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

WORLD WEATHER RESEARCH PROGRAMME (WWRP)

STANDING COMMITTEE ON SERVICES FOR AVIATION (SC-AVI)

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

3RD IN-PERSON AND ONLINE MEETING OF THE AVIATION RESEARCH AND DEVELOPMENT PROJECT – PHASE 2 (AvRDP2) SCIENTIFIC STEERING COMMITTEE

16 - 18 September 2024

Meeting Report

Published November 2024

1 OPENING OF THE MEETING AND PERSPECTIVES

Piers Buchanan and Chris Davis, co-chairs of AvRDP2 SSC, greeted participants at the meeting held both in-person at UKMO premises in Exeter, Davon, UK, and online via Zoom on September 16, 17, and 18, 2024. The list of attendees is provided in Annex 1.

After self-introductions from both in-person and online participants, the co-chairs officially opened the meeting. They reflected on the project's progress since the second in-person meeting in September 2023 in Boulder-USA and the subsequent quarterly online meetings. Noting that the Boulder meeting looked at the big picture of the project, the co-chairs outlined this meeting's objectives were to assess scientific progress, finalize the research phase, review the demonstration plan agreed during the course of 2024, and plan the 2025 demonstration for the designated airport pairs. The agenda provides details on when these objectives will be addressed by the meeting.

Day 1 focused on introducing the key objectives and progress of the AvRDP2 project. Several technical presentations examined advancements in ensemble weather forecasting models, particularly for aviation safety. A notable case study on turbulence involving Singapore Airlines was presented, evaluating the performance of forecasting tools. Discussions also explored ways to improve probabilistic forecasting methods and gather feedback from pilots and dispatchers. The day concluded with a focus on enhancing verification techniques and collaborative efforts.

On Day 2, the meeting continued talking about verifying forecast models by comparing them with observation data, from both satellite and radar imagery, while integrating real flight plans to enhance accuracy. During trials for the HKG-Sin route, pilots will access 2D weather forecasts via a dedicated website, and additional data will be purchased if necessary for validation. A feedback system will be implemented to collect useful insights from pilots on weather-related deviations. Additionally, a visual representation of confidence levels in forecasts would be developed. Future improvements will focus on integrating real-time flight path data and refining models with machine learning.

Day 3 concluded with finalization of work packages through 2025, setting key milestones for verification and product updates on the LHR-JNB route. Blending of nowcasting and NWP data into probabilistic forecasts was discussed, with case studies and analysis scheduled for March and June 2025. Regular meetings were deemed essential for progress on the HKG-SIN and LHR-JNB routes. Collaboration with external projects and publication strategies were briefly reviewed, alongside discussions on the project's legacy.

1.1. Major Projects Updates: WWRP Implementation Plan (IP) and WMO Commission for Services

- Chris discussed the future direction of weather research, noting that the WWRP has recently entered a new implementation phase (2024-2027). He touched on key areas for further research, including the integration of machine learning for weather forecasting and the expansion of nowcasting techniques for aviation.

- The talk of Mr Ian Lisk, President of the WMO Services Commission, reflected on the progress made since the 2019 AvRDP1 closing meeting. He highlighted key advancements, particularly in addressing severe convection and its impact on aviation, turbulence incidents, and the growing influence of climate change on weather phenomena.

1.2. The Value Chain Project-application

- Ms Helen Titley's presentation focused on the "Warning Value Chain," a framework developed during the High Impact Weather (HIWeather) project. She introduced tools created for post-event review and assessment that can be applied to various fields, including aviation. The framework helps track the flow of information from weather forecasts to decisions made by end-users. Helen demonstrated how this framework could be adapted to assess the effectiveness of aviation forecasts, potentially enhancing forecast communication and decision-making for aviation operations.

- Participants wanted to understand how the warning value chain framework can be mapped onto the aviation forecasting process. What are some specific examples of where "valleys of death" (gaps in information flow) might exist in aviation forecasting? In response to these questions, Helen explained that while the warning value chain has not been traditionally used in aviation, it could be adapted. She noted challenges in delivering forecast information directly to pilots and mentioned the importance of considering how warnings are issued, such as SIGMETs, which provide specific hazard warnings. Helen further identified potential gaps in delivering forecast information to pilots in real-time and during flight planning stages. She emphasized that pilots and ground teams require different types of information and ensuring seamless information flow between these stages is critical.

