past eight years. He stated that the field of agricultural meteorology offered practical solutions by integrating the study of direct and indirect weather and climate impacts on agriculture production including crops, forests, livestock and fisheries. He noted that CAgM had been active since 1953 and that in the predecessor of WMO, the International Meteorology Organization, the Commission for Agricultural Meteorology had been established in 1913. He wished all the participants the very best in their deliberations and an enjoyable stay in Incheon.

Dr Hoesung Lee, Chair of the Intergovernmental Panel of Climate Change, welcomed participants and said he was honoured to be at the opening of the seventeenth session of CAgM. He mentioned that the demand for agricultural land would compete against the demand for land required to meet the net zero greenhouse gas (GHGs) emissions goal, and that the demand for more forest areas and more land areas needed for bioenergy crops would increase. Agricultural productivity would thus play a crucial role in the pathways to the transition to the net zero GHGs world. Therefore, the study and review by CAgM of the science and technology to provide guidance for agricultural meteorology would be more important than ever. He added that the role of CAgM as a scientific body to contribute to the twin objectives of ensuring food

security and enhancing the capacity of agriculture for adaptation and mitigation was enormous and crucial. He expressed his wish that the CAgM session would be productive and hoped that participants enjoyed their stay in the Republic of Korea.

Mr Jeong-bok Yoo, Mayor of Incheon Metropolitan City, warmly welcomed all participants to Incheon. He mentioned that it was his honour to host the seventeenth session of CAgM. He stated that Incheon was the headquarters of the Green Climate Fund and that the city was evolving into a global climate city and pursuing low emissions and climate resilience. He expressed his hope that Incheon would provide a valuable platform for climate change discussions as well as for the CAgM agenda of agricultural meteorology programmes, capacity-building, cooperation with other international organizations, experts' activities, a future work programme and organizational structure. He wished all participants health and happiness.

2. The agenda of the session is provided in [Appendix 1](#).
  3. The session adopted eight resolutions, given in [Appendix 2](#), two decisions, given in [Appendix 3](#) and five recommendations, given in [Appendix 4](#).
  4. The Commission elected Mr Roger Stone (Australia) as president and Mr Orivaldo Brunini (Brazil) as vice-president.
  5. The list of participants is given in [Appendix 5](#). Out of a total of 150 participants, 55 were women, that is 37%.
  6. The Commission decided that its eighteenth session would be held in 2022.
  7. The seventeenth session of CAgM closed at noon on 20 April 2018.
-



## **APPENDIX 1. AGENDA**

### **1. ORGANIZATION OF THE SESSION**

- 1.1 Opening of the session
- 1.2 Consideration of the report on credentials
- 1.3 Adoption of the agenda
- 1.4 Establishment of committees
- 1.5 Other organizational matters
- 1.6 Date and place of the eighteenth session
- 1.7 Closure of the session

### **2. REPORT OF THE PRESIDENT OF THE COMMISSION AND REVIEW OF PREVIOUS DECISIONS AND RESOLUTIONS**

- 2.1 Report of the president of the Commission
- 2.2 Review of decisions and resolutions

### **3. STRATEGIC CONTEXT**

- 3.1 Commission for Agricultural Meteorology priority areas
- 3.2 Relationship with other WMO activities

### **4. WORK PLAN AND STRUCTURE**

- 4.1 Focus areas
- 4.2 Management Group
- 4.3 Capacity structure and deliverables

### **5. ELECTION OF OFFICERS**

### **6. ANY OTHER MATTERS**

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## APPENDIX 2. RESOLUTIONS ADOPTED BY THE SESSION

### Resolution 1 (CAgM-17)

#### Outputs of the intersessional period (2014–2018)

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Recalling** [Resolution 4 \(CAgM-16\)](#) – Working structure of the Commission for Agricultural Meteorology, including:

- (1) Annex 2 – Terms of reference of the OPCAME Chairpersons and Co-chairpersons,
- (2) Annex 3 – Components of the work programme of the Commission for Agricultural Meteorology for the sixteenth intersessional period,

**Noting:**

- (1) WMO Regulation 186 on the duties of a president of a WMO technical commission,
- (2) The summary of activities in agricultural meteorology (2014–2018), as contained in the annex to the present resolution,

**Noting with satisfaction:**

- (1) The extensive work of the four focus areas, expert teams and task teams,
- (2) The voluntary contributions of time and effort of all the experts in the areas of their expertise and knowledge,

**Noting with appreciation:**

- (1) Members' facilitation of the active participation of their experts in Commission for Agricultural Meteorology (CAgM) activities,
- (2) Enhanced partnership and collaboration with other bodies and programmes, such as through the mechanism for WMO contributions to the Global Framework for Climate Services, contributing to increased synergy and improved delivery of guidance and support to Members,
- (3) The financial support of the Korea Meteorological Administration to organize and host the [International Workshop on Agromet and GIS Applications for Agricultural Decision-making](#) in 2016,

**Having examined** the World Meteorological Congress and Executive Council decisions relevant to the work of CAgM,

**Having considered** the guidelines, publications, videos and other resources developed and issued under the auspices of CAgM during the sixteenth intersessional period, as listed in the annex to the present resolution, which effectively consolidate the volume of work done by the Commission,

**Having been informed** of the activities of the four CAgM focus areas,

**Expressing appreciation** for the dedicated efforts of the president, vice-president, focus areas chairpersons, leads and members of expert teams, and task teams supporting the working structure of the Commission, with respect to their individual contributions as well as collective achievements as manifested in the outputs of the work of the Commission,

**Satisfied** with the accomplishments of the various teams, including many publications and guidelines, and that much of the work was well documented, including through peer-reviewed literature,

**Decides** to adopt the summary of activities in agricultural meteorology (2014–2018) in the annex to the present resolution submitted to CAgM-17 for inclusion in the final report;

**Requests** the Secretary-General to support wider dissemination and uptake of the CAgM outputs, which are fundamental contributions to the ability of WMO to provide high-quality technical and scientific support on agricultural meteorological matters to Members.

### **Annex to Resolution 1 (CAgM-17)**

#### **List of handbooks and other publications of the Commission for Agricultural Meteorology during the sixteenth intersessional period**

##### **WMO Publications:**

- (1) [Handbook of Drought Indicators and Indices](#) (WMO-No. 1173, 2016)
- (2) [Weather and Desert Locusts](#) (WMO-No. 1175, 2016)
- (3) [Benefits of action and costs of inaction: Drought mitigation and preparedness](#) – a literature review (N. Gerber and A. Mirzabaev). Integrated Drought Management Programme (IDMP) Working Paper 1. 2017. WMO and GWP
- (4) [Synthesis Report on Capacity Development to Support National Drought Policies](#) (2015, WMO, FAO, UNCCD, CBD, UNW-DPC)
- (5) [Proceedings of the Regional Workshop on Capacity Development to Support National Drought Management Policies for Asia-Pacific Countries](#) (2015, WMO, FAO, UNCCD, CBD, UNW-DPC)
- (6) [Proceedings of the Regional Workshops on Capacity Development to Support National Drought Management Policies for Eastern and Southern Africa and the Near East and North Africa Regions](#) (2015, WMO, FAO, UNCCD, CBD, UNW-DPC)
- (7) [Summary Report on Regional Workshop on Capacity Development to Support National Drought Management Policies for West and Central Africa](#) (2015, WMO, FAO, UNCCD, CBD, UNW-DPC)
- (8) [National Drought Management Policy Guidelines: A Template for Action](#) (D.A. Wilhite). Integrated Drought Management Programme (IDMP) Tools and Guidelines Series 1. WMO and GWP (WMO-No. 1164, 2014)
- (9) Responses to the Questionnaire on Climate Services for Agriculture in Regional Association V (South-West Pacific) (CAgM-No. 105 – draft)
- (10) Evaluation Report of METAGRI Operational Project (2012–2015) (CAgM-No. 106 – draft)
- (11) Weather and Climate Services' for Farmers – Impact assessment (CAgM-No. 107 – draft)
- (12) Summary of Workshop on Agrometeorologists for farmers in hotter, drier, wetter future (CAgM-No. 108 – draft)

- (13) Report on Simple Raingauge Comparisons (CAgM-No. 109 – draft)
- (14) Operational Agricultural Advisory Systems in the World (in preparation)

### **Other WMO Reports:**

- (1) [Handbook on Livestock Poultry Inland Fisheries](#) (draft)
- (2) [Fire Danger Rating Handbook](#) (draft)
- (3) [Synthesis report on Weather, Climate and Fisheries](#) (draft)
- (4) [Tutorial on Dynamical Downscaling](#)
- (5) [Tutorial on Statistical Downscaling](#)
- (6) [Tutorial on QGIS for Agromet](#)
- (7) [Report on Drought](#) (draft)
- (8) [Report on Agricultural decision-support and Extension Services on Climate Extremes](#) (draft)
- (9) [Report on Weather and Climate Extremes and Agricultural Industry Needs](#) (draft)
- (10) [Report on Capacity-building](#) (draft)
- (11) [Report on Education and Training in Agromet](#) (draft)

