W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N

COMMISSION FOR AERONAUTICAL METEOROLOGY

EXPERT NETWORK ON AERONAUTICAL METEOROLOGICAL HAZARDS SCIENCE (EN-MHS)

FIRST MEETING*

Centurion, Pretoria, South Africa

22 to 23 August 2019

FINAL REPORT

** Back-to-back with a Seminar and Scientific Steering Committee Meeting of the WMO CAS/CAeM Aviation Research and Demonstration Project (AvRDP) of the World Weather Research Programme (WWRP)*

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GROUP PHOTO

Pictured (left to right): Ian Lisk, Greg Brock, Herbert Puempel, Sum Yee (Sharon) Lau, Piers Buchanan, Larisa Nikitina, Michael Berechree, Nanette Lomarda, Matt Strahan, Kamaljit Ray, Stéphanie Desbios, Beth Ebert, Yuki Kato, Ping Wah (Peter) Li, Fengyun Wang and Morné Gijben

Not pictured: Gaborekwe Khambule and Naoko Komatsu

1. ORGANIZATION OF THE MEETING

1.1. Opening of the meeting

1.1.1. The opening of the first meeting of the Commission for Aeronautical Meteorology (CAeM) Expert Network on Aeronautical Meteorological Hazards Science (EN-MHS/1) took place at 1400 hours on Thursday 22 August 2019 at the offices of the South African Weather Service (SAWS) on the Eco-Park Estate in Centurion, Pretoria, South Africa. Members of a Scientific Steering Committee (SSC) of a CAS/CAeM Aviation Research and Demonstration Project (AvRDP) of the World Weather Research Programme (WWRP) observed the EN-MHS/1 meeting on 22 August 2019 to discuss items related to AvRDP.

1.1.2. Mr Ian Lisk, president of the Commission for Aeronautical Meteorology (P/CAeM), expressed thanks to the government of South Africa and SAWS for their willingness and ability to host the meeting and he extended a warm welcome to all participants.

1.1.3. Ms Sum Yee (Sharon) Lau and Mr Matt Strahan, co-leads of the CAeM Expert Network on Aeronautical Meteorological Hazards Science (EN-MHS), also welcomed participants and thanked SAWS for hosting the meeting. They outlined the main purposes of the meeting which were to:

(a) assist the Scientific Steering Committee of the WMO CAS/CAeM AvRDP establish proposals for future aviation research for the consideration of an upcoming twelfth meeting of a WWRP SSC (WWRP/SSC-12),

(b) establish needs and expectations for a future Aeronautical Meteorology Scientific Conference (AeroMetSci), and

(c) finalize a first iteration of a work plan for EN-MHS.

1.1.4. Participants appreciated that, in view of commonalities in expert membership and to maximise the opportunity, the EN-MHS/1 meeting was being held back-to-back with an AvRDP Seminar and SSC Meeting that had taken place at the same location from 19 to 22 August 2019. In addition, participants appreciated the presence of the vice-president of CAeM, Ms Stéphanie Desbios, a co-lead of the CAeM Expert Network on Aeronautical Meteorological Information Services and Governance (EN-ISG), Mr Michael Berechree, and a co-lead of the CAeM Expert Team on Education, Training and Competency (ET-ETC), Ms Gaborekwe Khambule to facilitate coordination within the CAeM subsidiary structures.

1.1.5. On behalf of the WMO Secretary-General, Prof Petteri Taalas, Mr Greg Brock, Acting Chief of the Aeronautical Meteorology (AEM) Division of WMO extended a warm welcome to all participants and thanked SAWS for their generous hosting and logistical support.

1.1.6. The meeting was co-chaired by Ms Lau and Mr Strahan while Mr Brock served as Secretary. Ms Nanette Lomarda, Senior Scientific Officer of the World Weather Research Department of WMO also assisted the meeting on 22 August 2019.

