

International Civil Aviation Organization

ICAO

INFORMATION PAPER**ICAO Asia and Pacific (APAC)**Twenty-Sixth Meeting of the Meteorology Sub-Group
(MET SG/26)

Online, 1 to 5 August 2022

Agenda Item 6: Research, development and other initiatives**WMO ACTIVITIES OF RELEVANCE TO ICAO**

(Presented by the World Meteorological Organization, WMO)

SUMMARY

This information paper provides an overview of some of the recent activities of the World Meteorological Organization (WMO) of relevance to ICAO, particularly in the context of WMO's latest organization structures, engagement with ICAO and other agencies at the global and regional levels, recent and upcoming events, and other noteworthy information including links to WMO resources.

Action by the meeting is in paragraph 3.

1. INTRODUCTION

1.1 ICAO and the World Meteorological Organization (WMO) coordinate, collaborate and cooperate on international standards for aeronautical meteorological service provision, as contained in ICAO Annex 3/WMO Technical Regulations (WMO-No. 49), Volume II, Meteorological Service for International Air Navigation and supporting ICAO and WMO guidance material. Where resources allow, WMO continues to play an active role in supporting its Members and partners including ICAO in the establishment, maintenance and implementation of these international standards.

1.2 This information paper provides an overview of some of the recent activities of WMO of relevance to ICAO, particularly in the context of WMO's latest organization structures, engagement with ICAO and other agencies at the global and regional levels, recent and upcoming events, and other noteworthy information including links to WMO resources.

2. DISCUSSION**2.1 Latest organization structure in the WMO Services for Aviation activity area**

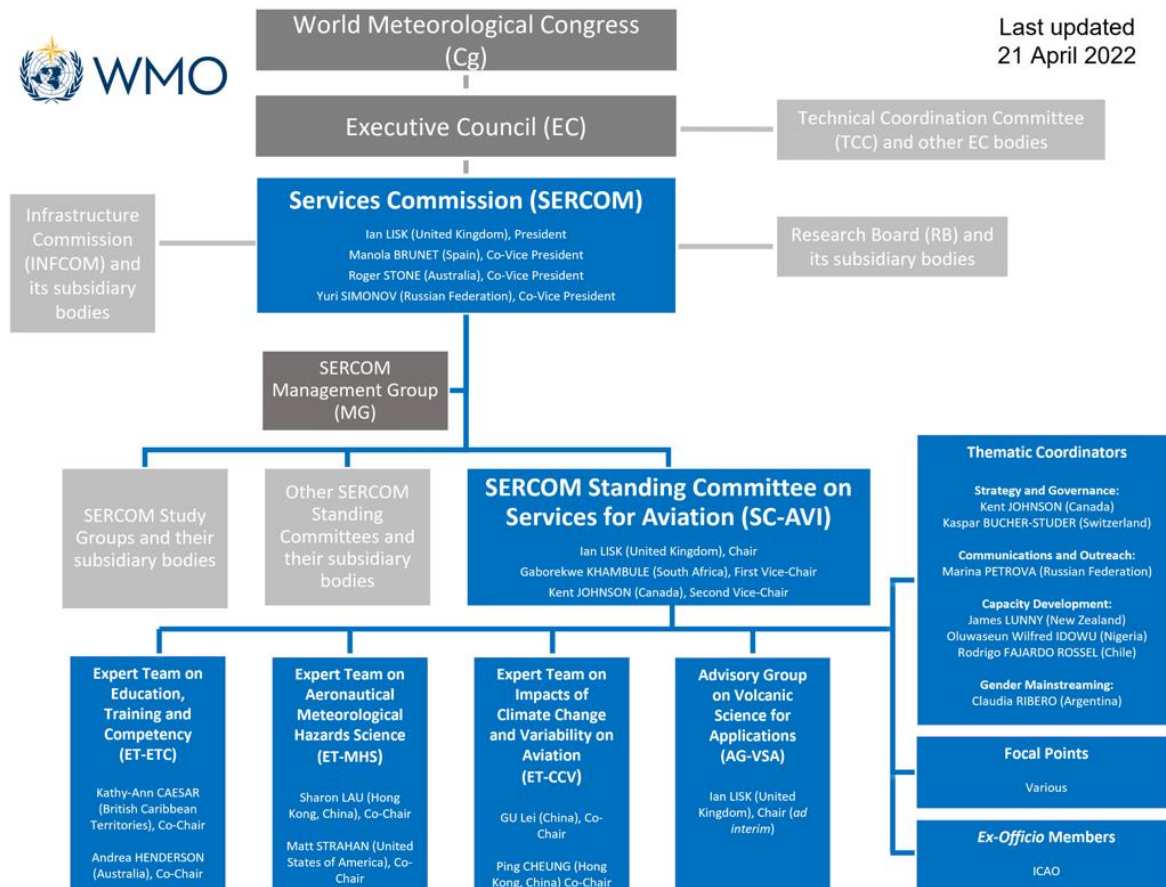
2.1.1 As reported to the last meeting (through [METSG/25-IP/16](#)), in 2019 WMO embarked on a major reform of its governance structures. This reform, by far the largest reform in the Organization's 70-year history, included a restructuring (consolidation and repurposing) of all extant