2 HONG KONG – SINGAPORE ROUTE (HKG-SIN) UPDATE (BY DANICE NG AND PING CHEUNG)

- Danice and Ping's presentation updated on the Hong Kong-Singapore flight route. Its focus was on the improvements made in product display and probabilistic forecasting of convective weather hazards for this route. The trial product was enhanced such that deterministic and ensemble probabilistic forecast models were being employed to predict potential convection related risks along the whole flight path.
- The European Centre for Medium-Range Weather Forecasts (ECMWF) has pioneered a system to predict forecast confidence, namely the Ensemble Prediction System (EPS). The ECMWF EPS, comprising one control forecast (CNTL) plus 50 member forecasts each with slightly altered initial conditions, had been used in producing probabilistic information. The preliminary study looked into different ways to blend convective weather nowcast with each of the EPS forecast to produce a convective weather probability forecast. It showed that blending with satellite nowcast outperform the solely ECMWF EPS forecast in terms of reliability at different forecast hours.
- Real-time updates were also addressed, with an explanation that hourly forecasts were being generated, but pilots were provided with summarised data to help them make quick decisions during flights. It was clarified that full probability distribution maps were not shown to pilots due to concerns about overwhelming them with excessive data. Instead, critical information was communicated through streamlined tools to ensure ease of use during flight planning and operation.
- The presentation highlighted the use of ensemble models to predict the likelihood of convective weather events along the Hong Kong-Singapore route. An example was shown for a tornado event observed in Guangzhou on 27 April 2024. It was noted that the blended probability could provide some insights on higher probability near the event location with longer lead time as compared to ECMWF EPS forecast.
- In collaboration with Meteorological Service Singapore (MSS), a common area bounding the Hong Kong-Singapore flight route for verification has been decided. FSS, POD, FAR and CSI showed that the blended forecast performance decreased as forecast horizon increases.
- Challenges related to the real-time application of these forecasts were also addressed. While forecasts could be accessed via a web interface, discussions were held around the potential integration of forecast data into pilots' Electronic Flight Bags (EFBs). It was acknowledged that the current system requires further development to ensure that pilots can receive timely updates while in the air.
- It was noted that probabilistic forecasts provided a more comprehensive understanding of the potential risks associated with convective weather along flight routes. The use of blended forecasts and satellite imagery has proven effective in identifying hazardous weather conditions. However, limitations in the models were acknowledged, particularly for rapidly developing weather systems and the limited time/spatial resolution of ECMWF EPS data available at the HKO.
- Further discussions emphasised that the continued refinement of ensemble models and integrating satellite data into forecasting systems were critical to ensuring that flight routes like Hong Kong-Singapore would benefit from improved safety measures in the face of convective weather hazards. Future work would focus on addressing the

challenges of forecast verification, including using satellite data from Japan Meteorological Agency (JMA), and getting feedback from the aviation users, such as airlines and air traffic controllers.

2.2 Update on the HKUST study - Convection Induced Turbulence

- Xiaoming’s presentation focused on a deep-learning model developed to predict convection evolution based on satellite imagery. The model was explained to have been trained on data from various sources, allowing it to predict convective systems even in regions lacking high-resolution weather simulations.
- It was noted that the model utilized satellite data for regions such as East Asia, including China, Japan, Taiwan, and surrounding ocean areas. A combination of satellite imagery and meteorological fields predicted by the Fuxi Weather Model was used. The deep learning model was designed to provide nowcasting predictions, making short-term convection forecasts for several hours in advance.
- The model's performance was reviewed through case studies, including tropical cyclones and convective systems. It was demonstrated that the model had successfully captured changes in the structure and intensity of weather systems, providing reliable turbulence predictions up to 12 hours ahead. However, it was acknowledged that while the model performed well, further improvements were required, particularly in regions with limited meteorological field data.
- Future plans were outlined, focusing on refining the model by incorporating more data and improving its accuracy for broader geographical areas. The potential for integrating this model into real-time aviation systems was also discussed to provide airlines with better convection avoidance strategies based on AI-driven predictions.