1.2. Adoption of the agenda (Doc. 1.2)

1.2.1. The meeting adopted the agenda as shown at Annex 1 to this report.

1.2.2. The full list of participants is given at Annex 2 to this report.

1.3. Working arrangements

1.3.1. The meeting adopted appropriate working arrangements, including an order of business.

2. OBJECTIVES AND TERMS OF REFERENCE OF EN-MHS (Doc. 2)

2.1. The meeting was apprised that at the sixteenth session of the Commission for Aeronautical Meteorology (CAeM-16) held in July 2018, through Recommendation 6 (CAeM-16), the Commission had agreed that one of its five priority themes for the next WMO financial period (2020-2023) should be aeronautical meteorological hazards prediction (WMO-No. 1222 refers). Recommendation 6 (CAeM-16) was subsequently endorsed by the Eighteenth World Meteorological Congress (Cg-18) in June 2019 (WMO-No. 1236, Part I, refers). As a consequence, P/CAeM in coordination with the CAeM Management Group had established EN-MHS to address this priority theme.

2.2. The meeting undertook a review of the objective and terms of reference of EN-MHS and agreed that a minor amendment to the terms of reference was necessary as given at Annex 3 to this report. The meeting agreed that the terms of reference should accordingly be updated on the WMO website and reflected in Part A of the EN-MHS work plan. **ACTION AGREED EN-MHS 1/1**

2.3. In connection with the work plan of EN-MHS, the meeting appreciated that a review and update of the work plan – Parts A and B comprising deliverables, activities, responsibilities and deadlines – would be undertaken as part of Agenda Item 5.

3. OUTCOMES OF AvRDP SEMINAR AND SSC MEETING OF RELEVANCE TO EN-MHS (PPT. 3)

3.1. The meeting undertook a review of preliminary outcomes of a Seminar and Scientific Steering Committee (SSC) Meeting of the CAS/CAeM Aviation Research and Demonstration Project (AvRDP) which were held immediately prior to EN-MHS/1.

3.2. Acknowledging that 2019 marked the final year of a five-year AvRDP project residing within WMO's World Weather Research Programme (WWRP) demonstrating nowcasting and very short-range forecasting techniques in support of aviation operations in the terminal area (TMA), EN-MHS experts assisted the AvRDP SSC members present in the formulation of a draft vision statement and proposals for future scientific research efforts. This response by the AvRDP SSC, with the assistance of EN-MHS, was consistent with Resolution 17 (EC-71) where the Executive Council of WMO had decided to supress Decision 44 (EC-68), *Intercommission Aviation Research Project,* in view of an understanding that 2019 would be the last year of AvRDP, that the outcomes of the project would be reviewed by a WWRP Scientific Steering Committee in October 2019, and that CAS and CAeM would analyse the next steps[1].

3.3. Participants exchanged views on where the next aviation research project, if endorsed, should focus scientific research efforts over the coming years given some of the following considerations:

(a) the evolving needs of aviation users as articulated through ICAO's Global Air Navigation Plan (GANP) and its aviation system block upgrades (ASBU) methodology,

(b) the progress of AvRDP between 2015 and 2019,

(c) the outcomes of a WMO Aeronautical Meteorology Scientific Conference in 2017 (AeroMetSci-2017),

(d) the long-term plan for aeronautical meteorology (LTP-AeM) published by WMO as AeM SERIES No. 5 (available here),

(e) the end-users' (ATM, pilots, airlines, etc.) needs, and

[1] WMO-No. 1237, Parts I and II, available here, refer.

(f) the focus areas of the ICAO Meteorology Panel including but not limited to the enhancement of the world area forecast system (WAFS) and the introduction of a regional hazardous weather advisory system.

In addition, participants were mindful of the continued threats posed to aviation safety, air navigation efficiency etc. by hazardous weather/meteorological conditions which can, in some instances, result in runway/taxiway excursions, loss-of-control in-flight (LOC-I) or controlled flight into terrain (C-FIT).

