

In November 2020 the WAFS hazard gridded data sets available on SADIS and WIFS will be updated.

New Icing Severity, and Turbulence fields at a 0.25 degree horizontal resolution will be published, along with 0.25 degree cumulonimbus extent/base/top.

On SADIS the files will be published in GRIB2 format using the following file naming conventions:

	T <sub>1</sub>	T <sub>2</sub>	A <sub>1</sub>	A <sub>2</sub> (Timestep)	ii (first two digits of pressure in hPa)	CCCC
Icing Severity	Y	I	Y	C, D, E, F, G, H, I, J, K, L, M	80, 70, 60, 50, 40, 30	EGRR / KWBC
Turbulence	Y	L	Y	C, D, E, F, G, H, I, J, K, L, M	70, 60, 50, 40, 35, 30, 25, 20, 15	EGRR / KWBC
CB Horizontal Extent	Y	B	X, Y	C, D, E, F, G, H, I, J, K, L, M	01	EGRR / KWBC
ICAO Height at CB Base	Y	H	X, Y	C, D, E, F, G, H, I, J, K, L, M	02	EGRR / KWBC
ICAO Height at CB Top	Y	H	X, Y	C, D, E, F, G, H, I, J, K, L, M	03	EGRR / KWBC

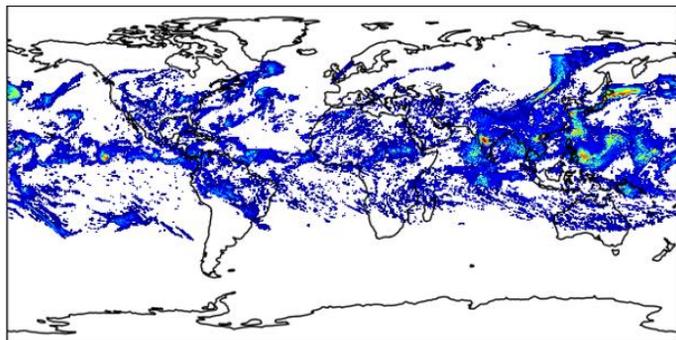
The A1 indicator “Y” denotes that this is a 0.25 degree data set.

## Icing Severity

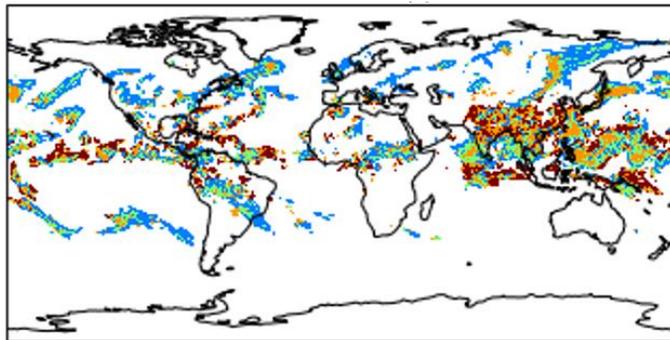
The new icing severity forecasts, provided for FL060, FL100, FL140, FL180, FL240 and FL300, brings improved algorithms and incorporates temperature, cloud fraction, vertical velocity and cloud liquid + cloud frozen water content. Instead of providing a value in the 0 to 1 (or 0 to 100% range) the data is categorized into to icing intensities.

A comparison of the old Icing Potential and new Icing Severity fields is shown below:

**WAFS Icing Potential, FL240**



**WAFS Icing Severity, FL240**



It can be seen that the new Icing Severity field contains much more distinct icing areas. More moderate/severe icing is forecast, particularly in the tropics; this is due to an improvement in the way convective icing is calculated.

**IMPORTANT NOTE:** Within the GRIB 2 coding, a new parameter number “37” is used. This is being added to the WMO No. 306 FM-92 GRIB code form in May 2020 into code table 4.2-0-19, and a new code table is being created.

