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Agenda Item 6: Turbulence Information**PROGRESS ON AIRCRAFT EDR DATA SHARING AND TURBULENCE FORECASTING IN
CHINA**

(Presented by China)

SUMMARY

Air turbulence is a critical weather hazard to civil aviation safety and operational efficiency. To step up aircraft Eddy Dissipation Rate (EDR) data sharing and improve turbulence forecasting for more effective risk mitigation, China has launched dedicated research focused on this area. This effort drives progress in EDR data standardization, quality control, information sharing, and multi-source integration, and involves the Civil Aviation Administration of China (CAAC), Air Traffic Management Bureau (ATMB), airlines, and other stakeholders. This paper presents the current status of the research and outlines the future plans.

1. INTRODUCTION

1.1 Climate change has markedly increased the frequency and intensity of turbulence encounters in recent years. Given its abrupt onset and unpredictability, turbulence is a serious threat to aviation safety and operational efficiency. In response, the CAAC has stepped up its focus on early warning and proactive mitigation.

1.2 Although the calculation of various turbulence indices is now mature and operationally available, its applicability remains constrained by a lack of turbulence observation data for verification. With ICAO having established EDR as the international standard for aircraft turbulence measurement and reporting, China is actively moving in this direction. In this context, systematic collection and integration of aircraft EDR data into forecasting applications is becoming increasingly important.

1.3 A key challenge, however, is that airlines use different onboard EDR algorithms and data formats, and aircraft data are not yet shared across the industry. This lack of uniformity prevents objective forecast verification and undermines accuracy. Therefore, establishing a unified EDR data system to strengthen monitoring and early warning capabilities has become an urgent operational priority.

1.4 The CAAC has organized meteorological departments in ATMB, airlines, and other relevant stakeholders to jointly conduct specialized research on aircraft EDR data. This work is now continuously advancing.

2. DISCUSSION

EDR Data Quality Control and Sharing

2.1 Due to the different algorithms and data format of EDR from different airlines, a quality control system for aircraft EDR data has been established, which is now applied to conduct real-time quality control for data currently collected from multiple airlines.

2.2 Normalized EDR values and the associated conversion models have been developed and are being further refined, including harmonizing numerical standards, analyzing individual airline algorithms, and standardizing storage formats.

2.3 Based on the existing data sharing platform, the real-time transmission of quality-controlled EDR data to relevant airlines via conversion models is also being advanced. This work is supported by dedicated data collection and distribution modules, together with corresponding network deployment and access control policies.

Turbulence Forecasting and Early Warning Technologies

2.4 To enhance the capability of turbulence forecasting, multiple turbulence indices are calculated and integrated using deep learning algorithms based on numerical weather prediction data. Real-time normalized EDR data are adopted for calibration, and a forecast correction model is under development to generate hourly EDR forecasts for the next 24 hours.

2.5 Normalized EDR data are fused with satellite data and numerical weather predictions, and coupled with EDR forecasts to generate real-time EDR fusion and extrapolation products, which are still under continuous optimization.

2.6 Real-time EDR fusion and extrapolation products are utilized with civil aviation operation standards and real-time flight operation information to develop a turbulence impact assessment model, delivering nationwide minute-level early warnings based on EDR observations.

EDR Information Services and Aircraft EDR Algorithm Research

2.7 Based on existing aviation weather service websites and mobile apps, work is underway to develop EDR visualization tools, to introduce unified turbulence warning and forecast products, and to explore personalized service options for individual airlines.

2.8 An analysis and evaluation of onboard EDR algorithms is currently underway. By leveraging historical EDR data provided by airlines, we are comparing these datasets with pilot voice reports and civil aviation turbulence incident records. Guided by ICAO EDR threshold standards and safety incident data, the evaluation assesses value distribution, turbulence level correlation, response consistency during typical events, and spatiotemporal characteristics. Ultimately, this analysis aims to identify algorithmic differences and select the most accurate and applicable solutions.

Future Work

2.9 Following ICAO's recommendation on the improvement of meteorological forecasting for turbulence, China will continue to promote the sharing of aircraft EDR data among relevant airlines,

further strengthen capabilities in turbulence case validation and multi-source meteorological data integration, and share relevant technical experience and operational practices when applicable.

3. CONCLUSION

- 3.1 The meeting is invited to note the information contained in this paper.
