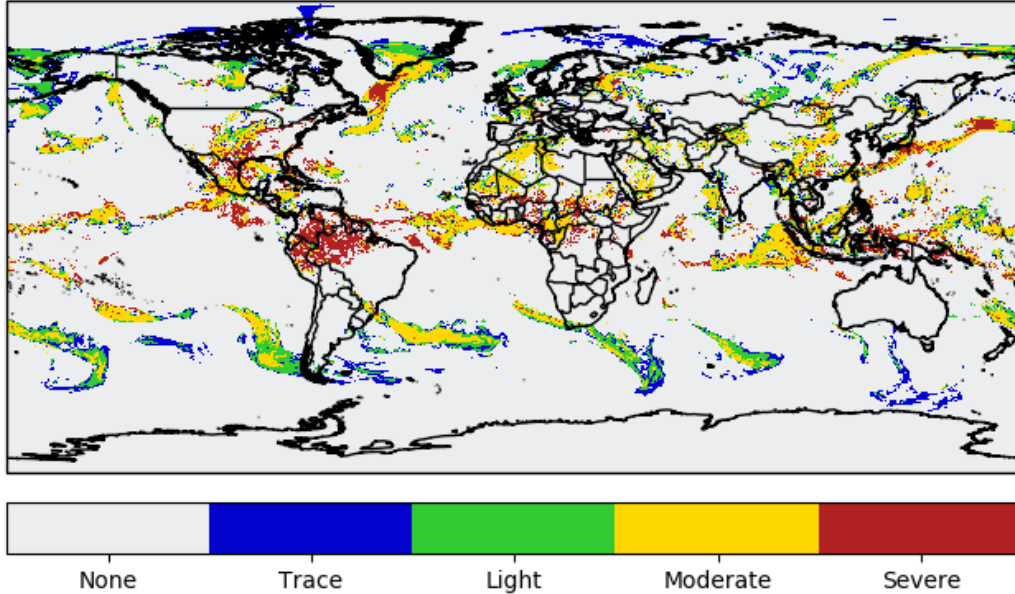# Probabilistic Icing Data

At present WAFS data sets includes a deterministic icing field which is created by blending (harmonising) the output from WAFC London and WAFC Washington.

### Deterministic Inflight Icing Severity Forecast at FL100

The plot above shows an example current WAFS icing severity field, which gives a categorical assessment of the icing intensity.

By creating an ensemble of forecast models, it becomes possible to see the spread of forecast values and identify the probability of the different categories of icing being exceeded.

In the example below the probability of the icing being of moderate or severe intensity (MOD+) at a particular flight level is shown.

MOG+ Icing probability FL100
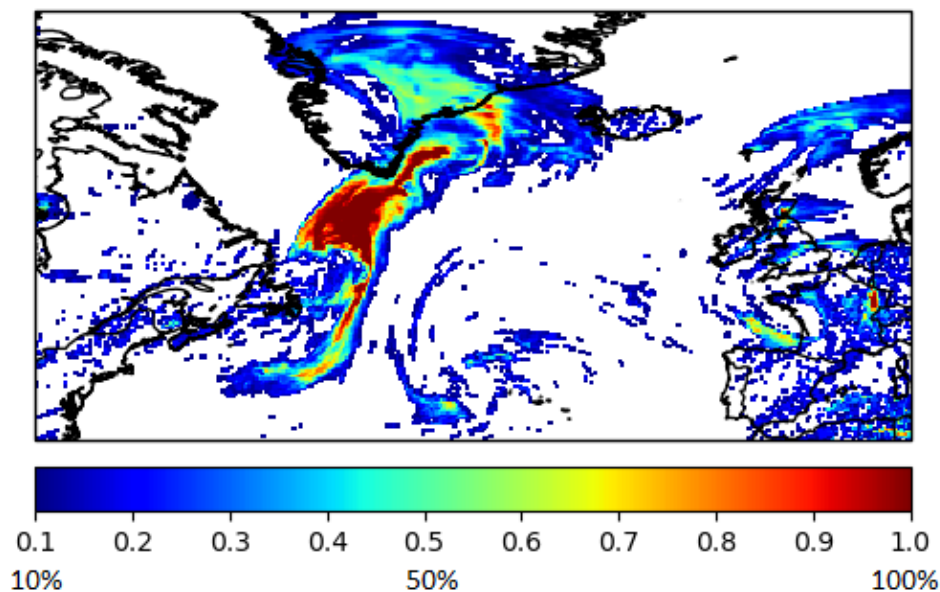
As an alternative, perhaps the probability of no icing is useful. In the plot below the darkest blue areas show where there is a very low risk of icing conditions being encountered.

