SADIS API - USER GUIDE

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Prepared by the ICAO Meteorological Panel Meteorological Operations Working Group (WG MOG)

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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Glossary

ABBREVIATIONS AND TERMS

AFS	Aeronautical fixed service
AFTN	Aeronautical fixed telecommunication network
AIREP	Air-report
API	Application Programming Interface
CB	Cumulonimbus cloud
FL	Flight level
FTP	File transfer protocol
GAMET	Area forecast for low-level flights
GRIB2	Gridded binary code (WMO) — Edition 2
IWXXM	ICAO Meteorological Information Exchange Model
METAR	Aerodrome routine meteorological report
METP	Meteorological Panel (ICAO)
OPMET	Operational meteorological (information). For the purposes of the SADIS API the term OPMET is the collective term used to describe METAR, TAF, SIGMET, AIRMET, Volcanic Ash Advisories, Tropical Cyclone Advisories, Space Weather Advisories, ASHATAM and VA NOTAMS, and notices.
PNG	Portable network graphics
SADIS	Secure Aviation Data Information Service (formerly, until 1 August 2016, Satellite Distribution System for Information Relating to Air Navigation)
SADIS Provider	United Kingdom Met Office
SADIS Provider State	United Kingdom, represented by the Head of the Meteorological Authority, United Kingdom Civil Aviation Authority
SCRAG	SADIS Cost Recovery Administrative Group
SIGMET	Information concerning en-route weather phenomena which may affect the safety of aircraft operations
SIGWX	Significant weather forecasts
SPECI	Aerodrome special meteorological report
TAC	Traditional Alphanumeric code format
TAF	Aerodrome forecast
TCAC	Tropical cyclone advisory centre
UTC	Co-ordinated Universal Time
VAAC	Volcanic ash advisory centre

WAFC	World Area Forecast Centre (London and Washington)
WAFS	World Area Forecast System
WIFS	WAFS internet file service, operated by the United States.
WG-MOG	Meteorological Operations Group (reporting to METP)
WMO	World Meteorological Organization
WIFS Provider	United States National Weather Service Aviation Weather Center
WIFS Provider State	United States, represented by the Head of the Meteorological Authority, United States Federal Aviation Administration
ZIP	A file format used for file compression and decompression

Reference documents

ICAO Annex 3   *Meteorological Service for International Air Navigation*

Doc 10157   (PANS-MET) *Procedures for Air Navigation Services – Meteorology (from Nov 2025)*

Doc 7910   *Location Indicators*

Doc 9855   *Guidelines on the Use of the Public Internet for Aeronautical Applications*

Doc 10003   *Manual on the ICAO Meteorological Information Exchange Model.*

Air Navigation Plans

Doc 7754   *Air Navigation Plan — European Region*

Doc 7474   *Air Navigation Plan — Africa-Indian Ocean Region*

Doc 8733   *Air Navigation Plan — Caribbean and South American Regions*

Doc 8755   *Air Navigation Plan — North Atlantic, North American and Pacific Regions*

Doc 9634   *Air Navigation Plan — North Atlantic Region*

Doc 9673   *Air Navigation Plan — Asia and Pacific Regions*

Doc 9708   *Air Navigation Plan — Middle East Region*

WMO

WMO-No 306   *Manual on Codes Volume I:2 International Codes*. Part B (WMO code FM 92 - IX Ext).
https://library.wmo.int/records/item/35625-manual-on-codes-volume-i-2-international-codes

WMO-No 306 *Manual on Codes Volume I:3 Representations derived from data models*. Part D.
https://library.wmo.int/records/item/35769-manual-on-codes-volume-i-3-international-codes

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Chapter 1.   INTRODUCTION TO THE SADIS API

1.1.   Background

1.1.1.   As part of its responsibilities as a World Area Forecast Centre (WAFC) London, the Met Office is required to provide a means by which aviation users can access the World Area Forecast System (WAFS) data sets.   This is fulfilled by the Secure Aviation Data Information Service (SADIS).