technical commissions as well as an alignment of the WMO Secretariat with the new WMO constituent bodies' structure.

2.1.2 Since 2019, the WMO Secretariat has worked extensively with WMO Members to implement the reforms. The Commission for Aeronautical Meteorology (CAeM), along with all other *intergovernmental* technical commissions, were dissolved. In its place, a new *non-governmental* Standing Committee on Services for Aviation (SC-AVI) was established under a new *intergovernmental* Commission for Weather, Climate, Water and Related Environmental Services and Applications (abbreviated to 'Services Commission' or SERCOM).

2.1.3 SC-AVI comprises approximately 20 experts, with representation from across all six WMO Regions. Its primary purpose is to contribute to furthering the standardized provision of meteorological services for international air navigation and to provide assistance to Members with aeronautical meteorological services to achieve compliance with those standards. ICAO is an ex-officio member of SC-AVI and, as such, is a key collaborator in all the Standing Committee's activities.

2.1.4 An illustration of the latest WMO organizational structure as it relates to SC-AVI is as follows:



2.1.5 As the foregoing graphic illustrates (bottom row), SC-AVI is currently supported by three expert teams (ET) and one advisory group (AG). Information on these SC-AVI subsidiary bodies is available via the following links: [ET-ETC](#), [ET-MHS](#), [ET-CCV](#) and [AG-VSA](#). In addition, several thematic coordinators and other focal points contribute to the work of the Standing Committee ([more information here](#)).

2.1.6 Final reports, executive summaries and other information pertaining to the outcomes of meetings of SC-AVI and its subsidiary bodies are [available here](#).

2.1.7 In part as a consequence of Governance Reform as well as the outcomes of intergovernmental and executive level meetings held in 2014 and 2017, WMO is continuing to explore way-and-means to enhance its coordination, collaboration and cooperation with ICAO, particularly but not only in the aeronautical meteorology domain. The WMO and ICAO Secretariat are presently engaged in preparing an update to their formal working arrangements, which were first established in 1954 and last updated in 1963. It is anticipated that the update to the working arrangements will be finalized and signed by the WMO Secretary-General and ICAO Secretary General later in 2022 or 2023.

2.1.8 Insofar as the WMO Secretariat is concerned, in 2021 two new staff members joined the Services for Aviation (AVI) Division. This means that the AVI Division is now staffed by Mr Greg Brock, Head, Ms Stéphanie Wigniolle, Scientific Officer, and Ms Adriana Oskarsson, Associate Programme Officer. The Secretariat of the AVI Division is contactable via email: aviation@wmo.int

2.2 Outcomes of an Extraordinary Session of the World Meteorological Congress

2.2.1 In October 2021 WMO convened an Extraordinary Session of the World Meteorological Congress, Cg-Ext. (2021). Owing to the prevailing impacts of the COVID-19 pandemic, this was the first time ever that a session of Congress had been convened entirely online. Extraordinary Congress adopted 12 resolutions in total.