3.4. A recommended priority to emerge from the discussion centred on significant convection and associated hazards including but not limited to high-altitude ice crystal icing and convectively induced turbulence[2]. In respect of other phenomena hazardous to aviation such as clear air turbulence, low-level wind shear, wake vortices, low cloud and low visibility including fog, the meeting recognized that, while of no less importance to aviation than significant convection, say, progress in these areas could be expected to continue as a routine activity ('business as usual') within the meteorological/scientific research community without necessitating a large scale WMO research project such as a WWRP Core project, but how to proceed with this would be subject to a decision of the WWRP SSC in consultation with the presidents of CAS and CAeM. Indeed, regular reporting on scientific research progress in such areas was strongly encouraged through channels such as EN-MHS and the WWRP Aviation Research project successor of AvRDP.

3.5. With respect to improving meteorological observing and forecasting techniques, the meeting suggested that special attention could be placed on the advancement of probabilistic forecasting and statistical methods (for providing confidence information and other assessments for the end-users), as well as on verification and validation. It was recognized that advances in these areas would, in particular, better involve the end-users including enabling MET-ATM impact translation and impact-based ATM decision support. In this connection, the meeting appreciated that early involvement of the end-users should be encouraged and that capacity building development for WMO Members would be required to ensure the appropriate integration of MET into ATM decision support.

3.6. In respect of a draft vision statement for future scientific research efforts, the meeting formulated the following proposal:

> *"Leveraging advances in meteorological observing, nowcasting and forecasting research to enable the delivery of risk-based, hazard-impact information services that fully meet aviation users' needs."*

3.7. The meeting noted that the foregoing draft vision statement and proposals for future scientific research efforts would be discussed, adjusted if necessary, and ultimately finalized within the AvRDP SSC prior to submission to WWRP/SSC-12 Meeting scheduled for 1 to 4 October 2019 in Geneva, Switzerland.

3.8. In addition, the meeting noted that, taking into account the outcomes of AvRDP between 2015 and 2019, the AvRDP SSC was leading the preparation of a compendium (or similar) of best practices in nowcasting and very short-range forecasting techniques in support of aviation operations with emphasize on MET-ATM integration in the terminal area, expected to be produced in draft form before the end of 2019. The EN-MHS agreed to assist the AvRDP SSC in this regard. **ACTION AGREED EN-MHS 1/2**

3.9. While AvRDP SSC members were in attendance, the opportunity was taken by EN-MHS to discuss needs and expectations in the context of an Aeronautical Meteorology Scientific Conference (AeroMetSci) in the next WMO financial period (2020-2023) – in line with Deliverable No. 2 of the EN-MHS work plan.

[2] Sometimes also referred to as 'convection-induced turbulence' and 'convective induced turbulence'.

3.10. Given the scope and outcomes of AeroMetSci-2017 held in Toulouse, France in November 2017 (WMO Publication AeM SERIES No. 2 refers), as well as the scientific research progress that continues to be made through projects such as AvRDP, the meeting agreed that, relative to the 2017 event, there would be potential merit during the next conference to:

(a) narrow the science focus to a small(er) number of key topics;

(b) expand the focus on MET-ATM integration; and

(c) expand the focus on climate change and variability impacts on aviation.

3.11. The meeting appreciated that conducting a conference of a similar size and duration to the 2017 event (which attracted more than 200 participants over 4 days) would be a significant undertaking requiring the dedicated support of experts within the meteorological and aviation communities as well as WMO secretariat resources. The meeting considered that the second half of 2021 could be a desirable target timeframe for the next AeroMetSci (with planning likely to commence approximately one year prior) subject to other foreseen commitments and the identification of an appropriate budget, host, sponsor(s), etc. It was noted that such details could be reflected in the EN-MHS work plan (Agenda Item 5 refers). Given that AeroMetSci-2017 as well as the CAeM-16 and its Technical Conference (TECO) were held in Europe – Toulouse, France and Exeter, United Kingdom respectively – and also that a WMO/IUGG International Workshop on Volcanic Ash was likely to take place also in Europe, potentially Iceland, in late 2020, the meeting noted that it may be necessary or desirable to convene the next AeroMetSci outside of the European footprint.

3.12. Brief consideration was also given by participants to the potential benefit of convening a training event (or similar) back-to-back with the next AeroMetSci. In this regard, the meeting agreed at this stage to not exclude this idea from future planning consideration but that primary focus should be on the delivery of another highly successful conference.

