



**Information Paper**

**MEETING OF THE METEOROLOGY PANEL (METP)  
WORKING GROUP MOG (WAFS)**

**SEVENTH MEETING**

**Offenbach, Germany, 11 to 13 April 2018**

**Agenda Item 3.3: Work required in support of WAFS Developments  
3.3.1 Matters relating to the gridded WAFS products**

**PROBABILITY FORECASTING FOR WAFS**  
(Presented by the WAFC Provider States)

**SUMMARY**

The WAFCs are planning for an increase in detail and amount of forecast information becoming available over the next 10+ years. In parallel, the WAFCs are also intending to utilise developments in meteorological science capability to provide probability forecasts to quantify the risks of hazard phenomena. The anticipated operational timescale is 2024.

Action by the METP-WG/MOG is in paragraph 4.

**1. INTRODUCTION**

1.1 Further to feedback received from IATA and the developing meteorological science capabilities, there is an identified requirement to explore the use of probability forecasts within the WAFS output.

1.2 This Information Paper provides an overview of the background of the relevance of probability forecasting to WAFS and the anticipated timescales of implementation.

1.3 The information contained within this Information Paper seeks to further the discussion at METP-WG/MOG/4.

## 2. DISCUSSION

2.1 The atmosphere is fundamentally chaotic and there is therefore a limit to forecast predictability. To phrase this differently, there will always be uncertainty associated with the evolution of the weather situation. This is particularly true as the forecast time horizon and complexity of the meteorological phenomena increases.

2.2 Meteorological science and computing power has also been advancing rapidly over recent years. This has enabled an expansion of the use of Ensemble Forecasting.

2.3 Ensemble Forecasting is the principle of running a numerical weather prediction model several times with small adjustments in the starting conditions. The small adjustments introduced in the starting conditions are often the known error range within the meteorological observations.

2.4 By reviewing how the different numerical weather prediction model runs diverge in evolution of the meteorological situation, an assessment can be made to quantify the uncertainty in the weather forecast. To state this another way, the likelihood of a particular meteorological situation evolving can be quantified as a probability.

2.5 The traditional approach to weather forecasting is known as deterministic, with only one forecast outcome. Whilst this can provide good advice, deterministic forecasting may not provide the users with a full understanding of the possible range of outcomes, or the risks of encountering specific phenomena.

## WAFS DEVELOPMENTS

2.6 Given the potential benefits in the ensemble forecasting approach, the WAFCs are planning to provide probability forecasts for the weather hazards of cumulonimbus, icing severity and turbulence severity.

2.7 The hazard probability information will be provided in demonstration mode from November 2022, and is expected to become operational in November 2024.

2.8 The time, horizontal and vertical resolutions of the data will be determined and publicised ahead of the demonstration data being made available.

2.9 The format of the probability forecast output will also be clarified ahead of data being made available for demonstration purposes, subject to further consultation. For example, it is expected that data will be made available in GRIB2, but may also be provided as hazard objects subject to appropriate risk thresholds being defined.

2.10 The contents of the GRIB2 files will depend on the available dissemination capabilities. For example, it will be technically possible to provide a probability of exceeding EDR levels on increments of 0.1. However, limits to dissemination capacity may prohibit providing more than just a probability of exceeding one or two discreet EDR levels.

## 3. CONCLUSION

3.1 In order for the WAFCs to utilise advances in meteorological science and deliver products to better describe the risk of cumulonimbus, icing severity and turbulence severity, it is considered relevant to provide forecast information in probability format.

3.2 It is intended that this information will be made available to users in demonstration mode from November 2022, with an expected operational implementation in November 2024.

4. **ACTION BY THE METP-WG/MOG**

4.1 The METP-WG/MOG is invited to:

- a) note the information contained in this paper.
- b) Discuss any relevant points for WAFS development.