2.2.2 Three noteworthy resolutions concern a new [WMO Unified Data Policy](#) (or the ‘*Unified Policy for the International Exchange of Earth System Data*’ to give it its full title), the Global Basic Observing Network (GBON) and a Systematic Observations Financing Facility (SOFF). Individually and collectively these resolutions, complemented by technical regulations and other enablers, are intended to significantly improve the provision of weather and climate services through enhanced availability of and access to observational and forecast data from around the world. The WMO Unified Data Policy establishes clear commitments for the free-and-unrestricted exchange of Earth system data. Meanwhile, the GBON represents a new approach to the design of the basic surface-based observing network. And the SOFF will provide dedicated access to long-term grants and technical assistance, especially targeting least developed countries (LDC) and small island developing States (SIDS), thereby helping to build long-term sustainability and Members’ compliance with the WMO technical regulations.

2.2.3 The next (regular) session of the World Meteorological Congress is expected to take place in May/June 2023.

2.3 WMO contribution to global initiatives (non-exhaustive)

2.3.1 Within the available resources, WMO continues to play an active role in the activities of the ICAO Meteorology Panel (METP) and its working groups (presently WG-MRAD, WG-MIE, WG-MOG and WG-MCRGG) addressing an array of topics including but not limited to:

- Hazardous weather information service (HWIS) concept;
- De-icing requirements, long-haul operations requirements and terminal area requirements;
- Low-level ice crystal observations as well as high-altitude ice crystal icing;
- ICAO meteorological information exchange model (IWXXM) requirements, IWXXM extensions and IWXXM documentation;

- MET in SWIM (system-wide information management);
- Operation and development of global MET systems, namely:
 - International airways volcano watch (IAVW);
 - World area forecast system (WAFS);
 - Secure aviation data information system (SADIS) and WAFS internet file service (WIFS);
 - Space weather (SWx) information service;
- Cost recovery guidance and governance including issues associated with redefinition of ‘meteorological authority’ and emerging data management/access issues and policies.

2.3.2 In the context of IWXXM, WMO continues to be responsible, at the request of ICAO, for the development and the publication of the IWXXM schemas. The latest version of the IWXXM schemas – namely version 2021-2 – was published by WMO on 15 November 2021 and is [available for operational use here](#). This version enables the IWXXM-related requirements of Amendment 79 to ICAO Annex 3 to be fulfilled. Technical specifications pertaining to IWXXM are included in the [*Manual on Codes \(WMO-No. 306\), International Codes, Volume I.3 – Annex II to the WMO Technical Regulations: Part D – Representations derived from data models*](#).

2.3.3 In addition to the above-mentioned METP-related activities, WMO actively contributes to the ICAO Airport Economics Panel and Air Navigation Services Economics Panel (AEP-ANSEP) on matters that include charges for and cost recovery of aeronautical meteorological service provision. The most recent discussions in this regard relate to the cost recovery models of the space weather information service, which became operational in November 2019. In addition, in 2021 WMO regained observer status on the ICAO Committee on Aviation Environmental Protection (CAEP). As a consequence, WMO expertise is now contributing to the work of CAEP Working Group 2 addressing airport and operations as well as CAEP ISG addressing impacts and science.

2.3.4 In respect of the International Air Transport Association (IATA), WMO continues to actively contribute to its Accident Classification Task Force (ACTF). WMO is a key contributor to the preparation of the annual IATA Safety Report, which provides an in-depth review and essential insight into global and regional accident rates and contributing factors, including those relating to weather/meteorological conditions and/or the unnecessary penetration by flight crew into adverse weather/meteorological conditions. The latest (2021) IATA Safety Report (published in April 2022) is [available here](#). WMO also continues to collaborate with IATA on the further expansion and enhancement of the WMO AMDAR (Aircraft Meteorological Data Relay) observing system, through a WICAP arrangement (WMO-IATA Collaborative AMDAR Programme). Further information on the AMDAR observing system and the WICAP is [available here](#).