4. OUTCOMES OF Cg-18 OF RELEVANCE TO EN-MHS (PPT. 4(1) and PPT. 4(2))

4.1. The meeting was apprised of outcomes of relevance to EN-MHS of the Eighteenth World Meteorological Congress (Cg-18) held in Geneva, Switzerland from 3 to 14 June 2019, including but not limited to:

(a) Resolution 27 (Cg-18) concerning endorsement of the recommendations of the CAeM-16 session held in July 2018;

(b) Resolution 28 (Cg-18) concerning endorsement of a long-term plan for aeronautical meteorology prepared by the CAeM;

(c) Resolution 7 (Cg-18) on the establishment of a new technical commission structure comprising an 'Infrastructure Commission' and a 'Services Commission'; and

(d) Resolutions 8 and 10 (Cg-18) respectively on the establishment of a new 'Research Board' and 'Scientific Advisory Panel'.

4.2. Information was given on the implications of the foregoing outcomes on the CAeM and its subsidiary bodies including EN-MHS as well as on the Commission for Atmospheric Sciences (CAS). In addition, information was given on key milestones and activities over the coming several months and over the next financial period (2020-2023) as WMO progresses with its 'governance reform' agenda. The meeting welcomed news that the president of CAeM, Mr Lisk, had been elected by Congress to serve as president of the new Services Commission.

4.3. The meeting discussed a number of the salient aspects of WMO Reform, in particular the envisaged function and form of WMO's work in the aeronautical meteorology domain as

well as the Organization's interface with partners such as ICAO. The meeting appreciated that while WMO Reform offered tremendous opportunity for the Organization, its Members, contributing experts and partners to be more efficient and more effective with the resources available to address the priority needs, it also presented challenges that would have to be overcome during and/or subsequent to a transition phase that was currently underway in advance of the Seventy-Second Session of the WMO Executive Council (EC-72) scheduled for June 2020.

4.4. P/CAeM (also in his capacity as the president-elect of the new Services Commission) informed that meeting that there was a tremendous body of work now being undertaken by the Officers of the Organization, presidents of technical commissions and regional associations, the Secretariat and others to develop terms of reference, procedures and suchlike for the new constituent bodies of the Organization. In addition, he indicated that it was his expectation that the foreseen transition from an intergovernmental CAeM to a non-intergovernmental Standing Committee on Aeronautical Meteorological Services [working title] under the new Services Commission would be made as smooth as possible.

4.5. In the context of Resolution 28 (Cg-18), the meeting appreciated that a detailed overview of the long-term plan for aeronautical meteorology had been given during the AvRDP Seminar immediately prior to EN-MHS/1, where it had been noted that a first edition of the long-term plan had been recently developed by the CAeM and published by WMO in July 2019 as WMO Publication AeM SERIES No. 5 (English only). Participants had learned of the background and rationale to the long-term such as the drivers for change within the aviation sector that are demanding increased efficiency and increased integration of high-quality meteorological information into aviation decision-support for trajectory-based operations, air traffic flow management and others. In addition, it was appreciated that the long-term plan was complementary to WMO strategic plans, ICAO global plans and suchlike, and was intended to guide WMO Members, aeronautical meteorological service providers and others in planning their service offerings over the next 10-15 years. It was noted that work on a second edition of the long-term plan was expected to commence in 2020, for eventual endorsement by WMO Congress in 2023.

5. REVIEW OF AND UPDATE TO EN-MHS WORK PLAN (Doc. 5, Appendix A and Appendix B)

5.1. The meeting undertook a review of the EN-MHS work plan – specifically Part A which contains the objective, terms of reference and key deliverables (taking into account the discussion at Agenda Item 2 above), and Part B which contains a detailed breakdown of each key deliverable in terms of activities, responsible persons or groups and deadlines (taking into account the discussion at Agenda Item 3 above).

