



NEW 0.25° Icing, NEW Improved Id NEW OPM

Retired: SIGWX<sup>-</sup> Retired: In clo

# WAFS 10 YEAR PLAN

OPMET TAC Format

### T+24 SIGWX BUFR Objects

Jetstream (position, speed, core height, depth), CB (extent, base, top), CAT, Icing, In-cloud turbulence, Tropopause height. Position of tropical cyclones, volcanic eruptions, and radioactive release

### SIGWX Charts

T+24, 13 high level and 4 medium level png charts

### GRIB2 Hazard Data 1.25°

Cumulonimbus extent/base/top (1), Icing Potential (6), In-cloud turbulence (5), CAT (6) T+6, T+9, T+12, T+15, T+18, T+21, T+24, T+27, T+30, T+33, T+36

### GRIB2 Data 1.25°

Wind (17), temp (17), Geopotential height (17), Relative Humidity (5), Tropopause height and temp, Jetstream height/speed/direction (1)

T+6, T+9, T+12, T+15, T+18, T+21, T+24, T+27, T+30, T+33, T+36





Note: the number shown by GRIB2 data types indicates the number of levels of data that will be available

**Note:** Test data sets would be made available to workstation providers and users ahead of each operational change.

n Nov	2020:	In Nov 20	<b>22:</b>
urbule ng anc T data ropopa Id turb	in IWXXM format ause height information bulence gridded data Adjustme in IWXXM format Adjustme ause height information Adjustme introdu	In cloud turbuler ed: BUFR format EW: SIGWX in IW ents to the high l uced for Annex 3	nce SIGWX objects SIGWX objects. /XXM format level SIGWX charts Amendment 80.
	<b>OPMET</b> TAC and IWXXM Format		
	<b>T+24 SIGWX BUFR Objects</b> Tropopause height information retired (Amendment 79)		<b>T+24 SIGWX IWXXM Objects</b> Jetstream (position, speed, core height), CB In cloud-turbulence BUFR format, CB base and jet depth retired
	<b>SIGWX Charts</b> Tropopause height information retired (Amendment 79)		<b>SIGWX Charts</b> T+24, 13 high level charts covering FL100 Medium level charts retired. CB base and je
	<b>NEW: GRIB2 Hazard Data 0.25°</b> Cumulonimbus extent/base/top (1) Icing Seve T+6, T+9, T+12, T+15, T+18, T+21, T+24, T+27 *Note: In-cloud turbulence retired and replace	erity (6), Turbul 7, T+30, T+33, ed with 3 extra	ence Severity (8), New Icing and Turbulence T+36 <mark>turbulence levels</mark> .
	<b>GRIB2 Data 1.25°</b> Wind (17), Temp (17), Geopotential height (17 T+6, T+9, T+12, T+15, T+18, T+21, T+24, T+27	7), Relative Hur 7, T+30, T+33,	nidity (5), Jetstream height/speed/direction T+36
	Nov 2020		Nov 2022
	2022	SADIS FTP	WIFS 2024
	TEST	SYSTEM	
			<b>GRIB2 Data 0.25°</b> Wind (49), Temp (49), Geopotential heig T+6 to T+24 in hourly intervals, T+27 to T
			<b>GRIB2 Hazard Data 0.25°</b> Cumulonimbus (base, top, extent). Icing 5 T+6 to T+24 in hourly intervals, T+27 to 5
		Vov 2022	
		2	<b>Next-generation SIGWX Objects,</b> FL100-FL530 Jetstream (position, speed, core height), T+6, T+9, T+12, T+15, T+18, T+21, T+24
			<b>SIGWX Charts</b> PNG charts for 3 areas (1 Mercator and 2 Jetstream (position, speed, core height), T+6, T+9, T+12, T+15, T+18, T+21, T+24
			<b>OPMET</b> IWXXM format
			NEW/ Drobabi

B (extent, top), Turbulence, Icing. Position of tropical cyclones, volcanic eruptions, and radioactive release

d (Amendment 80)

to FL530 et depth information retired (Amendment 80)

e (GTG) algorithms used.