2.3.5 Recognizing growing interest on the impacts of climate change and variability on aviation, WMO has also periodically engaged, mostly informally or through existing bodies such as ICAO CAEP, with experts from IATA, Airports Council International (ACI) and the European Union Aviation Safety Agency (EASA) on matters of common interest, such as the downscaling of climate scenarios to the regional or local level, climate adaptation and resilience and extreme weather event preparedness and mitigation.

2.4 WMO contribution to regional initiatives (non-exhaustive)

2.4.1 Within the available resources, WMO has contributed to activities or developments at a regional level, such as the supply of advice on the establishment of cost recovery arrangements, the implementation of quality management systems, the establishment of bilateral and/or multilateral SIGMET coordination arrangements and updates to regional SIGMET guides.

2.4.2 In addition, WMO has conducted several training events within the regions, including an Aviation Meteorology Training Seminar in November 2021, which was an online event convened in collaboration with the United Kingdom Met Office and Meteorological Service Singapore. The seminar provided training to nearly 50 forecasters and other staff working at aeronautical meteorological services in Africa, Europe, the Middle East and Asia/Pacific, in topics that included the issuance of SIGMET and the implementation of a competency framework. Information on the 2021 seminar, including access to the pre-recorded content, is [available here on the Services for Aviation Moodle training portal](#) (free registration). A similar online training seminar is expected to be convened by WMO and partner national meteorological services in November 2022. Information will be announced via the [WMO Services for Aviation website](#) in due course.

2.5 Other relevant developments/initiatives

Long-term plan for aeronautical meteorology

2.5.1 In 2019 WMO published its inaugural long-term plan for aeronautical meteorology. The long-term plan provides a framework upon which aeronautical meteorological service providers of Members/States in particular, and the broader meteorology and aviation communities in general, can plan a progressive transformation from a conventional “product-centric” approach to a modern “information-centric” approach to service provision for aviation through to 2030 and beyond.

2.5.2 The Standing Committee on Services for Aviation has recently commenced the preparation of an update to the long-term plan. The update (constituting the second edition) will seek to elaborate upon some of the many factors influencing the current and future provision of aeronautical meteorological services, including the investment in the global weather enterprise, the recovery from the Coronavirus disease (COVID-19) pandemic, the aviation industry’s demand for seamless, high-quality, georeferenced, digitized meteorological information on a worldwide basis, the advances in science and technology (for example high-resolution, ensemble prediction systems), and the future role of aeronautical meteorological personnel.

2.5.3 The update to the long-term plan is expected to be published in 2024. In the meantime, the first edition (2019) is [available here](#) (English only).

Gender equality in aeronautical meteorology

2.5.4 In 2021 WMO conducted a global survey on gender equality in the aeronautical meteorology domain. The survey was designed to collate information on respondents’ experience regarding gender equality in the workplace and the empowerment of women in the aeronautical meteorology domain in general. Staff and management working in this domain, including observers, forecasters, researchers and service managers, from the public and private sector were encouraged to complete the survey. More than 500 responses to the survey were received from across all six WMO Regions.

2.5.5 The final comprehensive results of the survey, on a global and regional basis, are currently being analyzed by the Standing Committee on Services for Aviation. Findings and recommendations arising from the survey will be published later in 2022 as part of the WMO Aeronautical Meteorology (AeM) Series of publications. The results of the survey will be used by the

Standing Committee to devise strategies to increase the involvement of women in the work of WMO, to encourage the promotion of them to higher (leadership) positions of responsibility at the national and international level, and will help integrate a holistic gender equality perspective through WMO's gender action plans and related initiatives. The report on the outcomes of the 2021 gender survey will be accessible via [this link](#) (under 'Other publications' – AeM SERIES).