5.2. The meeting developed an update to Parts A and B taking into account the foregoing considerations – see Annex 4 to this report – and requested the Secretariat to make the updated material available on the WMO EliosCloud platform. **ACTION AGREED EN-MHS 1/3**

6. COORDINATION NEEDS INCLUDING WITH OTHER CAeM ET/ENs

6.1. Given the foregoing EN-MHS/1 outcomes and the EN-MHS work plan, the meeting discussed coordination needs including with other CAeM subsidiary bodies (expert team and expert networks). In this regard the meeting suggested in particular that:

(a) It would be beneficial for EN-MHS to interact with the CAeM Expert Team on Education, Training and Competency (ET-ETC), the Expert Network on Aeronautical Meteorological Information Services and Governance (EN-ISG), and the Expert Network on Communication and Outreach (EN-COM) in the context of developing and making available guidance material or other resources supporting the pull-through of research-to-operations and science-for-services within the aeronautical meteorology

domain. In addition, given the expected scope of the next Aeronautical Meteorology Scientific Conference (Section 3 above refers), there will be a need for EN-MHS to coordinate with the Expert Network on the Impacts of Climate Change and Variability on Aviation (EN-CCV).

(b) It would be desirable to seek a more joined-up approach between WMO and ICAO that would better enable the transition of science into services, particularly in light of the above-mentioned opportunity presented by WMO Reform. In this connection, it was noted that WMO was intending to attend an ICAO Meteorology Panel Management Group Cross Working Group Progress meeting (METP MG CWGP/1) in November 2019 where such matters would be discussed.

(c) It would be desirable to ensure that ongoing demonstrations and showcases of best practices, such as nowcasting and probabilistic forecasting projects addressing high-altitude ice crystal icing and low cloud and low visibility, amongst others, be shared amongst WMO Members and well-communicated to aviation stakeholders such as ICAO.

6.2. In connection with the foregoing, the Secretariat informed the meeting of an ongoing activity within the ICAO Meteorology Panel (METP) Working Group on Meteorological Requirements and Integration (WG-MRI) seeking to develop a list of meteorological information services that address the gate-to-gate needs of aviation, consistent with the ICAO Global Air Navigation Plan. In this regard, the meeting was informed that the latest draft listing comprised the following elements (subject to change):

- Advanced Wake Turbulence Separation
- Departure Management (D-MAN)
- Surface Management
- Arrival Management (A-MAN)
- Network Operational Planning
- Initial Trajectory-based Operations (TBO)
- Continuous Descent Operations (CDO)
- Traffic Complexity Management
- Full 4D Trajectory-based Operations (TBO)
- De-icing / Anti-icing operations
- Runway in Use Planning
- Airport Collaborative Decision-Making (A-CDM)
- Winter Clearance Operations
- Runway maintenance

7. REVIEW OF ACTIONS ARISING FROM EN-MHS/1 (Doc. 7)

7.1. A review of the actions arising from the meeting was undertaken resulting in the final list of actions as given at Annex 5 to this report.

8. ANY OTHER BUSINESS

8.1. The meeting was informed that Cory Davis (New Zealand) had recently relinquished his position as a core expert within EN-MHS due to a change of circumstances. As a consequence there was a need to establish a replacement core member. P/CAeM agreed to discuss the matter further with the Permanent Representative of New Zealand with WMO and the EN-MHS co-leads with a view to resolving this situation as soon as possible. **ACTION AGREED EN-MHS 1/4**

8.2. Referring to foregoing discussions, particularly under Agenda Item 4, concerning WMO Reform, Mr Lisk gave a brief additional insight of his expectations in respect of the chairing and composition of the new Standing Committee on Aeronautical Meteorology [working title]. In his current role as P/CAeM and forthcoming role as president of the new Services Commission, he was very keen for there to be as much continuity as possible between existing and future

working structures and activities addressing aeronautical meteorology, and that he would be discussing this further with the Officers of the Organization, Secretariat and others concerned over the coming weeks and months.