3 MET OFFICE PRESENTATIONS

3.2 Probabilistic Cb Forecast Production by Andrew Creswick

- The presentation focused on the development of a probabilistic forecast for convective clouds (Cb). It was explained that the forecast was generated for the World Area Forecast System (WAFS), which was transitioning into a probabilistic system by 2028. The utilized method was the Ensemble Prediction of Convective Hazards (EPOCH), which calculates the probabilities of Cb exceeding three specific height thresholds—35,000, 40,000, and 45,000 feet.

- The forecast data was derived from ensemble models provided by ECMWF and included additional parameters like the most unstable CAPE to filter convective environments. Verification of the forecasts was conducted using satellite-based Cb detection algorithms, and the initial reliability of the results was reported to be suboptimal. Calibration was performed, improving the forecast reliability. It was emphasized that post-processing and blending techniques were employed to enhance the forecast accuracy for aviation use.

3.3 Global Convectively Induced Turbulence by James Mitton

- The presentation by James Mitton covered Global Convectively Induced Turbulence (CIT) forecasting. It was described how CIT had been a growing concern for aviation safety, with the forecast model providing guidance on areas prone to turbulence caused by convective weather systems. The importance of differentiating between clear air turbulence (CAT) and convectively induced turbulence was highlighted.

- A detailed case study involving Singapore Airlines Flight 321, which encountered turbulence on May 21, 2024, was presented. The forecast models had shown limited predictive capability in identifying the precise location of CIT. Ensemble forecasts were utilized, but further refinement was acknowledged as necessary to improve real-time predictions.

3.4 Relevant Global Satellite Products Update by Rory Gray

- Rory Gray's presentation focused on updates to global satellite products used to monitor severe convection. It was explained how satellite imagery is applied to detect overshooting tops and convective systems that pose aviation hazards. Algorithms developed by NASA Langley Research Centre were used to process the data and estimate the probability of high-altitude ice crystals forming in convective clouds, which can affect aircraft engines.

- The product was operationally implemented on five geostationary satellites, providing global coverage. The relevance of high ice content detection and its role in predicting lightning and severe weather was emphasized. The presentation concluded by showcasing the satellite products' ability to deliver real-time information to support aviation weather forecasting, with promising alignment between the satellite data and lightning strike positions.

3.5 Developments for LHR-JNB route by Piers Buchanan and Met Office team

The update on the London to Johannesburg route was based on optimizing flight paths to avoid convective weather and its impact on flight duration. Two scenarios were examined to assess deviations from the direct route: one with avoidance of regions with a greater than 20% probability of cumulonimbus clouds and another with a more risk-averse strategy, avoiding areas with more than 10% probability.

Key observations include:

- **Route Deviation**: Deviations were primarily influenced by weather conditions, with flights tending to veer westward to take advantage of tailwinds when landing in Johannesburg. The most significant deviations were recorded when cumulonimbus activity was concentrated across Central Africa. These deviations typically added only around 45 minutes to the total flight time, which is minimal for a 10-hour flight.
- **Flight Planning**: The analysis emphasized that the best time to make/decide such deviations is during the flight planning stage. Adjusting the route early allows pilots to use favourable winds without incurring significant time or fuel penalties. This is a cost-efficient approach, as mid-flight deviations could result in larger penalties.
- **Probabilistic Forecasts**: Forecasts based on ensemble models were used to predict convective hazards, with probabilities calculated for each flight segment. The planners had to weigh the risks based on these forecasts and make decisions that balanced safety with efficiency.
- In conclusion, proactive planning and using probabilistic weather models could help minimize time penalties, even with significant deviations.

4 LHR-JNB UPDATE (BY MORNE GIJBEN)

- Morne's presentation updated convection observations and forecasts using satellite-based (RDT) and radar-based (TITAN tracking) methods. He outlined techniques for blending storm data and extrapolating forecasts, with RDT providing up to 60 minutes and TITAN over 120 minutes.
- Storm severity identification from RDT cells and blending strategies were discussed, along with verification options like comparing RDT data with lightning strikes. He mentioned that machine learning models would predict convection probability by combining NWP and lightning data, using high-resolution models for more frequent forecasts over South Africa.
- The availability of MTG lightning imager data was noted to improve storm tracking. Challenges in interpreting high-resolution data and blending model outputs were emphasized for producing more consistent forecast products.
- Morne introduced the IMPROVER system to standardize datasets and enhance forecast quality through probabilities. He also discussed ongoing tests of storm probabilities and threshold adjustments, with comparisons of model outputs aimed at improving forecast accuracy across regions.