Aviation Research and Development Project

2.5.6 In 2021 WMO launched Phase 2 of an Aviation Research and Development Project (AvRDP2). AvRDP2 is a joint collaboration between the WMO Research Board World Weather Research Programme and the Services Commission Standing Committee on Services for Aviation.

2.5.7 Following on from the success of a Phase 1 AvRDP (2015-2019), the Phase 2 project (2021-2025) aims to develop, demonstrate and quantify the benefits of improvements to the forecasting of significant convection and associated hazards, gate-to-gate. The Project also intends to devote special attention on developing and demonstrating advancements in probabilistic forecasting and statistical methods (for providing confidence information and other assessments for the end-users), as well as on forecast verification and validation.

2.5.8 An AvRDP2 Scientific Steering Committee (SSC) and Community Advisory Group (CAG) have been established in addition to a collaborative partnership between WMO and the Hong Kong University of Science and Technology (HKUST). The AvRDP2 SSC, in consultation with the CAG and HKUST, is presently finalizing a science plan for the project.

Aeronautical Meteorology Scientific Webinars

2.5.9 The most recent Aeronautical Meteorology Scientific ('AeroMetSci') Conference was convened by WMO in collaboration with Météo-France in Toulouse, France in November 2017. Based on the success of AeroMetSci-2017 there were calls, from the 200+ participants, for WMO to convene a similar conference within a 3-to-5-year timeframe. Regrettably, owing to the impacts of the COVID-19 pandemic, WMO had to take the difficult but necessary decision to delay its plans to convene an AeroMetSci conference in 2022. The next physical conference is therefore expected to take place in 2024 (at the earliest).

2.5.10 In the meantime, WMO convened a series of AeroMetSci Webinars (web-based seminars) on 7, 8 and 9 June 2022. The theme of the webinars was: "*Scientific and technological innovation in observation and forecast of severe convection to enable service delivery transformation and improve aviation safety*". The webinars showcased some of the latest state-of-the-art scientific and technological advances taking place nationally, regionally and globally. The webinars were a blend of pre-recorded video presentations and live panel discussions. Approximately 450 delegates attended the webinars held across the six WMO regions.

2.5.11 The following links provide information on the webinars, including the concept note, programme and access to the pre-recorded video presentations and recordings of the panel discussions:

- [WMO Regional Association II \(Asia\) and Regional Association V \(South-West Pacific\)](#), held 7 June 2022, 0400-0700 UTC, Online
- [WMO Regional Association I \(Africa\) and Regional Association VI \(Europe\)](#), held 8 June 2022, 1100-1400 UTC, Online

- [WMO Regional Association III \(South America\) and Regional Association IV \(North America, Central America and the Caribbean\)](#), held 9 June 2022, 1600-1900 UTC, Online

Further AeroMetSci webinars may be convened by WMO in 2023, potentially addressing turbulence and icing. Information will be announced via the [WMO Services for Aviation website](#).

Biannual newsletters

2.5.12 WMO issues newsletters on a biannual basis to bring the community up-to-date on the latest global and regional developments in aeronautical meteorology, including national and regional case studies or good practice examples. The most recent WMO Services for Aviation Newsletter (Issue No. 1/2022) was published in June 2022 and is [available here](#). Previous newsletters are [available here](#). Anyone wishing to subscribe (for free) to future newsletters is invited to email a request to the WMO Secretariat: aviation@wmo.int