9. CLOSURE OF THE MEETING

9.1. Mr Mnikeli Ndabambi, Acting Chief Executive Officer of the South African Weather Service (SAWS) addressed the closing ceremony. He expressed his sincere thanks to WMO and the experts for visiting South Africa. He acknowledged the significant contribution that EN-MHS experts and other partners within the aeronautical meteorological community were making to enable safer skies in Africa and beyond. He also noted the importance of the long-term plan for aeronautical meteorology, as recently endorsed by WMO's Congress.

9.2. Mr Ian Lisk, president of CAeM, also expressed thanks to all participants for their contributions and to SAWS for the outstanding hospitality. He indicated that in view of WMO Reform it was uncertain when EN-MHS may next convene, but that in his capacity as the new president of the Services Commission he would be looking to convene future meetings on a needs-basis and, similar to this meeting, potentially back-to-back with another event to leverage efficiencies.

9.3. After closing remarks by the EN-MHS co-leads and a customary exchange of courtesies, the meeting closed at 1510 hours on Friday 23 August 2019.

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

EN-MHS/1

PRETORIA, SOUTH AFRICA

22 TO 23 AUGUST 2019

AGENDA

1. ORGANIZATION OF THE MEETING

1.1 Opening of the meeting
1.2 Adoption of the agenda
1.3 Working arrangements

2. OBJECTIVE AND TERMS OF REFERENCE OF EN-MHS

3. OUTCOMES OF AvRDP SEMINAR AND SSC MEETING OF RELEVANCE TO EN-MHS

4. OUTCOMES OF Cg-18 OF RELEVANCE TO EN-MHS

5. REVIEW OF AND UPDATE TO EN-MHS WORK PLAN

6. COORDINATION NEEDS INCLUDING WITH OTHER CAeM ET/ENs

7. REVIEW OF ACTIONS ARISING FROM EN-MHS/1

8. ANY OTHER BUSINESS

9. CLOSURE OF THE MEETING

EN-MHS/1

PRETORIA, SOUTH AFRICA

22 TO 23 AUGUST 2019

LIST OF PARTICIPANTS

1. EN-MHS MEMBERS

COUNTRY	NAME	E-MAIL
CO-LEADS		
HONG KONG, CHINA	LAU, Sum Yee (Sharon)	sylau@hko.gov.hk
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* Remote participation

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UNITED KINGDOM	LISK, Ian	ian.lisk@metoffice.gov.uk

3. WMO SECRETARIAT

NAME	TITLE	E-MAIL
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AMENDMENT TO THE TERMS OF REFERENCE OF EN-MHS
(as prepared during EN-MHS/1)

OBJECTIVE

To contribute, in close collaboration with relevant WMO and other partners, the promotion, facilitation and advocacy of science and technological research and innovation to improve the observation, forecasting and warning of aeronautical meteorological hazards, including appropriate pilot projects, to meet evolving user requirements for aeronautical meteorological information and services.

TERMS OF REFERENCE

(A) To coordinate the advancement in observation and quantification of aeronautical meteorological hazards, in particular in respect of satellite and other remote sensing applications as well as aircraft-based observations, in collaboration with the relevant WMO bodies and programmes.

(B) To collaborate with relevant WMO bodies and programmes to prioritize recommendations for the future development of the science of aeronautical meteorology, ~~in particular now-casting and very short-range forecasts, as well as probabilistic forecasts~~ including nowcasting and probabilistic forecasting needed to support aviation trajectory-based operations.

(C) To coordinate the exploration in the use of new technology, such as big data, machine learning and artificial intelligence, in addressing the forecasting and warning needs to enable impact-based decision support services to support MET-ATM ~~translation~~ integration.

(D) To report regularly on progress to the president of CAeM.