### **Articles in Peer-reviewed Journals**

- (1) [Downscaling of Surface Soil Moisture Retrieval by Combining MODIS/Landsat and In Situ Measurements](#) (Remote Sensing, 2018)
- (2) Integrated Drought Management Initiatives. In [Drought and Water Crises: Integrating Science, Management, and Policy](#) (2018)
- (3) The High-Level Meeting on National Drought Policy: A Summary of Outcomes. In [Drought and Water Crises: Integrating Science, Management, and Policy](#) (2018)
- (4) National Drought Management Policy Guidelines: A Template for Action. In [Drought and Water Crises: Integrating Science, Management, and Policy](#) (2018)
- (5) Benefits of Action and Costs of Inaction: Drought Mitigation and Preparedness. A Literature Review. In [Drought and Water Crises: Integrating Science, Management, and Policy](#) (2018)
- (6) Handbook of Drought Indicators and Indices. In [Drought and Water Crises: Integrating Science, Management, and Policy](#) (2018)
- (7) Agrometeorological Services for smallholder farmers in West Africa (Special Issue: 17th EMS Annual Meeting: European Conference for Applied Meteorology and Climatology, 2017)
- (8) [Drought management policies – from global collaboration to national action](#) (Water Policy, 2016)
- (9) [High Level Meeting on National Drought Policy: Summary and Major Outcomes](#) (Weather and Climate Extremes, 2014)

**Videos:**

- (1) [Empowering Farmers](#) – METAGRI Project Video 2017
- (2) [How to Conduct a Roving Seminar](#) (English) – METAGRI Project Video
- (3) [Bien préparer et conduire un séminaire intéressant](#) (French) – vidéo de projet METAGRI
- (4) [General Summary on Climate Field Schools](#) (BMKG/WMO)
- (5) [Lesson and Group Exercise on Rain Formation](#) (BMKG/WMO)
- (6) [Extreme Climate and Farmer Decision Game](#) (BMKG/WMO)
- (7) [Lesson and Group Exercise on Cloud Formation](#) (BMKG/WMO)
- (8) [Overview of Drought](#)

**Web Portals and Online Support Material:**

- (1) World Agrometeorological Information Service ([www.wamis.org](http://www.wamis.org))
- (2) South Africa Soil Moisture (<http://wamis.gmu.edu/Africa/about/>)
- (3) WAMIS DCPC (<http://dcpc.wamis.kma.go.kr/openwis-user-portal/srv/en/main.home>)
- (4) Integrated Drought Management HelpDesk (<http://www.droughtmanagement.info>)

Other related outputs can be found at the [CAgM-17 website](#).

**Resolution 2 (CAgM-17)****Gender equality and empowerment of women**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Recalling:**

- (1) [Resolution 59 \(Cg-17\)](#) – Gender equality and empowerment of women, and its annex – WMO Gender Equality Policy,
- (2) [Decision 77 \(EC-68\)](#) – WMO Gender Action Plan,

**Acknowledging** the outcomes of the [Conference on the Gender Dimensions of Weather and Climate Services](#) (Geneva, 5–7 November 2014) (*Conference Report – Conference on the Gender Dimensions of Weather and Climate Services*, WMO-No. 1148),

**Noting with satisfaction** that the Commission for Agricultural Meteorology (CAgM) is among the three technical commissions to have organized a Women’s Agrometeorology Leadership Workshop prior to its session, in implementation of the WMO Gender Action Plan and the priority actions identified for 2016–2019,

**Noting also** the value of the Women’s Agrometeorology Leadership Workshop in building leadership skills and gender and diversity awareness of workshop participants and in strengthening networks of female agricultural meteorologists,

**Noting further** the need expressed by participants in the above workshop for increased investment in female agricultural meteorologists through the creation of professional networks, capacity-building, increased female involvement in governance and management, and increased female participation in international scientific cooperation,

**Observing** that women are underrepresented in the working structures of the Commission and that increased female participation is required to meet the 30% target set by the Seventeenth World Meteorological Congress in the WMO Gender Equality Policy,

**Recognizing** the impacts of weather, water and climate on gender roles, especially in the event of disasters, and their implications for the provision of agricultural meteorological services,

**Invites** members to use the outcomes of the Conference on the Gender Dimensions of Weather and Climate Services as guidance and to seek to identify, as well as address, the distinct needs of women and men in the provision of agricultural meteorological services, including their potentially different levels of access to information and capacity to act;

**Invites** members to nominate more women as members of the CAgM Management Group, coordination groups and expert teams;

**Requests** the CAgM Management Group, in collaboration with the WMO Gender Focal Point:

- (1) To devise strategies to increase the involvement of women in the work of the Commission, including:
    - (a) Establish a mentoring programme to strengthen the capacity of female agricultural meteorologists to engage in the work of the Commission;
    - (b) Identify and address, if possible, the barriers that hinder full and equal participation of female agricultural meteorologists in the Commission;
    - (c) Build on the effective skill-building initiated through the Women's Agrometeorology Leadership Workshop by fostering this network of professional women through the provision of follow-on mentoring and guidance for this group and by organizing one or more additional workshops for women agricultural meteorologists prior to future CAgM meetings;
    - (d) Encourage the participants of the Workshop to apply for expert teams;
  - (2) To undertake steps to implement the WMO Gender Action Plan, by proposing mechanisms and partnerships that link relevant gender equality initiatives of WMO and major bilateral and multilateral donors and national governments to strengthen scientific investments that enhance understanding of gendered differences in access and use of agricultural meteorological information and services that benefit rural poor women and men;
  - (3) To consider appointing a recent participant in the Women's Agrometeorology Leadership Workshop to undertake these tasks, potentially as an adviser or the lead of a task team.
-

### **Resolution 3 (CAgM-17)**

#### **Review of previous resolutions and recommendations of the Commission for Agricultural Meteorology**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Noting** the actions taken on the resolutions and recommendations adopted by the Commission prior to its seventeenth session,

**Considering** that actions identified through previous resolutions and recommendations had been mostly completed, or were taken up as ongoing activities of the teams and groups of the Commission,

**Decides:**

- (1) To keep in force the following resolutions:
  - (a) Resolution 2 (CAgM-XV) – Terms of reference of the Commission for Agricultural Meteorology;
  - (b) Resolution 1 (CAgM-16) – Integrated Drought Management Programme;
- (2) Not to keep in force the other resolutions and recommendations adopted prior to its seventeenth session;

**Requests** the Secretary-General to use the terms of reference of the Commission for Agricultural Meteorology in Resolution 43 (Cg-XVI) – Terms of reference of the technical commissions, Annex 2, as the basis for any new structure focused on agricultural meteorology in the proposed restructuring of the technical commissions to be decided by the Eighteenth World Meteorological Congress.

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**Note:** This resolution replaces Resolution 3 (CAgM-16), which is no longer in force.

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### **Resolution 4 (CAgM-17)**

#### **Priorities (2018–2022) of the Commission for Agricultural Meteorology**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Recalling:**

- (1) Resolution 2 (CAgM-16) – Priorities (2014–2018) of the Commission for Agricultural Meteorology,
- (2) WMO draft Strategic and Operating Plans ([CAgM-17/INF. 3.1](#)),

**Noting,**

- (1) The draft WMO Strategic Plan for the period 2020–2023 consisting of the following five long-term goals:
  - (a) Goal 1 – Better serve societal needs: Delivering actionable, authoritative, accessible, user-oriented and fit-for-purpose information and services,

- (b) Goal 2 – Enhance Earth system observations and predictions: Strengthening the technical foundation for the future,
  - (c) Goal 3 – Advance targeted research: Leveraging leadership in science,
  - (d) Goal 4 – Close the gap on service: Enhancing and leveraging existing capabilities among all WMO Members to bring capability to all,
  - (e) Goal 5 – Work smarter: Supporting effective policy- and decision-making and implementation in WMO,
- (2) The contribution of agricultural meteorological services to the United Nations Sustainable Development Goals, including: 1 – No poverty, 2 – Zero hunger, 5 – Gender equality, 6 – Clean water, 7 – Clean energy, 13 – Climate action, 15 – Life on land, and 17 – Partnerships for the Goals,
  - (3) The crucial importance of food security to Members and the provision of weather and climate services for Members to increase food production and reduce impacts of extreme weather and climate events, and climate change on food productivity and stability,
  - (4) The priorities expressed at the Technical Conference on Future Challenges and Opportunities in Agricultural Meteorology and those of the CAgM at its seventeenth session,
  - (5) The continued work of the Global Framework for Climate Services (GFCS) with a focus on the agriculture and food security priority area and disaster risk reduction,
  - (6) The ongoing work of the Integrated Drought Management Programme with over 34 partner organizations,
  - (7) The limited resources available to CAgM and to the Agricultural Meteorology Programme,
  - (8) The need to have clear and relevant priorities to mobilize international resources,

**Agrees** to the following key priorities for the intersessional period 2018–2022 adopted as part of the contribution of CAgM to the WMO Strategic Plan, based on the WMO strategic thrusts:

- (1) Advancing scientific research and its application, as well as the development and implementation of technology to support sustained services outcomes on all scales and especially to address the global challenges of managing climate risks and adapting to climate variability and change through:
  - (a) Identifying innovative risk management systems in global food production associated with weather and climate risks;
  - (b) Developing technological applications to communicate information to agricultural decision-makers across the agricultural systems value chain (farmer-transport-milling/processing-export/trading (where appropriate);
  - (c) Reviewing standards for measuring agricultural meteorological parameters with a priority on soil moisture and agricultural mass and energy flux measurements;
- (2) Improving service quality and service delivery by:
  - (a) Developing enhanced services for the agricultural, livestock, forestry, rangeland and fishery communities including agricultural meteorological consultancy;
  - (b) Engaging with the agriculture and food security priority area of GFCS and similar relevant climate service initiatives globally;



- (c) Encouraging development of a knowledge-sharing interface between forecasters and scientists, extension services and the agricultural decision-makers, with information flow in both directions;
  - (d) Identifying agricultural meteorological information needs of the vulnerable communities to facilitate development of more useful and appropriate agricultural meteorological information products;
- (3) Strengthening capacity development through agricultural meteorological training and education at the regional, national and local levels;
  - (4) Building and enhancing partnerships and cooperation through working in collaboration with other WMO technical commissions and Members, United Nations agencies including the Food and Agriculture Organization of the United Nations, World Food Programme, United Nations Convention to Combat Desertification, United Nations Framework Convention on Climate Change, Intergovernmental Panel on Climate Change, Group on Earth Observations and other relevant organizations, to create synergies and to support improved agricultural production and economic development;

**Requests** the Secretary-General to take the necessary action to make these priorities known to constituent bodies and throughout the Secretariat, and to approve efficient resource utilization that targets these priorities.

