

REVIEW OF THE WORK PROGRAMME IMPLEMENTATION

Expert Team Reports and Coordination of Tasks

Report of the Expert Team on Aviation, Science and Climate (ET-ASC)

(Submitted by Herbert Puempel and Matt Strahan, ET-ASC Co-Chairs)

Summary and Purpose of Document

This document provides an overview of the activities of the ET-ASC since the last meeting of the CAeM Management Group held 8 to 10 November 2016 together with detailed information on the working arrangements and work plan of the expert team.

ACTION PROPOSED

The CAeM Management Group is invited to review the progress made by ET-ASC since November 2016, to review the working arrangements and work plan of the expert team and, as necessary, to formulate actions accordingly.

1. EXECUTIVE SUMMARY

<Text to be included in the Final Report of the meeting>

1.1 The MG noted that the Expert Team on Aviation, Science and Climate (ET-ASC) had undergone several changes in its membership and orientation since the last MG meeting held in November 2016. The MG was also pleased to note that ET-ASC had convened a second joint meeting with ET-ISA in May 2017 (report [available here](#)) to ensure full coordination of respective work programmes and facilitate joint preparations for the Aeronautical Meteorology Scientific Conference (AeroMetSci-2017). The new ET-ASC co-chair, Matt Strahan, had also acted as a link to the ICAO Meteorology Panel, particularly on WAFS issues within the WG-MOG.

1.2 The MG appreciated that, apart from answering any requests for scientific advice by other Expert Teams, partner organizations and industry, the preparation and conducting of AeroMetSci-2017 at Météo-France in Toulouse from 6 to 10 November 2017 had been the key activity of ET-ASC during 2017 in collaboration with other expert teams including ET-ISA.

1.3 The MG also noted that the coordination between the ET-ASC and ET_ISA was effected by a conjoint meeting held in May 2017 and dedicated to issues overlapping between the teams, and the preparation of the Aeromet Science Conference.

1.4 The MG noted that a Scientific Committee had been established for AeroMetSci-2017, drawing on the particular expertise of CAeM and CAS expert teams and invited experts from scientific research and development (R&D) institutes as well as from aeronautical meteorological service providers of WMO Members. The Scientific Committee had been co-chaired by Ping-Wah (Peter) Li of Hong Kong Observatory (ET-ASC core member) and Herbert Puempel (ET-ASC co-chair) and well supported by others in the expert team. The Call for Papers and Posters had been met with an overwhelming if not always timely response, and the Scientific Committee had diligently selected oral and poster presentations that appeared most promising in terms of scientific novelty, user interest and alignment with the conference themes.

1.5 The MG was apprised that the conference had entailed three main thematic sessions: 1) new developments in R&D for aeronautical meteorology, including techniques of nowcasting, short range forecasting and addressing specific aviation hazards. It had also considered the verification and validation of such predictions; 2) aspects of service delivery, i.e. how common situational awareness can be maintained in an increasingly data rich environment with a variety of different access and human-machine interface systems; and 3) the emerging evidence of climate change and variability impacting all aspects of aviation, from safety and regularity to the economic viability of specific operations.

1.5.1. The first session dedicated to scientific methodologies and progress thereof had been met with great interest, most subject areas had been covered by first-rate scientists from leading organizations/institutes and had been met by keen interest and rich discussion fora. Wrap-up panel discussions led by high-powered CAeM and scientific experts had helped to summarize and focus the relevant outcomes of the presentations.

1.5.2. The second session on service delivery had highlighted the strong need for further development of streamlined, coherent and focused information for all relevant stakeholders, including the need for communicating objectively measured and unambiguously predicted reliability and achievable accuracy of forecasts and warnings. The role of SWIM-based information systems and the need to support different user communities in their selection of fit-for-purpose data and products was noted.

1.5.3. The third session on the impact of climate change and variability on aviation had addressed the all-important question of how well regional and even local impacts are objectively predictable, how the potentially large uncertainty of the occurrence and severity of high-impact (extreme) weather events could be quantified, where possible reduced and communicated in a way that would permit aviation stakeholders to optimize their risk management.

1.6 The MG was pleased to note that the conference had been, according to feedback received from the around 230 participants, an outright success, and potentially opened new and promising ways of a fruitful information exchange between scientists, operational actors and end-user communities going forward.

1.7 As a lesson learned, the MG was informed that it may be quite important to establish a solid consultation process between the different stakeholders on the merits and expected benefits of scientific methodologies as well as the use and securing of non-standard meteorological data (aircraft-based, ground-based/aerodrome-specific, remote sensing). The time-honoured ICAO process of defining the industry requirements for meteorological service for international air navigation may have to become the "last mile" of a much more open and scientifically sound analysis of existing issues, scientific and technological capabilities and return-on-investment considerations. The need for governance (or, at least, a general agreement) on the use of aircraft data for the improvement of science and operations appeared urgently needed to avoid a potentially futile and resource-consuming competitive approach to data generation and use.