5 VERIFICATION (BY RAMON DE ELIA)

- Ramon’s presentation provided insights into the current state of verification, highlighting the importance of accurate nowcasting and forecasting tools for enhancing the safety and efficiency of flights, particularly in areas with high convective activity. He emphasized that the verification framework being utilized involved rigorous comparisons between observed weather data and the predictions generated by numerical weather models. Ramon further noted that refining models is needed to capture short-term weather patterns more effectively, especially in regions where severe weather conditions are frequent.

- The discussion on the verification was based on the need for improved collaboration between meteorological agencies and aviation authorities to ensure the timely dissemination of weather information. It was suggested that further simulations and real-time data sharing between airlines and forecasting centres could help enhance the verification process. Additionally, several participants expressed interest in exploring the use of machine learning techniques to improve the accuracy of weather predictions.

6 PLANNED DEVELOPMENTS AND DEMONSTRATION FOR HKG-SIN

Planned developments for the Hong Kong-Singapore (HKG-SIN) route would focus on leveraging nowcasting tools and satellite data to enhance flight safety and decision-making. It was highlighted that cloud-top heights and convection estimates derived from satellite observations would be integrated into the forecast models for more accurate predictions. There was also a focus on incorporating real-time pilot feedback via electronic flight bags. Pilots would be provided with specific log-in access to view forecast disruptions, allowing them to adjust flight paths based on the probabilistic forecasts available. Discussions centered around refining the system for easier access and interpretation by the pilots, including a focus on updating information in real-time during flights. Additionally, it was proposed, if time and resources permit, to run a kind of testbed, or Intense Observation Period, in 2025 over two weeks or for some ‘good’ cases of high convective activity, with HKUST CIT products run daily (if doable) and cross-compare with HKO products and pilot feedback.

7 PLANNED DEVELOPMENTS AND DEMONSTRATION FOR LHR-JNB

For the London-Johannesburg (LHR-JNB) route, the challenges of forecasting weather, particularly over regions like Africa where radar data is limited were discussed. A trained AI model using satellite observations (such as cloud heights and other metrics) is expected to be implemented for this route. The model would allow for better anticipation of weather impacts, including significant convection events. Satellite-based products will be key, given the scarcity of radar coverage over certain areas of Africa. Plans also involve the use of historical flight data to understand and verify the impact of these forecasts, alongside developing case studies for severe weather encounters along this flight path.

8 VERIFICATION/EVALUATION DISCUSSION ACROSS BOTH ROUTES

The verification process was a central topic in discussions across both the HKG-SIN and LHR-JNB routes. It was agreed that the realism and accuracy of the blended forecasts, which combine satellite data with numerical weather prediction (NWP) models, need further verification. Participants suggested verifying forecasts by comparing them with actual flight plans and outcomes, as well as cloud-top heights and radar-derived data. Verification efforts would also include evaluating forecast skill for both routes, using metrics like probability of convection, severity of turbulence, and deviations from planned flight routes. A major challenge highlighted was the difficulty of acquiring real-time radar data over certain regions, which would necessitate a greater reliance on satellite-based products.

9 LEGACY OF AVRDP2

The legacy of AvRDP2 was discussed with a focus on its contribution to the development of more accurate and actionable weather forecasts for aviation. The project's expected achievements in blending satellite and model data for nowcasting and forecasting severe weather were emphasized. Additionally, the integration of these tools into operational systems for airlines and aviation authorities was noted as a significant step forward. The project is expected to leave behind a robust framework for international collaboration in aviation weather prediction, with established verification methods and real-time feedback loops from pilots. The potential for further enhancements, such as machine learning models for turbulence prediction and the expanded use of probabilistic forecasting, was also seen as a key aspect of the project's legacy.