(1), Tropopause height and temp, Jetstream height/speed/direction (1)



ght (49), Relative Humidity (14), Jetstream height/speed/direction (1) Tropopause height and temperature (1) T+48 in 3 hour intervals, T+54 to T+120 in 6 hour intervals.

Severity (25), Turbulence Severity (36) T+48 in 3 hour intervals

> Probabilistic Hazard Data Cumulonimbus, Icing Severity, Turbulence Severity Resolution, time-steps and exact output still to be determined

, IWXXM format

, CB (extent, top), Turbulence, Icing. Position of tropical cyclones, volcanic eruptions, and radioactive release 4, T+27, T+30, T+33, T+36, T+39, T+42, T+45 and T+48

2 polar charts) for FL100-FL530

, CB (extent, top), Turbulence, Icing. Position of tropical cyclones, volcanic eruptions, and radioactive release I, T+27, T+30, T+33, T+36, T+39, T+42, T+45 and T+48

In Nov 2024: istic forecasts of CB, Icing and Turbulence









\* Note: The provision of deterministic data types will be reviewed, and may be replaced by probabilistic output if appropriate.

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# Vision:

to provide high resolution gridded data, multiple time step SIGWX forecasts, and OPMET data to global aviation activities including; trajectory based operations, free route operations, continuous descent operations, and improved air traffic flow management.



What does this mean: For an aircraft flying at 450 knots 0.25deg – 2 mins flying time 1.25deg – 10 mins flying time.

## Better temporal resolution

T+6	T+7	T+8	T+9	T+10	T+11	T+12	T+13	T+14	T+15	T+16	T+17	T+18	T+19	T+20	T+21	T+22	T+23	T+24	T+27
T+30	T+33	T+36	T+39	T+42	T+45	T+48	T+54	T+60	T+66	T+72	T+78	T+84	T+90	T+96	T+102	T+108	T+104	T+120	

# Scientific Upgrades

## Improved Icing Forecasts

The new icing diagnostic is more physically realistic that the current operational diagnostic since it takes account of a wider range of meteorological conditions conducive to icing.

The reliability diagram assesses how well the predicted icing severity correspond to their observed potential frequencies, perfect reliability is lying along the grey diagonal line. The new diagnostic shows an improvement in the reliability of the icing forecasts with more correct forecasts of low icing potential and fewer incorrect forecasts of high icing potential.





Credit: Katie Brown. Met Office.

## \*Extra time steps and vertical levels marked in green.

## Improved Turbulence Forecasts

The Graphical Turbulence Guidance (GTG) algorithms will provide turbulence forecasts of Eddy Dissipation Rate (EDR) which are an objective, aircraft-independent, universal measure of turbulence. The GTG turbulence forecasts include Clear Air Turbulence (CAT) and turbulence due to mountain wave activity.

The plot shows how GTG forecasts at 1.25° resolution (purple bars) outperforms the existing WAFS turbulence forecasts for all forecast areas.



Credit: NOAA/ESRL/GSD.

# New data delivery system

The next generation WAFS delivery system will enable users to customise gridded, SIGWX and OPMET data downloads to best suit their operational needs.

1) Data for flight trajectories

Users will be able to download gridded data for individual flight trajectories in order to optimise flight safety and performance.

FL400 **CB SIGWX OBJECT** FL050

# **SIGWX forecasts**

## Multiple time-step SIGWX data

Harmonised SIGWX forecasts based on 0.25 degree gridded wind, turbulence, icing and cumulonimbus. Forecasts will be produced in SWIM compatible IWXXM format.



2) Data for an area Users will be able to download 4 dimensional cubes of data for the area of interest.



Data will be produced for 3 hourly time-steps between T+6 and T+48.