

# WORLD METEOROLOGICAL ORGANIZATION



## **WORLD WEATHER RESEARCH PROGRAMME (WWRP)**

## **STANDING COMMITTEE ON SERVICES FOR AVIATION (SC-AVI)**

*A subsidiary body of WMO's Commission for Weather, Climate, Hydrological, Marine and Related Environmental Services and Applications (SERCOM)*

## **ONLINE MEETING OF THE AVIATION RESEARCH AND DEVELOPMENT PROJECT – PHASE 2 (AvRDP2) SCIENTIFIC STEERING COMMITTEE**

**06 June 2025**

**Meeting minutes**

**Published July 2025.**

## 1. OPENING OF THE MEETING

Piers opened the meeting by welcoming the members and outlining the agenda of the online meeting, which included:

1. Updates on the demonstration products on the two airport routes (LHR-JNB and HKG-SIN)
  - 1.1. Updates from the Hong Kong to Singapore route
  - 1.2. Updates from the London to Johannesburg route
2. Discussion on the September meeting
3. Planning for the final report
4. Next steps

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### 1. Updates on the demonstration products on the two airport routes (LHR-JNB and HKG-SIN)

#### 1.1 Update on HKG-SIN pair (Danice and Gerald)

- Danice provided updates on the hourly thunderstorm risk forecasts for air traffic controllers and the development of the electronic flight bag (EFB) for trial by a local airline starting in June or July, noting that the final report is due by year-end.
- Danice detailed the blending algorithm, which incorporates probabilistic forecasts using hourly weighting based on data from the previous 12 months. She introduced a new information platform for presenting probabilities to ATC, featuring contour lines that reflect thunderstorm risk calculated by ensemble outputs of probabilities of deep convective systems and auto-highlighting of routes based on risk. She cited a specific case where the blended forecast predicted eastward movement of convection following steering at around the 500hPa level, but the actual movement was more northward likely followed the 850hPa wind flow. Danice emphasized a potential enhancement to incorporate radar-based nowcasts.
- During the discussion, Chris asked for clarification on the EFB application, which Danice explained is an iOS-based application developed by HKO to replace traditional paper-based flight documentation. There was discussion of the storm movement on May 14, with Chris attributing it to vertical wind shear and noting the challenge of defining a single steering layer. Danice expressed appreciation for the feedback and outlined plans for future work, including the incorporation of radar nowcasting in the blending process and extended verification efforts.
- Gerald presented an update focused on the data range for the blended nowcast and reference Satellite-Derived Radar Reflectivity (SDRR), with verification extended over a one-year period. He shared verification score metrics against forecast lead time using updated data and discussed the Fractional Skill Score (FSS) in relation to the window size of selection. The period for all three forecast products spans from December 2024 to May 2025, with scores referenced to the SDRR. Gerald also provided a month-by-month performance review since January, noting that March and February showed the best results.

#### 1.2 Update on LHR-JNB pair (Piers & Morne)

- Morné provided an update on three case studies selected for the London to Johannesburg route, using data from the UK Met Office, SAWS, and other sources. He highlighted the application of nowcasting techniques to rapidly developing thunderstorms and the use of blended global and regional forecasts to improve accuracy.
- The team is also planning route-specific verification by analysing actual flight paths and assessing spatial and temporal forecast errors. Although progress was temporarily affected by a major cyber-attack at SAWS and personal illness, Morné confirmed that work has resumed.
- Piers linked Morné's work to the Met Office's probabilistic global convection forecast, highlighting its relevance to flight route optimization. The team also discussed the broader development of global probabilistic convection forecasts for aviation. The Met Office reported that real-time probabilistic forecasts are now running and may be considered as a future product for WAFC London. Preliminary plans include collecting more case studies during the European summer, supported by embedded forecasters at NATS.
- Blending techniques remain an active area of exploration. The current focus is on the IMPROVER method for post-processing, with initial trials combining global and regional forecast models. Early work by the LHR-JNB team demonstrates this approach using UK Met Office global CB forecasts and regional model outputs. Although no final blending strategy has been established, the project will continue to investigate and refine these methods.
- The team sees strong potential for integrating probabilistic forecasts and blending techniques into future aviation weather services, with possible continuation through the Hazardous Weather Information Service (HWIS) project in 2026.