1.8 In terms of the other subjects in the original work plan of ET-ASC, the MG was apprised that progress had been limited to a small number of issues and had turned out to depend, in many cases, on external inputs and coordination questions. It was therefore recommended to try to use the remainder of the inter-session period to complete any activities where progress could be tangible and to refer any remaining/open items to the next intersession period.

2. PROGRESS/ACTIVITY REPORT

<Text not to be included in the Final Report of the meeting>

2.1 Detailed information on content and outcomes of AeroMetSci-2017 as the main activity and achievement of the ET-ASC for the last year is to be found on the CAeM website, and will be presented to a larger audience as Conference Proceedings.

3. WORKING ARRANGEMENTS AND WORK PLAN

3.1 The short period of the run-up to the CAeM-16 Session to be held in Exeter, UK, in July 2018 will be dedicated to overseeing the publication of the AeroMetSci-2017 Conference Proceedings, the formulation of recommendations and conclusions for the AEM scientific community, and suggestions for issues to be addressed in the field of AEM science and R&D for the next intersession period.

3.2 Given the prevailing and potentially far-reaching discussions on the possible future organizational structure of WMO technical commissions, science and R&D may be required to support the strategic planning process of the next Commission in order to ensure that in a potentially complex development a sound scientific base and orientation will be retained as guiding principle of the Commission. It will also serve to support the members of the MET Panel of ICAO in advising the future progress of the meteorological aspects of the GANP.

TEAM			
Commission	WMO Commission for Aeronautical Meteorology (CAeM)		
Expert Team on	Aviation, Science and Climate		
Start Date / End Date	August 2014	August 2018	
Stakeholders	CAEP, SES, AvRDP, CAS		
Team	Name	Organization / Country	E-mail
Chair / Co-chairs	Herbert PUEMPEL Matt STRAHAN	Austria United States	HPuempel@gmail.com Matt.Strahan@noaa.gov
Core Members	Ping Wah LI Cory P. DAVIS Anna IVANOVA Matthew HORT Piers BUCHANEN	Hong Kong, China New Zealand Russian Federation United Kingdom United Kingdom	pwli@hko.gov.hk cory.davis@metervice.com ivanova@mecom.ru matthew.hort@metoffice.gov.uk piers.buchanan@metoffice.gov.uk k

DESCRIPTION	
Objective	Raise awareness of aviation stakeholders on issues of aviation and climate, promote the use of current scientific methodology for Now-Casting and VSRF in Aviation, including probabilistic forecasting
Background	Provide a sound scientific base for GANP / ASBU , with a view to validation and translation of MET input to ATM and ASU
Terms of Reference	<p>(a) To coordinate the response to science related requests in support of the development of new and evolving service delivery concepts and related observing system requirements, in collaboration with the relevant WMO bodies and programmes;</p> <p>(b) To coordinate the response to science related requests for advice to support the development of new and evolving aviation now-casting and very short-range forecasting concepts in collaboration with the relevant WMO bodies and programmes;</p> <p>(c) To provide expert representation to the ICAO CAEP and coordination of responses to science related requests for advice relating to the impacts of climate change and variability on aviation, including seasonal and inter-annual changes, in collaboration with GFCS and relevant WMO bodies and programmes; and to make WMO Members aware of emerging opportunities for related services;</p> <p>(d) To develop and maintain a repository of relevant research activities in collaboration with the relevant organizations and bodies;</p> <p>(e) To report regularly on progress to the president of CAeM.</p>

COMMUNICATION STRATEGIES

Description	Target Audience	Delivery Method	Frequency / Date	Responsibility
Work Plan	ATM, ASU representatives	Publications, Workshops scientific events	Publications ongoing /on demand, Sci. Event 4Q2017	Chair and team, Secretariat support
General correspondence	On demand (e.g. Airbus etc.)	Targeted expertise, links to suitable institutions	On demand	Co-Chairs, Secretariat
Team Meetings	ET-ASC	Conference calls, email contact, face-to-face	As required or with appropriate events	Co-Chairs and team
Reports	CAeM	Email	As required	Co-Chairs
Final Report	CAeM	Email	As required	Co-Chairs

WORK PLAN						
WP A (TOR a)	Coordinate the response to science related requests in support of the development of new and evolving service delivery concepts and related observing and forecasting system requirements in collaboration with the relevant WMO bodies and programmes		Responsibility	Deliverable	Target date	Status
	Task A1	Prepare information on observational data requirements for high-resolution NWP models				
	Activity A1.1	Study the need for the AMDAR and other aircraft-based observational data, including observations of humidity and turbulence	MS, CD	Study note	Dec 2017	Ongoing. Consider combining with A1.2?
	Activity A1.2	Study the needs for other data for use in data assimilation for high-resolution NWP and ensemble forecasting	MS, CD			Open. Suggest use of Ralph Petersons presentation given at AeroMetSci-2017.
	Task A2	Advice on the future of WAFS and other forecasting systems for aviation				
	Activity A2.1	Prepare an "Issue paper" for future WAFS development	MS	Issue paper	Dec 2017	Ongoing. Draft developed Aug. 2017. Further enhancements suggested by WG-MOG. WAFCs to meet in Feb. 2018 to finalize for WG-MOG in April 2018.
	Activity A2.2	Prepare Input to Guidance material (WMO-No.732) on WAFS	MS, All	Chapter for the Guide	Dec 2017	Deferred.
	Activity A2.3	Prepare Input to Guidance material (WMO-No.732) on probabilistic forecasting	MS, All	Chapter for the Guide	Dec 2017	Deferred.