Probability of no icing at FL100
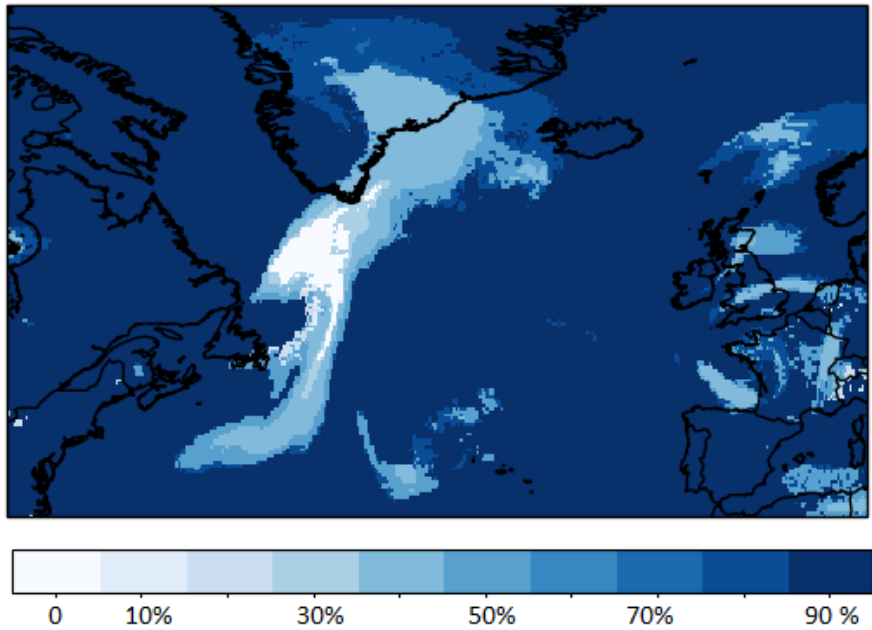
An alternative method of presenting probabilistic information is using a risk matrix. The plot below shows a probabilistic icing matrix which considers the both the intensity of the icing and the probability that it will occur.

Probabilistic Inflight Icing Matrix Forecast at FL100
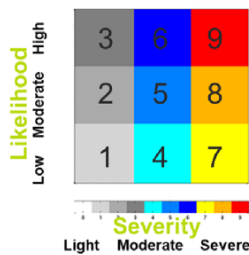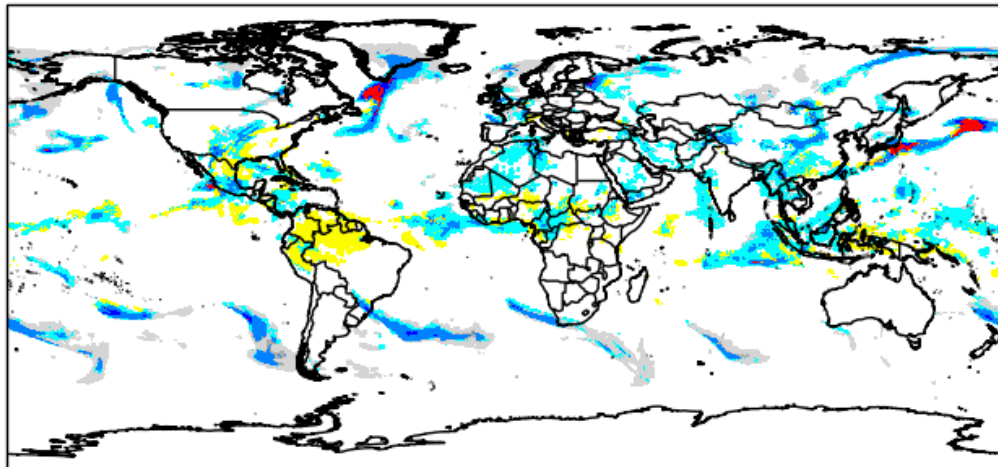
The matrix to the left shows how the probability values are constructed. It should be noted that even though a numerical sequence is used, a "7" (low likelihood of severe turbulence) isn't necessary going to be more problematic or impactful than a "6" (high likelihood of moderate turbulence).

Questions

The WAFCs would like to find out the following information to help inform what a useful probabilistic icing data set would look like:

1) Would knowing the probability that the icing severity exceeds a particular value be useful operationally? If so, please explain why, and what change to operating practices it might have?

2) What icing threshold(s) would be useful for operational use?

3) Would all forecast probability values be of interest? Or is a certain degree of certainty required before the forecast data is useful (for example >50% or >70%)

4) Considering the icing matrix, would the operational decision change in the scenarios below?

Risk Matrix value	Probability	Operational Decision
1	Low risk of light icing	
3	High risk of light icing	
4	Low risk of MOD icing	
6	High risk of MOD icing	
7	Low risk of SEV icing	
9	High risk of SEV icing	

5) Is knowing where there is high probability of no icing at all useful? If so, how would you use it operationally?

6) What forecast period would be useful? (maximum possible is 5 days)

7) Which thresholds and probabilities are needed for your EDTO (ETOPS) flight planning decisions?

8) If there are any other ideas of what probabilistic icing information might help with operational decision making, please let us know.