New and recently updated WMO publications

2.5.13 New and recently updated WMO publications of direct or indirect relevance to aeronautical meteorology include:

- [Technical Regulations \(WMO-No. 49\), Volume II, Meteorological Service for International Air Navigation](#) (2021 update)
- [Manual on Codes \(WMO-No. 306\) – International Codes, Volume I.2, Part B – Binary Codes and Part C – Common Features to Binary and Alphanumeric Codes](#) (2021 update)
- [Manual on Codes \(WMO-No. 306\) – International Codes, Volume I.3, Part D – Representations derived from data models](#) (2021 update)
- [Manual on the Global Data-processing and Forecasting System \(WMO-No. 485\)](#) (2021 update)
- [Manual on the WMO Information System \(WMO-No. 1060\)](#) (2021 update)
- [Manual on the WMO Integrated Global Observing System \(WMO-No. 1160\)](#) (2021 edition)
- [Guide to the WMO Integrated Global Observing System \(WMO-No. 1165\)](#) (2021 update)
- [Guidelines for Public-Private Engagement \(WMO-No. 1258\)](#) (2021 edition)
- [Aerodrome Reports and Forecasts: A User's Handbook to the Codes \(WMO-No. 782\)](#) (2022 edition)

2.5.14 These and many other WMO publications are available via the [WMO e-Library](#). Pertinent publications are also [listed here](#).

2.5.15 WMO is presently preparing major updates to the [Guide to Practices for Meteorological Offices Serving Aviation \(WMO-No. 732\)](#) and the [Guide to Aeronautical](#)

[Meteorological Services Cost Recovery: Principles and guidance \(WMO-No. 904\)](#). These updates are expected to be published in late 2023.

Discontinuation of WMO-No. 49, Volume II

2.5.16 In response to outcomes of the Sixteenth Session of the Commission for Aeronautical Meteorology (CAeM-16) in 2018 and the Eighteenth Session of the World Meteorological Organization (Cg-18) in 2019, WMO is taking necessary steps to discontinue the *Technical Regulations* (WMO-No. 49), Volume II, *Meteorological Service for International Air Navigation* owing, essentially, to its duplication of ICAO Annex 3 (and upcoming *Procedures for Air Navigation Services – Meteorology*, PANS-MET).

2.5.17 WMO is presently engaged in discussions with ICAO to explore options that would enable WMO Members and their aeronautical meteorological service providers to gain necessary and appropriate access to ICAO Annex 3 and PANS-MET as a minimum.

2.5.18 A plan of action for the discontinuation of WMO-No. 49, Volume II is currently underway. Potentially, Parts I and II of WMO-No. 49, Volume II, which concern core standards, recommended practices, appendices and attachments will be discontinued in 2023. Meanwhile, Parts III and IV of WMO-No. 49, Volume II will, potentially, be discontinued only once material of continuing relevance has been incorporated into ICAO PANS-MET (provisionally 2026).

2.6 Upcoming WMO meetings/events

2.6.1 The COVID-19 pandemic continues to have an impact on planned meetings/events of WMO, although the impacts are lessening over time reflected in a gradual return to hybrid and, eventually, physical meetings. The following provides an indication of upcoming global WMO meetings/events of relevance, together with web links where available. The information provided here is subject to change.

- Second Session of the Services Commission (SERCOM-2), 17-21 October 2022, Geneva, Switzerland and Online
- Seventy-sixth Session of the Executive Council (EC-76), April 2023, Geneva, Switzerland
- Nineteenth Session of the World Meteorological Congress (Cg-19) and Seventy-seventh Session of the Executive Council (EC-77), June 2023, Geneva, Switzerland
- Third Meeting of the Standing Committee on Services for Aviation (SC-AVI-3), September 2023, Geneva, Switzerland

2.7 Available WMO resources and further information

2.7.1 WMO continues to maintain a Services for Aviation website, [available here](#). This website contains information and resources associated with WMO's Services for Aviation activity area, including direct access to regulatory and guidance materials, meeting documentation and reports, survey findings, newsletters, capacity development training aids and more.

2.7.2 Recently WMO has also enhanced its Services for Aviation Moodle training portal, [available here](#). Supplementing the above-mentioned website, the Moodle training portal specifically provide aeronautical meteorology training and guidance material sourced from around the world, covering both operational and non-operational aspects of aeronautical meteorology. The portal's

primary focus is the specialist needs of the aeronautical meteorological forecaster. To benefit from the full suite of materials hosted on the Moodle training portal, users are encouraged to [register an account, for free, via this link](#).

3. ACTION BY THE MEETING

- 3.1 Note the information contained in this paper.