	Task A3	<i>Prepare WMO Scientific Conference - AMSC-2017 (with ET-ISA and others)</i>					
		Activity A3.1	Establish and chair the Scientific Committee of AMSC-2017	HP, PL		till Dec 2017	Complete.
		Activity A3.2	Prepare the scientific programme for the event; review and selection of abstracts	HP, PL	Sci Programme	Oct 2017	Complete.
		Activity A3.3	Assist in preparing the AMSC-2017 final deliverables: Conference Proceedings with recommendations	HP, PL	WMO Publication	Feb 2018	Ongoing.

WP B (TOR b)	Coordinate the response to science related requests for advice to support the development of new and evolving aviation nowcasting and very short-range forecasting concepts in collaboration with the relevant WMO bodies and programmes;		Responsibility	Deliverable	Target date	Status	
	Task B1	Organize and coordinate AvRDP activities in coordination with CAS and WWRP					
		Activity B1.1	Organize Phase 1: Nowcasting capabilities development	PL	Project implementation plan and activities	End June 2017	Ongoing.
		Activity B1.2	Support the Nowcasting Symposium WSN-16 and training workshop	PL			Complete.
		Activity B1.3	Organize Phase 2: Translation of MET information into ATM impacts	PL			To be re-considered, as this requires full interaction with users, not suitable for global approach.

WP C (TOR c)	Provide expert representation to the ICAO CAEP and coordinate responses to science related requests for advice relating to the impacts of climate change and variability on aviation, including seasonal and inter-annual changes, in collaboration with GFCS and relevant WMO bodies and programmes; make WMO Members aware of emerging opportunities for related services		Responsibility	Deliverable	Target date	Status
Task C1	Provide WMO representation at ICAO CAEP					
	Activity C1.1	Participate in CAEP and provide inputs on behalf of WMO and CAeM (pending agreement by ICAO)	DI to coordinate with ICAO; HP		July 2017	Pending Secretariat coordination with CAEP.
	Activity C1.2	Prepare a "white paper" to raise awareness of the issues	HP	White paper	??	Complete.
Task C2	Raise awareness of WMO Members					
	Activity C2.1	Article for the WMO Bulletin on climate change impact on aviation	HP	Article	Nov 2016	Complete. Published in WMO Bulletin Vol 65(2), 2016
Task C3	Review and amendment of climate-related provisions in WMO Technical Regulations (WMO-No.49), Vol II					
	Activity C3.1	Review of aerodrome climatology requirements included in the WMO Technical Regulations, Volume II, Part III; prepare draft amendment proposal for consideration of CAeM-16	AI, DI, GB	Amendment proposal	Dec 2017; May 2018	Ongoing. Ground work prepared by Anna Ivanov. Will need finalization with Secretariat and others (ET-CCP?).
	Activity C3.2	Coordinate the climate-related provisions with CCI, ICAO and ACI	AI, DI, GB		1Q 2018	Not yet started.
	Activity C3.3	Collect national practices of climatological data processing for airports from ET-ASC members	AI, all ET members		Dec 2017	Not yet started. Cooperation with ET-GOV required, probably deferred to next session.

WP D (TOR d)	Develop and maintain a repository of relevant research activities in collaboration with the relevant organizations and bodies		Responsibility	Deliverable	Target date	Status
	Task D1	<i>Collect and publish online relevant materials to the ToRs of ET-ASC (research in NWP, nowcasting, observations, climate change impact and climate data processing)</i>				
	Activity D1.1	Create collaborative way of sharing publications (Google docs or use the moodle website?)	CD, All	Sharing platform; materials posted	July 2017; then ongoing	Ongoing.

WP E (TOR e)	Reporting and outreach		Responsibility	Deliverable	Target date	Status
	Task E1	<i>Submit regular reports on progress</i>				
		Activity E1.1	Yearly reporting	Co-chairs	Report	Each year
	Task E2	<i>Prepare and disseminate other relevant information to raise awareness of CAeM community on developments in the area of responsibility of the ET-ASC</i>				
		Activity E2.1	Prepare relevant information to raise awareness of the CAeM Community on developments under the ET-ASC scope (reports, web pages, etc)	All	Y ?	As available
	Activity E2.2	Communicate through the ET-CCP articles for the Newsletter	Co-chairs	Y	On a quarterly basis	Ongoing.