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**Note:** This resolution replaces Resolution 2 (CAgM-16), which is no longer in force.

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### **Resolution 5 (CAgM-17)**

#### **Commission for Agricultural Meteorology contributions to other World Meteorological Organization activities**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Recalling:**

- (1) [Resolution 11 \(Cg-17\)](#) – Towards a future enhanced integrated and seamless Data-processing and Forecasting System,
- (2) [Resolution 46 \(Cg-17\)](#) – Integrated Global Greenhouse Gas Information System,
- (3) [Resolution 62 \(Cg-17\)](#) – Relationship and interaction between the Intergovernmental Board on Climate Services and WMO constituent bodies,
- (4) [Resolution 64 \(Cg-17\)](#) – Development of a results-based framework for WMO support to the implementation of the Global Framework for Climate Services,
- (5) [Decision 9 \(EC-68\)](#) – Severe Weather Forecasting Demonstration Project,
- (6) [Decision 16 \(EC-68\)](#) – Country-focused results-based framework and mechanism for WMO contributions to the Global Framework for Climate Services,
- (7) [Decision 28 \(EC-68\)](#) – Operational implementation of a Global Seasonal Climate Update,
- (8) [Decision 3 \(EC-69\)](#) – WMO Global Multi-hazard Alert System,
- (9) [Decision 10 \(EC-69\)](#) – Climate Services Information System products to support United Nations system planning and WMO Members on seasonal to interannual timescales,

- (10) [Decision 51 \(EC-69\)](#) – The Integrated Global Greenhouse Gas Information System Implementation Plan,
- (11) [Resolution 8 \(CHy-15\)](#) – Development of a pilot WMO Global Hydrological Status and Outlook System,

**Noting** Decision 44 (EC-69) – Enhancing national and regional drought-monitoring systems, which requested:

- (1) The president of the Commission for Agricultural Meteorology to take the lead in coordinating issues on drought-monitoring and early warning systems with Commission for Hydrology, Commission for Climatology, Commission for Basic Systems, Commission for Atmospheric Sciences and the regional associations,
- (2) The Secretary-General to support Members in further developing national and regional drought-monitoring systems,

**Noting also:**

- (1) Review of decisions and resolutions ([CAgM-17/INF. 2.2](#)),
- (2) Relationship with other WMO activities ([CAgM-17/INF. 3.2](#)),

**Noting further** the five Global Framework for Climate Services (GFCS) components: User Interface Platform; Climate Services Information System; Observations and Monitoring; Research, Modelling and Prediction; and Capacity Development,

**Requests** the president of the Commission and the Management Group to ensure that expert team and task team members are available to contribute to the following WMO activities:

- (1) WMO contributions to the GFCS and the Commission for Climatology Implementation Coordination Team on the Climate Services Information System;
- (2) Integrated Global Greenhouse Gas Information System;
- (3) Global Seamless Data-processing and Forecasting System;
- (4) Severe Weather Forecasting Demonstration Project;
- (5) Global Seasonal Climate Update;
- (6) WMO Global Hydrological Status and Outlook System;

**Requests** the President of the Commission to encourage the establishment of greenhouse gas flux measurement sites in agricultural regions in collaboration with the Commission for Atmospheric Sciences;

**Agrees** that the focus of the Commission should be the GFCS priority areas on agriculture and food security, disaster risk reduction, and water;

**Requests** the Secretary-General to keep the president of the Commission and Management Group informed of all of the above WMO activities including notification of meetings and related events.

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## **Resolution 6 (CAgM-17)**

### **Focus areas**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Noting** that the Commission needs to strengthen the participation of experts from National Meteorological and Hydrological Services and from other bodies with relevant interests, and ensure the strong participation of experts from developing countries and of women in the work of the Commission,

**Agrees** to organize its subsidiary bodies into focus areas rather than open panels of Commission for Agricultural Meteorology experts, in order to simplify the jargon used within the Commission;

**Decides** to adopt the terms of reference of the chairpersons and co-chairpersons of the Commission focus areas, as contained in the annex to the present resolution.

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**Note:** This resolution replaces Resolution 4 (CAgM-16), which is no longer in force.

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## **Annex to Resolution 6 (CAgM-17)**

### **Terms of reference of the focus area chairpersons and co-chairpersons**

1. **Terms of reference common to all Focus Areas chairpersons and co-chairpersons**
  - (a) Act upon issues referred to the Focus Area by the CAgM Management Group and coordinate an active and responsive overview of all deliverables and associated activities related to the priorities of the Focus Area;
  - (b) Ensure that the Focus Area teams are well informed of global and regional activities within their areas of responsibility;
  - (c) Monitor and evaluate the roles, activities, progress and priorities of the expert and task teams established by the Commission under the responsibility of the Focus Area to ensure coordination of work between the teams;
  - (d) Participate (as members of the CAgM Management Group) in decisions on the composition of Focus Area teams including their leadership;
  - (e) Provide advice to team leaders on their work plans and the composition of their teams, including potential interaction with other interested bodies;
  - (f) Work with the Secretariat and the CAgM Management Group to establish or update Focus Area work plans as required;
  - (g) Provide feedback to the members of the Focus Area including an activity report by the end of calendar years in the intersessional period;
  - (h) Submit reports to the CAgM Management Group and the Secretariat on meetings, newsletters, constituent body sessions for the next session of the Commission;
  - (i) Share tasks specified above on an equitable basis, as chairperson and co-chairperson of each Focus Area;

- (j) Serve for a period of four (4) years as the chairperson and co-chairperson of each Focus Area subject to satisfactory performance.

## 2. **Modes of operation common to all Focus Areas**

- (a) Each Focus Area, led by a chairperson and co-chairperson, will consist of a pool of experts in specialized areas of programme interests. Focus Area chairpersons and co-chairpersons will be members of the CAgM Management Group (MG). Focus Area experts will be nominated based on regional representation, gender balance and unique, specialized expertise;
- (b) Based on Resolution 8 (CAgM-17), Working Structure of CAgM, a limited number of Expert Teams (ETs) and Task Teams (TTs) will be agreed upon;
- (c) The Focus Area chairpersons and co-chairpersons will undertake the work within their thematic areas with the support of the experts of their respective Focus Area. The chairpersons and co-chairpersons will work with leaders of relevant teams to establish work plans in accordance with the priorities set by the CAgM Management Group, by assigning tasks, deliverables and deadlines, as agreed in wide consultation throughout the Focus Area. The chairpersons and co-chairpersons will oversee and promote adherence to the work plan, maintain a dialogue with those experts that have been assigned tasks, share the responsibilities of the conduct of the Focus Area and communicate on achievements and issues with the Management Group;
- (d) Based on the requirements as determined by CAgM and its MG, ETs will be convened for at least two years specified to complete several thematic tasks. Each ET will be led by a team leader which will be designated at the Session and any replacement of an ET leader will be done in conjunction with the president, CAgM Management Group and Secretariat;
- (e) To more efficiently use the limited resources of the Secretariat, Focus Area meetings with all ETs of each Focus Area are encouraged but individual ET meetings are still possible. It is encouraged that ET members use email, video and teleconferencing as much as possible. When possible, only selected representatives of each ET will attend the ET or Focus Area meeting but the regional and gender balance will still be maintained as stated in item (j);
- (f) Implementation/Coordination Team (ICT): At least once per intersessional period, the ICT will review expert team and task team thematic recommendations and consolidate a selective list of relevant recommendations and implementation plans to be submitted to the MG. The ICT will be composed of Focus Area ET and TT leaders, with designated co-chairpersons for the ICT nominated by the Focus Area (co-) chairpersons and approved by the president and vice-president of CAgM;
- (g) To foster effective links to the regional associations and ensure their involvement in the planning, implementation and coordination of the Agricultural Meteorology Programme at the regional level, the relationship between the ICT, Working Groups on Agricultural Meteorology in each Region, and the CAgM Management Group will be coordinated by the vice-president of Commission;
- (h) At the discretion of the president, CAgM MG, and the Secretariat, additional Task Teams (TT) may be established to focus on current and urgent CAgM matters. Based on the requirements as determined by CAgM and its MG, TTs will be established for a specified and defined period (e.g., 3 months to 2 years) to complete a specific thematic task. Each TT will be led by a team leader selected by the president, CAgM Management Group and Secretariat from the pool of nominated CAgM experts;
- (i) A meeting of the TT is not mandatory for TT assignments and it is encouraged that TT members use e-mail and video and teleconferencing as much as possible. Upon completion of the assigned task, the task team members will return to the Focus Area pool of experts;

- (j) The MG will strive to involve experts from developing countries and a larger number of women in CAgM activities, from the perspectives of strengthening knowledge and capacity, but more importantly because of the unique and important experience and perspectives offered by these experts.