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UPDATE TO EN-MHS WORK PLAN
(as prepared during EN-MHS/1)

EXPERT NETWORK ON AERONAUTICAL METEOROLOGICAL HAZARDS SCIENCE

CAeM OPERATING PLAN – PART A

OBJECTIVE (Max. 50 words)	To contribute, in close collaboration with relevant WMO and other partners, the promotion, facilitation and advocacy of science and technological research and innovation to improve the observation, forecasting and warning of aeronautical meteorological hazards, including appropriate pilot projects, to meet evolving user requirements for aeronautical meteorological information and services.
TERMS OF REFERENCE (Max. 8 items. Max. 25 words each. To be consistent with the priority themes established by CAeM-16 and available here for each ET/EN)	(A) To coordinate the advancement in observation and quantification of aeronautical meteorological hazards, in particular in respect of satellite and other remote sensing applications as well as aircraft-based observations, in collaboration with the relevant WMO bodies and programmes. (B) To collaborate with relevant WMO bodies and programmes to prioritize recommendations for the future development of the science of aeronautical meteorology, including nowcasting and probabilistic forecasting needed to support aviation trajectory-based operations. (C) To coordinate the exploration in the use of new technology, such as big data, machine learning and artificial intelligence, in addressing the forecasting and warning needs to enable impact-based decision support services to support MET-ATM integration. (D) To report regularly on progress to the president of CAeM.
MAJOR DELIVERABLES (Max. 10 items. Max. 15 words each)	(1) Input to WMO Rolling Review of Requirements process. (2) Input to the roadmap on extension of AvRDP project in coordination with relevant WMO bodies. (3) Organization and successful delivery of a WMO Aeronautical Meteorology Scientific Conference in the second half of 2021. (4) Monitor evolving meteorological capabilities in support of ATM and airport operations, including supporting and/or facilitating the delivery of associated demonstration projects

Last updated:	23/08/2019

EXPERT NETWORK ON AERONAUTICAL METEOROLOGICAL HAZARDS SCIENCE

CAeM OPERATING PLAN – PART B

MAJOR DELIVERABLE No. (Max. 15 words)	**1**	Input to WMO Rolling Review of Requirements process.

Activity No.	**Concise description of activity** (Max. 25 words each)	**Reference document(s)**	**Responsibility**		**Deadline** (Month and year or Meeting reference)	**Status** (Not started / On hold / On-going / Completed / Deferred / Cancelled)
			Lead (Name of expert)	**Support** (Name of expert or Group)		
1.1	Provide comment on the draft WMO "Vision for the WMO Integrated Observing System (WIGOS) in 2040" developed by Inter-Commission Coordination Group on WIGOS (ICG-WIGOS).	"Vision for the Global Observing System in 2025"	Sharon Lau	EN-MHS	15 January 2019	Completed
1.2	…	…	…	…	…	…
1.3	…	…	…	…	…	…
1.4	…	…	…	…	…	…
1.5	…	…	…	…	…	…

Last updated: 23/08/2019

EXPERT NETWORK ON AERONAUTICAL METEOROLOGICAL HAZARDS SCIENCE

CAeM OPERATING PLAN– PART B

MAJOR DELIVERABLE No. (Max. 15 words)	**2**	Input to the roadmap on extension of AvRDP project in coordination with relevant WMO bodies.

Activity No.	**Concise description of activity** (Max. 25 words each)	**Reference document(s)**	**Responsibility**		**Deadline** (Month and year or Meeting reference)	**Status** (Not started / On hold / On-going / Completed / Deferred / Cancelled)
			Lead (Name of expert)	**Support** (Name of expert or Group)		
2.1	Review outcomes of AeroMetSci-2017 in Toulouse and the AvRDP.	WMO AeM SERIES No. 2	Matt Strahan	Peter Li	July 2019	Completed
2.2	Prepare the "vision statement" on the proposed future aeronautical MET research project .	EN-MHS/1 report	Matt Strahan	Sharon Lau, AvRDP SSC	30 September 2019	On-going
2.3	Support the submission of the "vision statement" for consideration by WWRP SSC		Sharon Lau	Peter Li, AvRDP SSC	October 2019	Not started
2.4	Work with AvRDP SSC to revise the "vision statement", if necessary, based on comments by WWRP SSC		Sharon Lau	Matt Strahan, AvRDP SSC	November 2019	Not started
2.5	Support the submission of the "vision statement" for consideration by P/CAeM and P/CAS		Sharon Lau	AvRDP SSC	December 2019	Not started

Last updated: 23/08/2019

EXPERT NETWORK ON AERONAUTICAL METEOROLOGICAL HAZARDS SCIENCE

CAeM OPERATING PLAN– PART B

MAJOR DELIVERABLE No. (Max. 15 words)	**3**	Organization and successful delivery of a WMO Aeronautical Meteorology Scientific Conference in the second half of 2021.