10 WAY FORWARD WITH PRIORITIES THROUGH THE REMAINDER OF THE PROJECT

Participants examined the products developed, methods used, and plans for user engagements for the two project routes. They identified key tasks and resolutions for the project's future activities and the Legacy of the AvRDP2. From the key discussion points listed above, the meeting derived and agreed upon some actions as follows:

The plan for the remainder of the project was discussed, with a key focus on prioritizing quarterly meetings leading up to the final project conclusion. Milestones have been outlined for December 2024, March 2025, and June 2025, with a final in-person meeting in late 2025 to finalize the project report. It was agreed that quarterly updates would include progress reports on verification efforts, product updates, and trial feedback, particularly for the Hong Kong to Singapore and London to Johannesburg routes. Key deliverables, including demonstration products and user feedback, are targeted for each quarter. The project is on track, with verification efforts and final reporting being critical for the last phases.

Poster for AeroMetSci-2024

- The creation of a poster for AeroMetSci24 was confirmed. The poster is set to highlight the progress of the AvRDP2 project, focusing on the advancements in forecasting and nowcasting for aviation. The content will cover key achievements in both the HKG-SIN and LHR-JNB routes, showcasing the integration of real-time weather data and feedback from aviation users. Relevant team members will review the final version of the poster before submission. This poster comes in addition to the presentation done by Danice in coordination with colleagues from Meteorological Service Singapore (MSS) at the conference about research and development at HKO over the HKG-SIN route.

11 PLAN FOR 2025 (AND BEYOND)

- The discussion regarding the plan for 2025 and beyond highlighted that there would be no formal continuation of the AvRDP2 project before 2028. However, opportunities for further collaboration and the use of project results in other initiatives were acknowledged. There is potential for ongoing work to continue, particularly in the area of product refinement and user feedback. The legacy of the project, including improved verification methods, integration of probabilistic weather forecasting, and contributions to international aviation forecasting, will likely be carried forward in future projects. Final project reports and publications will be completed in late 2025.

ANY OTHER BUSINESS

No other business was discussed during the meeting.

1. SUMMARY OF AGREED ACTIONS

AvRDP2-SSC-actions	Who/Due date
Pair 1 and Pair 2 teams to conduct monthly meetings	Piers (LHR-JNB) Danice (HKG-SIN)

	Due date variable
Pair 1 LHR- JNB route: Activities were grouped in work pages (WP1- WP3)- led by Piers and Morne**.**	
• **WP1**: Prototype Cb products developed with 3-hourly output; discussed with airlines. • **WP2**: Update on progress. • **WP3**: Conduct A case study combining SAWS and MO data	Mid-December 2024
• **WP1**: Additional layers explored, aiming to produce a product similar to HKO. The demonstration phase planned out. • **WP2**: First analysis complete. • **WP3**: Present case studies combining SAWS and MO data. Linkage with WISER project displayed via web-based products.	Mid-March 2025
• **WP1**: Update on the demonstration phase. • **WP3**: Further analysis of running route options for case studies using blended data	Mid-June 2025
• **WP1**: Draft report and presentation on the demonstration phase. • **WP2**: Analysis written up, incorporating feedback from the March meeting. • **WP3**: Write up and presentation of results.	Mid-September 2025
Pair 2: HKO-SIN route led by Danice	
• Present feedback from the airline (CP) at the December meeting. • Provide updates on discussions or interactions with Air Traffic Control (ATC). • Verification: Comparison of CTH (Cloud Top Height) products with radar data for August through November. • CIT: Data gathering for calibration and determining the NWP (Numerical Weather Prediction) data source.	mid-December 2024
• Present updated product based on feedback from previous rounds. • Flight Route Dependent Verification- conduct verification specific to flight routes. • CIT: Final algorithms for EDR (Eddy Dissipation Rate) nowcast ready.	Mid-Mar 2025
• Gather and present another round of feedback from the airline (and possibly ATC). • Present CIT test results and preliminary analysis.	Mid - Jun 2025
• Findings written up and presented. • Write up and present findings from HKO (Hong Kong Observatory) and MSS (Meteorological Service Singapore). • Write up and present CIT test results and analysis.	Mid-Sept 2025
Final face-to-face meeting - Sept 2025 (tbc)	Piers and Chris
AvRDP2 poster for the AeroMetSci-2024 conference AvRDP2 presentation for the AeroMetSci-2024 conference	Piers (by 25 Sept) Danice and MSS colleagues (by 18 Sept)
Publication and final report	Piers, Chris and the Secretariat / Dec 2025

2. NEXT MEETINGS PLANNING AND CLOSURE OF THE MEETING

It was agreed that quarterly meetings will be held between now and the end of the project to ensure that all planned developments and milestones are discussed and presented. These meetings will serve as checkpoints for activities related to project deliverables and outcomes. Key milestones will be aligned with these quarterly meetings.