### **Resolution 7 (CAgM-17)**

#### **Commission for Agricultural Meteorology Management Group**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Noting** the improved linkages with the regional associations through the activities of the working groups on agricultural meteorology and through regional representation on the Commission for Agricultural Meteorology Management Group,

**Decides** to adopt the terms of reference for the Commission Management Group as provided in the annex to the present resolution.

**Note:** This resolution replaces Resolution 4 (CAgM-16), which is no longer in force.

### **Annex to Resolution 7 (CAgM-17)**

#### **Management Group of the Commission for Agricultural Meteorology**

#### **1. Terms of reference of the Management Group of the Commission for Agricultural Meteorology**

- (a) Monitor and review the internal structure and working methods of the Commission and make necessary adjustments to the working structure in the intersessional period;
- (b) Ensure the overall integration of the focus areas and coordinate strategic planning issues;
- (c) Review and approve the work plans for the activation of Focus Area expert teams taking into account the requirements expressed at the session of the Commission, and assess and evaluate the progress achieved and provide continuing guidance on timescales for their works and outputs;
- (d) Advise the president of the Commission on matters related to cooperation with other technical commissions and support to other WMO and related programmes;
- (e) Advise the president of the Commission on requirements arising between its sessions for new appointments of Focus Areas chairpersons and co-chairpersons, the establishment or activation of teams, and the designation of team leaders;
- (f) Advise the president on all other matters related to the work of the Commission;
- (g) Identify opportunities for co-sponsorship and cost sharing of events with partners and sponsors;
- (h) Conduct as much of the work as possible through electronic means of communication, thus minimizing the costs and environmental impacts of travel.

## **2. Terms of reference of the president of the Commission for Agricultural Meteorology**

- (a) Undertake the duties required of a president of a WMO Technical Commission in accordance with WMO General Regulation 186;
- (b) Represent the Commission at the relevant WMO meetings, workshops and conferences including other technical commissions, the Executive Council and Congress, meetings of Executive Council bodies and Meetings of Presidents of Technical Commissions;
- (c) Promote the recognition of, and increase awareness about, the role of agricultural meteorology to other WMO Constituent Bodies and subsidiary bodies;
- (d) Provide input, presentations and reports, as required, to WMO constituent body sessions, particularly the Executive Council and Congress;
- (e) Designate a substitute if any Focus Areas chairperson, co-chairperson, expert team member or task team member is unable to continue in that role, relying on WMO General Regulation 33 for the appropriate guidance;
- (f) Maintain regular communication with the members of the Commission in its activities, for example, through newsletters;
- (g) Coordinate with the rest of the Technical Commissions and other bodies of WMO.

## **3. Terms of reference of the vice-president of the Commission for Agricultural Meteorology**

- (a) Assist the president of the Commission and lead the activities assigned by the president as and when required, represent the Commission on occasions when the president cannot personally participate, and chair the meetings of the CAgM Management Group in the president's absence;
- (b) Ensure effective communications between the CAgM Management Group and any Working Groups on Climate Services, Adaptation and Agricultural Meteorology or Working Groups on Climate and Hydrology with Sub-Groups or Sub-tasks on agricultural meteorology on their activities and priorities, especially before sessions of WMO constituent bodies addressing climate-related matters, that is, Congress, the Executive Council, regional associations and relevant technical commissions;
- (c) Liaise with the Focus Areas (co-)chairpersons in implementation of their workplans, provide advice on overcoming problems in completion of the agreed tasks, in consultation with the Secretariat and the CAgM Management Group;
- (d) Liaise with national agricultural meteorological societies or organizations to maintain the activities of the Global Federation of Agricultural Meteorological Societies (GlobalFAMS);
- (e) Submit reports to the CAgM Management Group and the Secretariat on meetings, newsletters, constituent body sessions for the next session of the Commission;
- (f) Consult with the president on all of the above matters.

#### **4. Composition of the Management Group of the Commission for Agricultural Meteorology**

The CAgM Management Group shall include the president, the vice-president and the chairpersons and co-chairpersons of Focus Areas 1 through 4 with the total membership not exceeding 10. The following chairpersons and co-chairpersons were selected in accordance with WMO General Regulation 33:

##### **Focus Area 1: Weather and Climate Services for Agriculture**

Chairperson: Yvette Everingham (Australia)

Co-chairperson: Kyurang Kim (Republic of Korea)

##### **Focus Area 2: Research and Technology Development in Agrometeorology**

Chairperson: Harlan Shannon (United States of America)

Co-chairperson: Lorena Ferreira (Argentina)

##### **Focus Area 3: Agrometeorological Risk Management**

Chairperson: Guangsheng Zhou (China)

Co-chairperson: Meriem Alaouri (Morocco)

##### **Focus Area 4: Communications, Education and Capacity Development / Enabling Environment**

Chairperson: Adamou Sitta (Niger)

Co-chairperson: Elena Mateescu (Romania)

The Commission was pleased to note that the composition of its new Management Group included good geographical and gender balance and the introduction of new members and thus fresh ideas and experiences. The Commission noted that it was in a state of transition with respect to its structure as guided by the previous Management Group and, recording the strong contributions made by, and expertise of, Federica Rossi (Italy), requested her to make herself available as advisor to the president of CAgM on an ex-officio basis.

#### **5. Mode of operation of the Management Group of the Commission for Agricultural Meteorology**

- (a) The CAgM Management Group, subject to available resources, should meet annually, or at least three times during the intersessional period, but should carry out most of its work by correspondence or by teleconference whenever possible;
- (b) In order to harmonize regional activities and priorities in climate matters and to ensure consideration of regional interests in the work of the Commission, the regional representatives would be invited to at least one session of the CAgM Management Group during the intersessional period, preferably the first meeting at which the priorities of the work programme are established. These regional experts may be from regional working groups or sub-groups on climate-related matters, or there may be another climate expert appointed for this purpose by the president of the regional association;
- (c) The president may invite to its sessions individual experts or rapporteurs that report to the CAgM Management Group, and/or experts on specific major issues, subject to the agenda and availability of funds;



- (d) Members of the CAgM Management Group may be selected to serve as rapporteurs for specific, important WMO cross-cutting topics.

## **Resolution 8 (CAgM-17)**

### **Working structure of the Commission for Agricultural Meteorology**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Noting** the need for the Commission to be more flexible and therefore to modify the structure while still maintaining a link to the previous intersessional period for a continuation of ongoing topics,

**Having considered** the need:

- (1) To increase the flexibility of providing quality deliverables and to provide sufficient resources for training and capacity-building activities, within the available financial resources,
- (2) To improve the role of the regional associations in decisions of the Commission,
- (3) To improve the flow of technical information emanating from the activities of the Commission to all Members,

**Decides:**

- (1) To adopt the working structure of the Commission, with immediate effect, as follows:
  - (a) CAgM Management Group;
  - (b) Focus area 1: Weather and Climate Services for Agriculture;
  - (c) Focus area 2: Research and Technology Development in Agrometeorology;
  - (d) Focus area 3: Agrometeorological Risk Management;
  - (e) Focus area 4: Communications, Education and Capacity Development/Enabling Environment;
- (2) To adopt key components of the work programme for the seventeenth intersessional period including proposed deliverables for each focus area, as contained in Annex 1 to the present resolution;
- (3) To recognize the terms of reference and membership of existing joint expert groups and task teams, as contained in Annex 2 to the present resolution;

**Authorizes** the president of the Commission to activate the work of the focus areas, expert and task teams in accordance with priorities agreed by the Commission and its Management Group, taking into account the availability of the necessary resources;

**Further authorizes** the president of the Commission, with the assistance from the Management Group, to establish during the intersessional period implementation coordination expert and task teams additional to those agreed by the Commission, if a requirement has been established;



**Requests** the president of the Commission, with assistance from the Management Group:

- (1) To keep the impact and effectiveness of the amended working structure under review and to provide an interim intersessional report to members of the Commission and a final report to the Commission at its eighteenth session;
- (2) With assistance also from the Secretary-General, to facilitate Commission experts, on a case-by-case basis, in providing technical assistance to WMO projects involving aspects of agricultural meteorology;

**Requests** the Secretary-General to arrange, within available resources, a level of support for the amended structure that will facilitate the participation of the members of the Focus Areas and implementation coordination expert and task teams.

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**Note:** This resolution replaces Resolution 4 (CAgM-16), which is no longer in force.

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### **Annex 1 to Resolution 8 (CAgM-17)**

#### **Components of the work programme of the Commission for Agricultural Meteorology for the seventeenth intersessional period**

Components of the work programme of the Commission for Agricultural Meteorology for the seventeenth intersessional period including proposed Expert Teams, Task Teams, and deliverables are presented for each of the four CAgM Focus Areas. For each Expert Team, activities during the intersessional period 2018–2022 should work towards achieving the specific deliverables listed below. Establishment of additional Task Teams and their deliverables will be decided by the CAgM Management Group.