Activity No.	**Concise description of activity** (Max. 25 words each)	**Reference document(s)**	**Responsibility**		**Deadline** (Month and year or Meeting reference)	**Status** (Not started / On hold / On-going / Completed / Deferred / Cancelled)
			Lead (Name of expert)	**Support** (Name of expert or Group)		
3.1	Propose the theme and goal of the next WMO Aeronautical Meteorology Science Conference	WMO AeM SERIES Nos. 2 and 5	EN-MHS		Q1 2020	On-going
3.2	Develop concept note for the conference	EN-MHS/1 report	Matt Strahan	Secretariat, Larisa Nikitina, Sharon Lau, Naoko Komatsu	Q2 2020	Not started
3.3	Identify host for the conference		Matt Strahan		Q4 2019	Not started
3.4	Provide support in the organization of the conference (e.g. serve as SSC member, identify guest speaker, develop conference programme)		EN-MHS	EN-ETC, EN-CCV	Q4 2020	Not started
3.5	Hosting of the conference		(To be determined)	(To be determined)	Latest Q4 2021	Not started

	3.6	Consolidate the outcome of conference in a WMO publication.		Secretariat	EN-MHS	Q1 2022	Not started

Last updated:	23/08/2019

EXPERT NETWORK ON AERONAUTICAL METEOROLOGICAL HAZARDS SCIENCE

CAeM OPERATING PLAN– PART B

MAJOR DELIVERABLE No. (Max. 15 words)	**4**	Monitor evolving meteorological capabilities in support of ATM and airport operations, including supporting and/or facilitating the delivery of associated demonstration projects.

Activity No.	**Concise description of activity** (Max. 25 words each)	**Reference document(s)**	**Responsibility**		**Deadline** (Month and year or Meeting reference)	**Status** (Not started / On hold / On-going / Completed / Deferred / Cancelled)
			Lead (Name of expert)	**Support** (Name of expert or Group)		
4.1	Input to the proposed demonstration to validate the new enroute weather hazard information		Matt Strahan	EN-MHS	Q2 2020	Not started
4.2	Provide support to facilitate the conduct of demonstrations to showcase the current operational capabilities		Matt Strahan	EN-MHS	Q1 2021	Not started
4.3	Provide support in the validation of the demonstration results, in particular in the evaluation of the new "advisory" information		Matt Strahan	EN-MHS	Q2 2022	Not started
4.4	Provide input in the plan for the transition to the next generation en-route weather hazard information		Sharon Lau	EN-MHS, EN-ISG	Continuous	Not started
4.5	Monitor and report on various projects, such as the SESAR project to harmonize European gridded hazard forecasts for aviation and wake vortices		Piers Buchanan	EN-MHS	October 2019	On-going

		projects.					

Last updated:	23/08/2019

ACTIONS ARISING FROM EN-MHS/1

EN-MHS Action No.	Ag. Item	Action	Responsibility	Deliverables	Deadline	Status	Note
1/1	2	Update the EN-MHS terms of reference on the WMO website and reflect in Part A of the EN-MHS work plan	Secretariat	Updated TORs on website and work plan	31 August 2019		
1/2	3	Assist AvRDP SSC in the development of a compendium (or similar) of best practices in nowcasting and very short-range forecasting techniques with emphasis on MET-ATM integration	EN-MHS	Best practices compendium	31 December 2019		
1/3	5	Make the updated EN-MHS work plan (Parts A and B) available on the WMO EliosCloud platform	Secretariat	Uploaded work plan	31 August 2019		
1/4	8	Liaise further with PR of NZ with WMO and EN-MHS co-leads to identify a replacement core expert on EN-MHS	P/CAeM	Replacement core expert	30 September 2019		

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