The new code table will be as shown to the right:

Please be aware that there is a possibility that the parameter number could change to 37 before this data becomes operational

Code Figure	Meaning
0	None
1	Trace
2	Light
3	Moderate
4	Severe
5-191	Reserved
192-254	Reserved for local use
255	Missing value

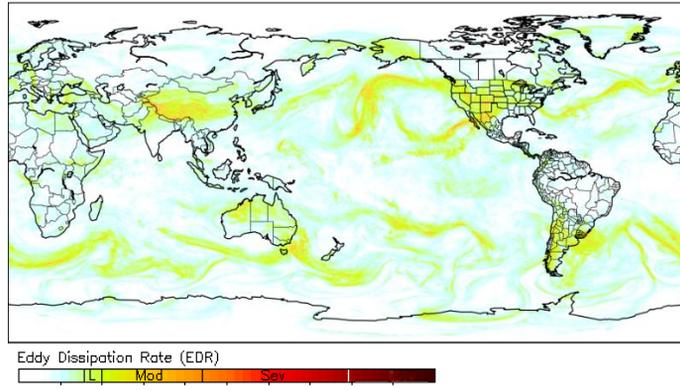
For further information e-mail [SADISmanager@metoffice.gov.uk](mailto:SADISmanager@metoffice.gov.uk) or [ncep.awcweb@noaa.gov](mailto:ncep.awcweb@noaa.gov)

## Turbulence

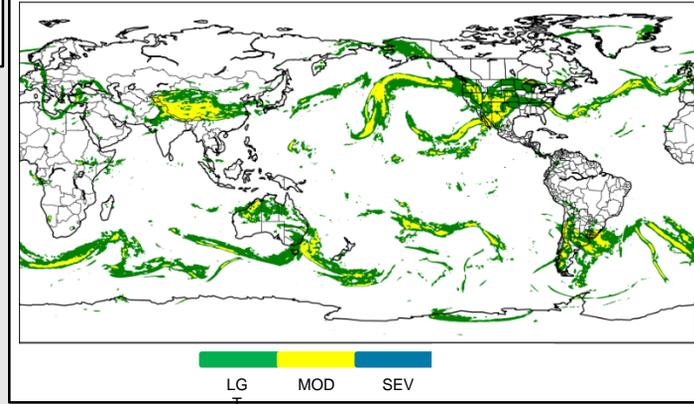
The new turbulence hazard grids, provided for FL100, FL140, FL180, FL240, FL300, FL340, FL390 and FL450 uses a multi-diagnostic algorithm, Graphical Turbulence Guidance (GTG) developed by the National Center for Atmospheric Research (NCAR). GTG forecasts clear air and orographic turbulence, and will provide output in terms of Eddy Dissipation Rate (EDR). EDR is an aircraft independent measure of turbulence, represented by values of 0 to 1.

Two ways of displaying this data are shown below:

### WAFS Turbulence Severity , FL240



### WAFS Turbulence Severity, FL240



**IMPORTANT NOTE:** ICAO Annex 3, Appendix 4, Section 2.6 describes how the EDR values relate to turbulence intensity for a medium sized aircraft – but please note that a revision to these figures have been proposed for Amendment 79 (applicable Nov 2020). These values are shown in the table to the right.

Further information on how GTG works can be found here:

<https://journals.ametsoc.org/doi/full/10.1175/JAMC-D-16-0205.1>

#### Turbulence shall be considered:

- Severe when the peak value of the EDR equals or exceeds 0.45;
- Moderate when the peak value of EDR is equal to or above 0.20 and below 0.45;
- Light when the peak value of EDR is equal to or above 0.10 and below 0.20
- Nil when the peak value of EDR is below or equal to 0.10

*The EDR values given above describe the severity levels for a medium-sized transport aircraft under typical en-route conditions (i.e. altitude, airspeed and weight).*

## Cumulonimbus

There is no change to the algorithms being used to calculate cumulonimbus extent, base and top but they will be provided at 0.25 degree resolution.