#### **Focus Area 1: Weather and Climate Services for Agriculture**

Focus Area 1 will emphasize the improvement and development of agrometeorological products, services and communication to users including early warning systems. It will develop the following deliverables based on a review of existing material as a contribution to the implementation of the GFCS Climate Services Information System and the User Interface Platform.

#### **Expert Team on Agrometeorological Tools and Applications**

Leader: James Adamu Ijampy (Nigeria)

#### **Deliverables / Outputs:**

- (a) Develop or modify agrometeorological tools and applications for the Climate Service Toolkit (CST);
- (b) Guidance material on applications on remote sensing and GIS Applications in Agrometeorology;
- (c) Guidance material on how to best develop agrometeorological decision support systems;
- (d) Guidance material on applications of Weather Forecasts for Agriculture such as Numerical Weather Prediction (NWP);

- (e) Report on any expertise provided on Agrometeorological Tools and Applications to WMO Members and projects in various countries.

### **Expert Team on Feedback Mechanisms and Outreach of Agromet Information**

Leader: Hatem Baccour (Tunisia)

#### **Deliverables / Outputs:**

- (a) Guidance material on user needs and requirements for weather and climate applications in agriculture;
- (b) Guidance material on weather and climate economic assessments and weather index insurance products for agriculture;
- (c) Report on any expertise provided on feedback mechanisms and outreach of agrometeorological information to WMO Members and projects in various countries.

### **Expert Team on Crop, Animal, and Pest/Disease Early Warning Systems**

Leader: Tom Davison (Australia)

#### **Deliverables / Outputs:**

- (a) Guidance material on animal/plant pest/disease applications modelling and early warning systems, irrigation scheduling, crop protection, and crop forecasting;
- (b) Guidance material on developing crop calendars;
- (c) Revision of guidance material on the use of phenology for climate monitoring and crop phenology for agrometeorological monitoring and assessments;
- (d) Report on any expertise provided on crop, animal, and pest/disease modelling including aerial dispersion to WMO Members and projects in various countries.

### **Joint CAgM/JCOMM Task Team on Weather, Climate and Fisheries**

Leader: To be determined by CAgM Management Group in conjunction with JCOMM Management Group

#### **Deliverables / Outputs:**

Terms of reference provided in Annex 2.

## **Focus Area 2: Research and Technology Development in Agrometeorology**

Focus Area 2 will emphasize research and technology development to provide high quality agrometeorological products, resources and services. It will develop the following deliverables as a contribution to the implementation of the GFCS Observation and Monitoring and Research, Modelling and Prediction Components, the WMO Integrated Global Observing System and the Integrated Global Greenhouse Gas Information System (IG3IS). It will also focus on operational data issues in agricultural meteorology and improving the World Agrometeorological Information Service (WAMIS).

### **Expert Team on Soil Moisture Monitoring and Applications**

Leader: John Qu (United States of America)

#### **Deliverables / Outputs:**

- (a) Guidance material on standards for soil moisture measurements and how to integrate ground based and remotely sensed soil moisture observations;
- (b) Guidance material on how to use soil moisture monitoring for agricultural applications;
- (c) Report on any expertise provided on soil moisture measurements and applications to WMO Members and projects in various countries.

### **Expert Team on Flux Measurements for Agriculture with a focus on GHG emissions**

Leader: Elizabeth Pattey (Canada)

#### **Deliverables / Outputs:**

- (a) Guidance material and database on agricultural mass/energy flux measurements for use by WMO members and United Nations agencies;
- (b) Report on any expertise provided to IG3IS, United Nations agencies, WMO Members and projects in various countries.

### **Expert Team on Climate and Agricultural Modelling for Sustainable Agriculture**

Leader: Ward Smith (Canada)

#### **Deliverables / Outputs:**

- (a) Develop pilot test cases on the use of climate scenarios for making crop management recommendations;
- (b) Guidance material on coupling of weather/climate models with agricultural models;
- (c) Report on any expertise provided on the use of climate and crop modelling to promote sustainable agriculture for WMO Members and projects in various countries.

### **Focus Area 3: Agrometeorological Risk Management**

Focus Area 3 will emphasize the impacts of natural hazards and extreme weather and climate events on agriculture. It will develop the following deliverables as a contribution to the implementation of the GFCS Climate Services Information System as well as to the WMO Global Multi-Hazard Alert System (GMAS) and the WMO Global Hydrological Status and Outlook System. It will also focus on the reviewing impact assessments of climate variability and change on agriculture and how to further develop application related to Climate Smart Agriculture.

### **Expert Team on Drought**

Leader: Andrea Susnik (Slovenia)

#### **Deliverables / Outputs:**

- (a) Guidance material on drought risk management measures in conjunction with the Integrated Drought Management Programme;

- (b) Report on the status of drought-monitoring systems, outlooks, impacts, assessment of possible agricultural losses and preparedness in the WMO regions;
- (c) Guidance material on how to clearly communicate the existing definitions of drought, drought triggers, the various components of the lifecycle of drought;
- (d) Provide summary of drought and its impacts on agriculture for the WMO Annual Statement on the Status of the Global Climate and the Global Seasonal Climate Update;
- (e) Guidance material on incorporating national drought alerts and warnings into regional MHEWS and global alert systems such as GMAS and the Common Alerting Protocol;
- (f) Report on any expertise provided on the drought issues to WMO Members and projects in various countries.

### **Expert Team on AgroClimatic Data and Sub-seasonal to Seasonal Forecasts for Agriculture**

Leader: Udo Busch (Germany)

#### **Deliverables / Outputs:**

- (a) Develop complete agroclimatic data series including data rescue based on existing techniques, for agricultural applications and analyses such as downscaling for crop modelling and to validating remotely sensed information;
- (b) Guidance material on developing complete agroclimatic data series;
- (c) Guidance material on methodologies for assessing the feasibility of using sub-seasonal to seasonal forecasts for applications in agriculture;
- (d) Report on any expertise provided on the use of weather and climate modelling for sustainable agriculture to WMO Member and projects in various countries.

### **Expert Team on Impacts of Extreme Events / Natural Hazards on Agriculture (except drought)**

Leader: Flavio Justino (Brazil)

#### **Deliverables / Outputs:**

- (a) Report on impacts of extreme events/natural hazards on agriculture;
- (b) Inputs for the WMO Annual Statement on the Status of the Global Climate about extreme events/natural hazards and their impacts on agriculture;
- (c) Develop mechanisms and guidance material on incorporating alerts and warnings on extreme events/natural hazards on agriculture to regional and global multi-hazard alerting systems;
- (d) Report on any expertise provided on the extreme events/natural hazards impacts on agriculture to WMO Members and projects in various countries.

### **Focus Area 4: Communications, Education and Capacity Development**

Focus Area 4 will promote the training, education, and outreach related to agricultural meteorological topics to the transfer of knowledge and methodologies to the agricultural community and to enhance capacity-building. This focus area will also improve the capacity of users to understand available agricultural meteorological and climate products and services

for better uptake and appropriate use. It will also review any improvements in the Guide to Agricultural Meteorological Practices and will identify any agrometeorological knowledge and capacity development tools.

### **Expert Team on Capacity Development**

Leader: Valentina Grigoryan (Armenia)

#### **Deliverables / Outputs:**

- (a) Complete, and update if needed, the supplement to WMO-No. 1083 on agricultural meteorology which will replace WMO-No. 258, Supplement 2;
- (b) Update the list of available and recommended agricultural meteorological textbooks for a range of levels of formal education and informal training;
- (c) Development of agrometeorological training modules for farmers and extension agents use in training events and WMO RTCs courses in conjunction with the Global Centres of Research and Excellence in AgroMeteorology (GCREAMs) and other institutions that offer education and training in agricultural meteorology (i.e. universities);
- (d) Guidance material on Roving Seminars and Climate Field Schools, and National Forums/ Dialogues;
- (e) Update the list of available and recommended centres offering graduate programmes in Agricultural Meteorology or related domains;
- (f) Report on any expertise provided on the use of existing WMO Gender Issues and Women Empowerment standards by WMO Members, projects and Commission activities.

### **Expert Team on Communication and User Interface for Agriculture**

Leader: Jong Sook Park (Republic of Korea)

#### **Deliverables / Outputs:**

- (a) Guidance material on effective communication and dissemination development strategies on agrometeorological topics for WMO Members and projects;
- (b) Guidance material on the use of socioeconomic assessments and policy support mechanisms in agrometeorology;
- (c) Input on the needs of agricultural meteorologists in NMHSs and with members of the Global Federation of Agricultural Meteorology Societies (GlobalFAMS) into the various WMO survey mechanisms;
- (d) Report on any successful examples provided on user-interfacing issues related on the GFCS priority areas of agriculture and food security and disaster risk reduction to WMO Members and projects.