## **2. Discussion on the September meeting**

During the planning discussion for the September meeting, participants considered whether to hold the meeting in a hybrid or fully virtual format. A tentative decision was made to proceed with a hybrid meeting, with agreement to finalize the decision by Tuesday morning of the following week. It was noted that the September meeting would be critical for drafting the final report and reviewing project outcomes. Concerns were raised about travel arrangements and the need for an official invitation letter from WMO to secure funding. To accommodate varying circumstances, it was suggested that a hybrid format would allow both in-person and virtual participation. It was also proposed that, if the September meeting is held virtually, a consultative meeting could take place in January or February to complete the remaining project activities. Additionally, a short wrap-up meeting in November or early December was recommended to finalize the report.

## **3. Planning for the final report**

Stephanie presented a structure for the final project report, outlining sections on background, project definition, scientific studies, areas of investigation, route-specific developments, and key recommendations. It was noted that the report should emphasize main outcomes, suggestions for future research, and the possibility of a third phase. The target audience was discussed, including aviation meteorologists, airlines, regulatory authorities, ICAO, and academic stakeholders. Emphasis was placed on ensuring the report is accessible, with a clear summary in the main body and detailed technical content in the annexes to support readability and highlight key takeaways. The importance of aligning the report with the interests of WMO, ICAO, and the Research Board was noted, with a recommendation to coordinate with these organizations. The SSC agreed to circulate the report outline for detailed feedback. It was confirmed that the project will conclude at the end of 2025, with additional discussion on the potential for continued industry engagement beyond the official project end date.

## **4. Next steps**

- Piers and Chris to confirm the format of the September meeting (hybrid or virtual).

- Gerald to explore case studies comparing Singapore–Hong Kong and London–Johannesburg products, and consider using the Jaccard index for verification
- Danice/Morné to continue developing blended forecast techniques, incorporating radar reflectivity nowcasts, finalizing the electronic flight bag trial, and refining probabilistic forecast displays
- Secretariat to circulate the proposed report outline, gather feedback, and prepare the introductory sections, such as project background, to also consider options for publishing findings
- Piers to lead discussion on future industry engagement beyond 2025, explore continued technology transfer, and assess the potential for a third project phase
- All team members to continue product verification and reconvene in September to finalize efforts and further discuss a first version of the final project report.
- NEXT FACE-TO-FACE MEETING: 24- 26th Sep 2025 at UKMO in Exeter, UK

AvRDP2-SSC-actions	Who/Due date
○ Confirm the September meeting format (hybrid or virtual)	Piers and Chris/Wednesday 11 June
○ Explore case studies comparing Singapore–Hong Kong and London–Johannesburg products and consider using the Jaccard card index for verification.	Danice/Gerald
○ Secretariat to circulate the proposed report outline and gather feedback.	Lead-WWRP Secretariat
○ Discussion on future industry engagement beyond 2025, explore continued technology transfer, and assess the potential for a third project phase	Piers and Secretariat
○ Develop a first version of the final project report, to be discussed at the face meeting in September	All/Friday 19 September
○ Face-to-Face Meeting organization	Secretariat and Piers

## LIST OF ATTENDEES

### 1. SSC members

COUNTRY	NAME	E-MAIL	WMO AFFILIATION
UNITED KINGDOM	BUCHANAN, Piers <sup>[1]</sup>	<a href="mailto:piers.buchanan@metoffice.gov.uk">piers.buchanan@metoffice.gov.uk</a>	SC-AVI
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[1] Co-chair of AvRDP-SSC

## 2. WMO Secretariat

NAME	POSITION	E-MAIL
MSEMO, Hellen	Scientific Officer, World Weather Research Division, Science and Innovation Department	<a href="mailto:hmsemo@wmo.int">hmsemo@wmo.int</a>
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DE CONING, Estelle	Chief, World Weather Research Section, Science, and Innovation Department	<a href="mailto:edeconing@wmo.int">edeconing@wmo.int</a>

## 3. List of apologies/absentees

NAME	POSITION	E-MAIL	WMO AFFILIATION
BROCK, Greg	Chief, Services for Aviation section, Services Department	Gbrock@wmo.int	WMO Secretariat
TITLE, Helen	UNITED KINGDOM	helen.titley@metoffice.gov.uk	WWRP

## 4. Invitees

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