- 18th December 2024: The first of the quarterly meetings is expected to feature early updates from the HKG-SIN route trial, verification progress, and user feedback. It was suggested that user feedback from Cathay Pacific would be available by this time.
- Mid-March 2025: A second meeting where feedback-based updates on products will be shared, particularly focusing on enhancements suggested by users. Verification data for both flight routes will also be discussed.
- Mid-June 2025: Another quarterly meeting, potentially focusing on product feedback and verification results, emphasising the LHR-JNB route.
- September/October 2025: The final in-person meeting is scheduled to summarize the project's work, review all findings, and prepare for the final report. This meeting will also include presentations and feedback for both routes - HKG-SIN and LHR-JNB.
- Participants agreed to have regular updates and establish monthly follow-up meetings for the working groups involved with each route to ensure timely progress.

Closure of the Meeting
The closure discussions involved reflecting on AvRDP2's legacy. It was acknowledged that, while official follow-on activities might not be initiated before 2028, the project had created a strong framework for weather forecasting in aviation. There was consensus on the importance of capturing the progress in publications. Suggestions included producing a final report in 2025 to summarize the entire project and exploring publication options such as submitting a paper to BAMS (Bulletin of the American Meteorological Society) or Meteorological Applications. It was noted that a formal WWRP report could be the official output of the project.

After warmly thanking the UKMO for their hospitality and all arrangements made for this successful meeting, the SSC co-chairs closed it on Wednesday, September 18, at 12h00 (11h00 UTC).

ANNEX 1

LIST OF ATTENDEES

1. SSC MEMBERS

COUNTRY	NAME	E-MAIL	WMO AFFILIATION
UNITED KINGDOM	TITLEY, Helen	helen.titley@metoffice.gov.uk	WWRP
SOUTH AFRICA	GIJBEN, Morné	morne.gijben@weathersa.co.za	SC-AVI
UNITED KINGDOM	BUCHANAN, Piers [1]	piers.buchanan@metoffice.gov.uk	SC-AVI
United States of america	DAVIS, Chris [1]	cdavis@ucar.edu	WWRP
UNITED STATES OF AMERICA	YANG, FANGLIN	FANGLIN.YANG@NOAA.GOV	WWRP

[1] Co-chair of AvRDP2-SSC

2. WMO Secretariat

NAME	POSITION	E-MAIL
WIGNIOLLE, Stéphanie	Scientific Officer, Services for Aviation Section, Services Department	swigniolle@wmo.int
MSEMO, Hellen	Scientific Officer, World Weather Research Division, Science and Innovation Department	hmsemo@wmo.int

3. List of online participants

COUNTRY/ ORGANISATION	NAME	E-MAIL	WMO AFFILIATION
WMO	DE CONING, Estelle	edeconing@wmo.int	WWRP
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JAPAN	IKEDA, Michiko	michi-ikeda@met.kishou.go.jp	SC-AVI
HONG KONG, CHINA	CHEUNG, Ping	pcheung@hko.gov.hk	SC-AVI
ARGENTINA	DE ELIA, Ramon	rdelia@smn.gob.ar	WWRP
IFALPA	SIEVERS, Klaus[2]	klaus.sievers@vcockpit.de	AvRDP2 SSC CAG
IATA	RENNIE, Graham [2]	v-rennieg@iata.org	AvRDP2 SSC CAG

[2] Part-time attendance

4. Invitees

NAME	COUNTRY OR ORGANIZARION	E-MAIL
Yin Lam (Danice) Ng	HONG KONG, CHINA	ylng@hko.gov.hk
METHVEN, John	UNITED KINGDOM	j.methven@reading.ac.uk
Bartholomew, Claire	UNITED KINGDOM	claire.bartholomew@metoffice.gov.uk
Lisk, Ian[3]	UNITED KINGDOM	ian.lisk@metoffice.gov.uk
Mitton, James	UNITED KINGDOM	
Gray, Rory	UNITED KINGDOM	
Creswick, Andrew	UNITED KINGDOM	

[3] Attendance to Day 1 only