### **Expert Team on Information Communication Technology Applications**

Leader: Andrea Núñez (Chile)

#### **Deliverables / Outputs:**

- (a) Guidance materials for practical use and development of ICT applications (i.e. radio, website, web-platform, smartphone applications) for agriculture for WMO Members and projects;

- (b) Guidance materials on methods used to test and evaluate the effectiveness and impact of ICT applications (i.e. radio, websites, and mobile phone applications) by agricultural users in various countries;
  - (c) Report on any expertise provided on ICT applications for agriculture to WMO Members and projects in various countries.
- 

## **Annex 2 to Resolution 8 (CAgM-17)**

### **Existing joint expert groups and task teams**

There is one existing joint team with other Commissions where the Terms of Reference have already been approved by and/or coordinated with the other WMO constituent bodies.

#### **1. Joint CAgM-JCOMM Task Team on Weather, Climate and Fisheries**

##### **1.1 Membership**

Leader: To be determined by CAgM Management Group in conjunction with JCOMM Management Group

##### **1.2 Terms of Reference**

- (a) Review the current data collection by JCOMM and others, to assess how these data meet the current needs of the ecosystem-approach to management in fisheries; as appropriate, work with other JCOMM expert teams to develop climate services for fisheries based on the available marine climate data;
  - (b) Encourage oceanic and coastal fisheries management organizations to inform their members about the advantages of making, reporting and protecting relevant marine meteorological and ocean observations that are used by the various WMO/IOC observation and information systems;
  - (c) Contribute to the understanding of the impacts of climate change on fisheries and marine aquaculture;
  - (d) Identify risk assessment or management evaluation tools that incorporate climate variability in order to improve the ecosystem-approach to management of fisheries;
  - (e) Identify how weather and climate tools can inform integrated coastal zone management relevant to coastal fisheries and marine aquaculture;
  - (f) Explore the possibility of developing inputs of climate impacts on fisheries for the WMO Annual Statement on the Status of the Global Climate;
  - (g) Promote the strengthening of climate services for fisheries under the GFCS agriculture/food security priority area by developing pilot projects with other international organizations;
  - (h) Submit reports, including recommendations on follow-up actions, in accordance with timetables agreed by Management Committees of CAgM and JCOMM.
-

## APPENDIX 3. DECISIONS ADOPTED BY THE SESSION

### Decision 1 (CAgM-17)

#### Organization of the session

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Having considered** the provisional agenda proposed by the president of CAgM,

**Approves** the provisional annotated agenda;

**Approves** the report of the representative of the Secretary-General on credentials in accordance with WMO General Regulations 21 to 24;

**Adopts** the establishment of committees for the duration of the session as:

(1) Coordination Committee:

Chairperson: President

Members: Chairperson of plenaries, Secretary-General's representative, Secretariat staff, representative of local organizing committee;

(2) Nomination Committee:

Co-Chairperson: Mr Andrew Ferrone (Luxembourg)

Co-Chairperson: Ms Elena Mateescu (Romania)

(3) Selection Committee:

Members: Mr Vernon Carr (Australia), Ms Kawsar Parvin (Bangladesh), John Prueger (United States of America), Ms Surekha Ramessur (Mauritius), Mr Geert Sterk (The Netherlands), Mr Constantino Alarcon Velasco (Peru),

**Agrees** to the programme of work of the session:

(1) Working hours of the meetings: 9.30 a.m.–12.30 p.m. and 2.30 p.m.–5.30 p.m.;

(2) Arrangement and allocation of agenda items for the session;

**Decides** to suspend General Regulation 110 for the whole duration of the session to permit rapid processing of documents in accordance with General Regulation 3;

**Decides** that in conformance with General Regulation 112 summarized minutes are not required for the session.

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### Decision 2 (CAgM-17)

#### Composition and terms of reference for the Selection Committee

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Having reviewed** Regulations 23 to 32 and in particular 25, 31 and 32,

**Decides** that the Selection Committee will consist of one delegate from each WMO regional association, nominated through consultation among the members of the Commission from each regional association, with the terms of reference described in the annex.

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### **Annex to Decision 2 (CAgM-17)**

#### **Terms of reference for the Selection Committee**

- (1) Elect a chairperson and co-chairperson;
  - (2) Review the qualifications of experts nominated to be experts of the Commission by Permanent Representatives with WMO in light of the draft working structures of the Commission;
    - (a) Propose Management Group members for adoption by the Commission;
    - (b) Propose experts for the working structures for further consideration by the Management Group when the working structures decided by the Commission are convened;
  - (3) Ensure regional and gender balance among the proposed Management Group members and other experts.
-



## APPENDIX 4. RECOMMENDATIONS ADOPTED BY THE SESSION

### Recommendation 1 (CAgM-17)

#### Drought and desertification

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

#### Recalling:

- (1) [Resolution 9 \(Cg-17\)](#) – Identifiers for cataloguing extreme weather, water and climate events,
- (2) [Decision 3 \(EC-69\)](#) – WMO Global Multi-hazard Alert System,
- (3) [Resolution 8 \(CHy-15\)](#) – Development of a pilot WMO Global Hydrological Status and Outlook System,
- (4) [Resolution 1 \(CAgM-16\)](#) – Integrated Drought Management Programme,

**Recalling also** [Decision 44 \(EC-69\)](#) – Enhancing national and regional drought-monitoring systems, requesting:

- (1) The president of the Commission for Agricultural Meteorology (CAgM) to take the lead in coordinating issues on drought-monitoring and early warning systems with the Commission for Hydrology, Commission for Climatology, Commission for Basic Systems, Commission for Atmospheric Sciences and the regional associations,
- (2) The Secretary-General to support Members in further developing national and regional drought-monitoring systems,

#### Noting:

- (1) United Nations General Assembly Resolution 54/223 – Implementation of the United Nations Convention to Combat Desertification in those countries experiencing serious drought and/or desertification, particularly in Africa, adopted in 1999,
- (2) Conference of the Parties to the United Nations Convention on Biological Diversity (CBD) Decision X/35 – Biodiversity of dry and sub-humid lands, which urged Parties and other governments to develop and implement, or revise existing, drought-management plans and early warning systems at all levels to increase the resilience of dry and sub-humid lands, adopted at the tenth session of CBD in October 2010,
- (3) The [final declaration of the High-level Meeting on National Drought Policy](#) (Geneva, 11–15 March 2013),
- (4) The [Windhoek Declaration for Enhancing Resilience to Drought in Africa](#) (Windhoek, Namibia, 15–19 August 2016),
- (5) The [Santa Cruz de la Sierra Drought Conference Declaration](#) (Santa Cruz de la Sierra, Plurinational State of Bolivia, 14–16 August 2017) on drought for Latin America and Caribbean countries,
- (6) [United Nations Convention to Combat Desertification \(UNCCD\) Decision 29/COP.13 – Policy advocacy on drought](#),

**Noting also** all the outputs and activities of CAgM and the Integrated Drought Management Programme on drought during the past four years, and the relationship of CAgM with other WMO activities,

**Having considered:**

- (1) The role played by climate and climatic factors in desertification processes and the importance of meteorology and hydrology in many aspects of the combat against desertification,
- (2) That drought and desertification have serious implications for socioeconomic development and the environment in many countries, especially in arid, semi-arid and dry sub-humid areas,
- (3) That WMO has participated effectively in sessions 1 to 13 of the Conference of the Parties to UNCCD, and will continue to do so in future sessions,
- (4) That WMO, the Food and Agriculture Organization of the United Nations (FAO) and UNCCD have successfully collaborated and organized the High-level Meeting on National Drought Policy (Geneva, 11–15 March 2013),
- (5) That WMO, CBD, FAO, UNCCD and the UN-Water Decade Programme on Capacity Development successfully completed six [regional national drought management policy workshops](#),
- (6) That WMO and the Global Water Partnership, together with over 30 partner institutions, have successfully completed the first phase of the Integrated Drought Management Programme (IDMP) (2013–2016) and have launched the Integrated Drought Management HelpDesk in its second phase (2017–2019),

**Recognizing** that the subject of drought and desertification has been considered in detail by UNCCD,

**Requests** the president of the Commission:

- (1) To support CAgM experts in focus area 3 to develop a prototype drought alert system and methodologies for Members to catalogue drought events that can also be used for the Global Seasonal Climate Update, Global Hydrological Status and Outlook System (HydroSOS), Annual Statement on the State of the Global Climate, and Global Multi-hazard Alert System (GMAS);
- (2) To identify further linkages between Commission activities on drought and IDMP;

**Invites** WMO Members:

- (1) To continue to strengthen national and regional meteorological and hydrological networks and monitoring systems to ensure adequate gathering and dissemination of basic data and information nationally, regionally and internationally;
- (2) To encourage the open sharing of agricultural, meteorological and hydrological data among national and regional ministries and organizations to improve drought-related decision-making and support the development of drought early warning systems;
- (3) To support as appropriate national, regional and global programmes for integrated data collection and to carry out assessment and research related to land degradation and desertification, and mitigation of drought problems;
- (4) To continue to review, study and undertake research on the interactions between climate, drought and desertification, and their socioeconomic impacts;
- (5) To draw the attention of appropriate authorities and experts to the use and applications of meteorological and hydrological information in national action programmes for the implementation of UNCCD;

- (6) To stimulate education and training on the meteorological and hydrological aspects of the multidisciplinary fields in the combat against desertification;
- (7) To support the Secretary-General in the further implementation of the recommendations of UNCCD;
- (8) To support the implementation actions of the Global Framework for Climate Services in regard to drought risk management, the Climate Services Information System and the user interface programme;
- (9) To support the activities of IDMP with regards to the three pillars of integrated drought management: drought-monitoring and early warning systems, drought vulnerability and impact assessments and drought preparedness;
- (10) To support global agricultural monitoring efforts through the Group on Earth Observation Global Agricultural Monitoring (GEO-GLAM) by collaborating to integrate drought information into agricultural monitoring;

**Requests** the Secretary-General:

- (1) To continue to circulate to Members, for information and appropriate action, any relevant decisions of the Conference of the Parties to UNCCD which may have implications for WMO Members;
- (2) To continue to take steps towards the implementation of actions recommended by UNCCD that are of direct relevance to WMO;
- (3) To cooperate as appropriate, within budgetary resources, with other relevant international and regional organizations in the implementation of UNCCD;
- (4) To continue collaboration with UNCCD and other organizations in the implementation actions of the Drought Management Centre for Southeastern Europe and to explore the establishment of similar centres in other regions;
- (5) To continue collaboration with CBD, FAO and UNCCD on the implementation of IDMP;
- (6) To ensure effective coordination with WMO drought activities with regards to IDMP, the FAO Framework on Water Scarcity in Agriculture, the UNCCD Drought Initiative and GEO-GLAM;

**Requests** all relevant technical commissions, programmes and regional associations to liaise with CAgM and IDMP experts and establish synergies with CAgM and IDMP with regards to drought-monitoring and early warning systems, drought vulnerability and impact assessments, and drought preparedness especially with regards to GMAS, HydroSOS and cataloguing extreme weather, water and climate events.

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**Note:** This recommendation replaces Recommendation 1 (CAgM-16), which is no longer in force.

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## **Recommendation 2 (CAgM-17)**

### **Status and progress made in agricultural meteorology**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Recalling** [Resolution 7 \(EC-68\)](#) – Country Profile Database, which urged Members to contribute to the development of the Country Profile Database (CPDB) by nominating focal points, maintaining up-to-date information regarding their capabilities and through extrabudgetary and in-kind contributions,

**Noting:**

- (1) Recommendation 2 (CAgM-16) – National progress reports made in agricultural meteorology,
- (2) The creation by the WMO Secretariat of a comprehensive database of the status of agricultural meteorological activities of Members based on the information provided in the reports from the Members,

**Invites** Members to ensure that their CPDB focal points update the CPDB on issues related to agricultural meteorology and drought;

**Requests** the Secretary-General:

- (1) To ensure that questions on agricultural meteorology are included in the CPDB surveys;
- (2) To maintain contacts with agricultural meteorologists and send out informal surveys if needed;
- (3) To publish brief summaries and analyses of the status and progress in agricultural meteorology to inform Members in the form of a circular letter from the president at least once every two years.

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**Note:** This recommendation replaces Recommendation 2 (CAgM-16), which is no longer in force.

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## **Recommendation 3 (CAgM-17)**

### **Training and education in agricultural meteorology**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

**Acknowledging** that capacity development is one of the priority areas established by the Seventeenth World Meteorological Congress (see annex to Resolution 69 (Cg-17) – WMO Strategic Plan 2016–2019),

**Acknowledging also** that capacity development is one of the priorities of the Commission,

**Recalling:**

- (1) Annex to Resolution 49 (Cg-XVI) – Elements of a WMO Strategy for Capacity Development, which stated that capacity development is an ongoing process rather than a short-term intervention that aims to increase capacity in a manner conducive to sustained growth,

- (2) [Resolution 18 \(EC-64\)](#) – WMO Capacity Development Strategy,
- (3) [Decision 63 \(EC-68\)](#) – Capacity development priorities for 2016–2019,

**Noting:**

- (1) [Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology](#) (WMO-No. 258), Volume I, Supplement No. 2 – Guidelines for Curricula in Agricultural Meteorology,
- (2) [Guide to the Implementation of Education and Training Standards in Meteorology and Hydrology](#) (WMO-No. 1083), Volume I – Meteorology,

**Noting also:**

- (1) The objectives of the WMO Capacity Development Strategy: (a) define required capacities and identify deficiencies; (b) increase visibility and national ownership; (c) optimize knowledge management; (d) reinforce resource mobilization and project management; (e) strengthen global, regional and subregional mechanisms; and (f) increase education and research opportunities,
- (2) That an improvement of the training standards for agricultural meteorologists is a prerequisite for the provision of comprehensive weather and climate services for agriculture,
- (3) That capacity development is a major part of the Global Framework for Climate Services, and that agriculture and food security is one of the priority areas of the Framework,
- (4) That guidelines on education and training for personnel in meteorology and operational hydrology have been revised to focus on learning outcomes instead of required curricula,
- (5) That there are several WMO Regional Training Centres and universities that can assist in providing training courses in agricultural meteorology,

**Recognizing** the contribution of the following organizations in assisting WMO to provide training in agricultural meteorology from 2014 to 2018: the AGRHYMET Centre, European Commission Joint Research Centre, European Organization for the Exploitation of Meteorological Satellites, European Space Agency, Famine Early Warning System Network, Food and Agricultural Organization of the United Nations, Italian Institute of Biometeorology and Spanish State Meteorological Agency,

**Requests** the Secretary-General:

- (1) To report on the current capacity of agricultural meteorology services, allowing the Commission to form appropriate capacity development responses, prioritize investments and mobilize resources, as well as to monitor and evaluate the success of the work of the Commission;
- (2) To provide appropriate information and resources, including information with respect to socioeconomic benefits, which Members can use to demonstrate the value of agricultural meteorology services to their national governments and other relevant organizations;
- (3) To liaise closely with Regional Training Centres and specialized centres on the provision and content of education and training courses and tools in agricultural meteorology to strengthen and expand training programmes in that discipline; this is to ensure adequate response to identified training requirements for agricultural meteorologists and understanding of the potential role of the Global Centres of Excellence in Agricultural Meteorology (G-CREAMs);

- (4) To provide training for an increased appropriate number of qualified agricultural meteorological technical personnel, nationally or regionally, to provide the basic services required by agriculture;
- (5) To promote more dialogue between farming communities and the National Meteorological and Hydrological Services to understand and enable the use of weather and climate information and their applications in agricultural decision-making processes;
- (6) To ensure the Agricultural Meteorology Programme is closely engaged with the Education and Training Programme so that agricultural meteorology requirements are appropriately included;
- (7) To arrange for the revision of the *Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology*, Volume I, Supplement No. 2 – Guidelines for Curricula in Agricultural Meteorology, into learning outcomes following the example of the *Guide to the Implementation of Education and Training Standards in Meteorology and Hydrology*;
- (8) To keep Supplement No. 2 as the current version until the new publication has been approved;
- (9) To enhance coordination of agricultural meteorological projects being delivered by other organizations, including donor agencies, and actively explore new funding opportunities;
- (10) To continue to improve access to, and the provision of, fellowships and sponsored exchange programmes;
- (11) To facilitate symposia, seminars and workshops identified by the Commission during its seventeenth session, as well as those identified during the intersessional period by its Management Group;
- (12) To facilitate, as appropriate and within available resources, the revitalization of inactive institutions to increase their capacities; and to strengthen strategic institutions that may serve as additional centres to the G-CREAMs;

**Invites Members:**

- (1) To promote and liaise with training institutions and universities on the new guidelines for learning outcomes on education and training in agricultural meteorology (that is, the *Guide to the Implementation of Education and Training Standards in Meteorology and Hydrology*);
- (2) To provide better dissemination of weather and climate information to their agricultural extension services;
- (3) To improve agricultural meteorological infrastructure in developing and least developed countries through regional and international support;
- (4) To improve collaboration among the various meteorological, climatological and agricultural research, education and extension institutions in various regions in the world.

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**Note:** This recommendation replaces Recommendation 3 (CAgM-16), which is no longer in force.

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### **Recommendation 4 (CAgM-17)**

#### **Review of relevant resolutions of the World Meteorological Organization governing bodies**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

#### **Noting:**

- (1) With satisfaction the action taken on its previous recommendations by the Executive Council,
- (2) Review of decisions and resolutions ([CAgM-17/INF 2.2](#)),

**Recommends** the following Executive Council resolutions and decisions be maintained in force:

- (1) Resolution 6 (EC-LX) – Establishment of a National Agrometeorological Station Network;
- (2) Decision 46 (EC-68) – Collaboration between the Commission for Atmospheric Sciences and the Commission for Agricultural Meteorology;
- (3) Decision 47 (EC-68) – Development of METAGRI Services Project;
- (4) Decision 43 (EC-69) – Establishment of a soil moisture demonstration project;
- (5) Decision 44 (EC-69) – Enhancing national and regional drought-monitoring systems;

**Recommends** the following World Meteorological Congress resolutions be maintained in force:

- (1) Resolution 21 (Cg-XVI) – Use of the Standardized Precipitation Index for characterizing meteorological droughts by all National Meteorological and Hydrological Services;
- (2) Resolution 22 (Cg-XVI) – Agricultural Meteorology Programme;
- (3) Resolution 43 (Cg-XVI) – Terms of reference of the technical commissions;
- (4) Resolution 17 (Cg-17) – Integrated Drought Management Programme.

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**Note:** This recommendation replaces Recommendation 4 (CAgM-16), which is no longer in force.

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### **Recommendation 5 (CAgM-17)**

#### **Continuation and strengthening of the work of the Commission for Agricultural Meteorology**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

#### **Recalling:**

- (1) That the Seventeenth World Meteorological Congress requested the Executive Council to provide recommendations to the Eighteenth Congress on constituent body constructs,
- (2) Decision 84 (EC-68) – Governance review,

(3) Decision 68 (EC-69) – WMO constituent body reform,

**Recommends** that the ongoing work and planned deliverables of the Commission for Agricultural Meteorology be taken into account in the ongoing governance review, and that all necessary arrangements to ensure their continuity be incorporated into the governance review outcomes.

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## APPENDIX 5. LIST OF PARTICIPANTS

### 1. Officers of the session

Byong-Lyol LEE	President of CAgM
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### 2. WMO Members represented in the technical commission

#### Argentina

Lorena FERREIRA (Ms)	Principal delegate
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#### Armenia

Valentina GRIGORYAN (Ms)	Principal delegate
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#### Australia

Vernon CARR	Principal delegate
Lynette BETTIO (Ms)	Alternate
Christa PUDMENZKY (Ms)	Delegate
Kathryn REARDON-SMITH (Ms)	Delegate
Roger STONE	Delegate

#### Bangladesh

Kawsar PARVIN	Principal delegate
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#### Belarus

Ekaterina ISTOMINA (Ms)	Principal delegate
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#### Belize

Shanea YOUNG (Ms)	Principal delegate
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#### Brazil

Francisco de Assis DINIZ	Principal delegate
Orivaldo BRUNINI	Alternate
Flavio Barbosa JUSTINO	Delegate

#### British Caribbean Territories

Adrian TROTMAN	Principal delegate
Shontelle STOUTE (Ms)	Delegate

#### Bulgaria

Valentin KAZANDJIEV	Principal delegate
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#### Canada

Allan HOWARD	Principal delegate
Raymond DESJARDINS	Alternate

#### Chile

Andrea ACEVEDO NÚÑEZ (Ms)	Principal delegate
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#### China

Guangsheng ZHOU	Principal delegate
Chaosheng LI	Alternate
Jianping GUO	Delegate
Sen LI	Delegate
Yan Ling SONG (Ms)	Delegate

#### Czechia

Filip CHUCHMA	Principal delegate
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#### Democratic Republic of the Congo

Nicolas EBENGO PANGA	Principal delegate
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#### Ecuador

Gilma CARVAJAL (Ms)	Principal delegate
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**Egypt**

Samy RATEB	Principal delegate
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**Ethiopia**

Dula Shanko LEBETA	Principal delegate
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**France**

Grégoire PIGEON	Principal delegate
Mathieu REGIMBEAU	Delegate

**Germany**

Udo BUSCH	Principal delegate
Cathleen FRUEHAUF (Ms)	Alternate

**Ghana**

Andrew Yaw NKANSAH	Principal delegate
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**Greece**

Anastasia PAPAKRIVOU (Ms)	Principal delegate
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**Hungary**

Attila Viktor KOVÁCS	Principal delegate
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**Indonesia**

Marjuki MARJUKI	Principal delegate
Ana Oktavia SETIAWATI (Ms)	Alternate

**Iran, Islamic Republic of**

Sayed Masoud MOSTAFAVI	Principal delegate
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**Ireland**

Keith LAMBKIN	Principal delegate
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**Israel**

Yiftach ZIV	Principal delegate
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**Italy**

Teodoro GEORGIADIS	Principal delegate
Anna DALLA MARTA (Ms)	Delegate

**Japan**

Akira MIYATA	Principal delegate
Kenji OSHIO	Delegate

**Kazakhstan**

Kamar SALIYEVA (Ms)	Delegate
Duman ZHOLDIN	Delegate

**Libya**

Mukhtar AGOUB	Principal delegate
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**Malawi**

Clement BOYCE	Principal delegate
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**Malaysia**

Fariza YUNUS (Ms)	Principal delegate
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**Mali**

Afoussatou DIARRA (Ms)	Delegate
Cheick Oumar KEITA	Delegate

**Mauritius**

Surekha RAMESSUR (Ms)	Principal delegate
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**Morocco**

Meriem ALAOURI (Ms)	Delegate
Omar CHAFKI	Delegate

**Myanmar**

May Khin CHAW (Ms)	Principal delegate
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**Netherlands**

Geert STERK	Principal delegate
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**Niger**

Aissatou Sitta ADAMOU (Ms)	Principal delegate
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**Nigeria**

Haruna ZAKARI	Principal delegate
James Ijampy ADAMU	Alternate

**Norway**

Berit NORDSKOG (Ms)	Principal delegate
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**Peru**

Constantino ALARCON VELASCO	Principal delegate
Karim Lisette QUEVEDO CAIÑA (Ms)	Delegate

**Philippines**

Edna JUANILLO (Ms)	Principal delegate
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**Republic of Korea**

Jaecheol NAM	Principal delegate
Heungjin CHOI	Alternate
Sewon KIM	Alternate
Changbum CHO	Delegate
Hyeyoung GO (Ms)	Delegate
Jinkyu HONG	Delegate
Baekjo KIM	Delegate
Hyun-Seok KIM	Delegate
Kyurang KIM	Delegate
Soo-Ock KIM (Ms)	Delegate
Byong-Lyol LEE	Delegate
Seung-Jae LEE	Delegate
Jongsook PARK (Ms)	Delegate
Seungkyun PARK	Delegate
Donghyun SHIN	Delegate
Dukjin WON	Delegate
Jaegwang WON	Delegate
Soyoung YIM (Ms)	Delegate

**Romania**

Elena MATEESCU (Ms)	Principal delegate
Daniel ALEXANDRU	Delegate
Lucian Gabriel PATRASCU	Delegate

**Russian Federation**

Natalia KOMISSAROVA (Ms)	Principal delegate
Alexander KLESHCHENKO	Alternate
Ekaterina TAYURSKAYA (Ms)	Delegate

**Senegal**

Oumar KONTE	Principal delegate
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**Slovakia**

Pavol NEJEDLÍK	Principal delegate
Lívia LABUDOVÁ (Ms)	Delegate

**Slovenia**

Andreja SUŠNIK (Ms)	Principal delegate
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**South Africa**

Sue WALKER (Ms)	Delegate
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**Spain**

Jose Pablo ORTIZ DE GALISTEO M.	Principal delegate
Ramiro ROMERO FRESNEDA	Alternate

**Sudan**

Amani ELSHEIKH (Ms)	Principal delegate
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**Thailand**

Sotharat INSAWANG (Ms)	Principal delegate
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**The former Yugoslav Republic of Macedonia**

Silvana STEVKOVA (Ms)	Principal delegate
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**Trinidad and Tobago**

Arlene AARON-MORRISON (Ms)	Principal delegate
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**Tunisia**

Hatem BACCOUR	Principal delegate
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**Ukraine**

Oleg SKOROPAD	Principal delegate
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**United Kingdom of Great Britain and Northern Ireland**

Felicity WORSFOLD (Ms)	Principal delegate
Catrina JOHNSON (Ms)	Alternate

**United Republic of Tanzania**

Isack YONAH	Principal delegate
Wilbert Timiza MURUKE	Alternate
Mecklina Merchades BABYEGEYA (Ms)	Delegate

**United States of America**

Harlan SHANNON	Principal delegate
John PRUEGER	Alternate
Jeffrey ANDRESEN	Delegate
William BOLHOFFER	Delegate
John QU	Delegate

**Zambia**

Lilian MZYECE (Ms)	Principal delegate
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**3. WMO Members not represented in the technical commission****Bosnia and Herzegovina**

Borislav MARIC	Principal delegate
Nedžad VOLJEVICA	Delegate

**Chad**

Gaya DJERGO	Principal delegate
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**Liberia**

Arthur GAR-GLAHN	Principal delegate
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**Luxembourg**

Andrew FERRONE	Principal delegate
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**4. Invited experts**

Ahmedin ABDULKERIM  
Tatiana ANDRY ARIVELO (Ms)  
Seoyeon CHU (Ms)  
Mohamed EL MAMY  
Tsegaye Ketema HAILE  
Maria del Carmen HOECHST VELEZ (Ms)  
Jongok JANG  
Almaz Tadesse JIFAR (Ms)  
Ibrahim Sinneh KAMARA  
Byung-jin KANG  
Odile KILAMBALAMBA MAYADILA (Ms)  
Jinmi KIM (Ms)  
Hoesung LEE  
Sang-Bum LEE  
Sungho LEE  
Francisca MARTEY (Ms)  
Michael MAWUTOR TANU  
Kodjenini MIAN  
Manasah MKHABELA  
Jeonghoon MOON  
Philippe RICHARD  
Saeeda SALEH (Ms)  
Byunghyun SONG  
Federico SPANNA  
Caifang WANG  
Elizabeth WEIGHT (Ms)  
Jeong-Bok YOO

**5. Representatives of international organizations and other bodies****United Nations Framework Convention on Climate Change**

Walters TUBUA

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For more information, please contact:

**World Meteorological Organization**

7 bis, avenue de la Paix – P.O. Box 2300 – CH 1211 Geneva 2 – Switzerland

**Communication and Public Affairs Office**

Tel.: +41 (0) 22 730 83 14/15 – Fax: +41 (0) 22 730 80 27

Email: [cpa@wmo.int](mailto:cpa@wmo.int)

**[public.wmo.int](http://public.wmo.int)**