1.1.2.   The SADIS API is the third incarnation of SADIS, having originally started out as a satellite-based system and then an FTP system. The SADIS FTP system will continue to run alongside the SADIS API until 2028 and information on it is published in a separate user guide.

1.1.3.   The WAFS data sets provided on SADIS are described in ICAO Annex 3 — *Meteorological Service for International Air Navigation[1]*, and from November 2024 PANS-MET (Doc 10157) – *Procedures for Air Navigation Services – Meteorology*. It is expected that the data sets available on via the SADIS API will evolve with time to respond to new requirements by the International Civil Aviation Organisation (ICAO), States and end users.

1.1.4.   The purpose of this *SADIS API User Guide* is to give an overview of the available data and to provide information on using the SADIS API. It is intended to complement the information provided within the API specification itself and technical manuals which will accompany the individual software that is provided by third parties to interact with and visualise data which is downloaded.

1.1.5.   This *SADIS API User Guide* is published on the ICAO METP website: https://www.icao.int/airnavigation/METP/MOGWIFSSADIS%20Reference%20Documents/Forms/AllItems.aspx and Met Office website https://www.metoffice.gov.uk/services/transport/aviation/regulated/sadis/info/sadis-api Additional system information is available from the Met Office SADIS website at URL: https://www.metoffice.gov.uk/services/transport/aviation/regulated/sadis/info/sadis-api.   It will be reviewed annually and updated when changes are made to the system or data provided.

1.2.   Management of SADIS

1.2.1.   As SADIS is a multi-regional service provided by one State to serve multiple ICAO States, it is necessary to enable the user States to have an influence over the content and schedule of SADIS; and the medium and long-term management of the service to ensure that their requirements and those of the end users are adequately met. The ICAO Meteorological Panel (METP) – through its Meteorological Operations working Group (WG-MOG) oversees the SADIS to ensure that the information provided meets their requirements. It will act on behalf of users to address complaints and any difficulties which have not been resolved through normal day to day operational oversight by the SADIS Provider. It also integrates new requirements on the system and identifies operational adjustments to the service.

1.2.2.   Meetings of the WG-MOG are held annually in relation to SADIS and WAFS.

1.2.3.   The United Kingdom, as the SADIS Provider State, has been invited by ICAO to implement the SADIS in accordance with ICAO specifications for the system. The SADIS Provider manages the day-to-day operational control and support of the SADIS system and ensures that the data required by all users is delivered in accordance with ICAO provisions.

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[1] 'ICAO Annex 3' hereafter

1.3.   Access to SADIS

1.3.1.   States may wish to meet their obligation under Article 28 of the Convention on International Civil Aviation regarding the supply of meteorological information to aviation users for the provision of meteorological service for international air navigation by using SADIS.

1.3.2.   In particular, Section 2.1 of ICAO Annex 3, Appendix 2 notes:

> 2.1.1   Aerodrome meteorological offices shall use forecasts issued by the WAFCs in the preparation of flight documentation, whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.
>
> 2.1.2 In order to ensure uniformity and standardization of flight documentation, the WAFS GRIB and BUFR data received shall be decoded into standard WAFS charts in accordance with relevant provisions in this Annex, and the meteorological content and identification of the originator of the WAFS forecasts shall not be amended.

1.3.3.   As described in the Regional Air Navigation Plans, SADIS provides WAFS and OPMET data to Africa, Europe, and Middle East ICAO Regions; and to west and central parts of the ICAO Asia and Pacific Region.

1.3.4.   The WAFS Information File Service (WIFS), which is administered by the Aviation Weather Centre that is part of the National Oceanic and Atmospheric Administration (NOAA) in the United States of America, provides data to the Americas; and to east and central parts of the ICAO Asia and Pacific Region. Information on WIFS is available here: https://www.aviationweather.gov/wifs/

1.3.5.   Figure 1, below, shows the different coverage areas of SADIS and WIFS. States in the area marked as "US/UK shared" can choose which service to use operationally, but it is important to note that it is not permitted to use both SADIS and WIFS operationally at the same time.
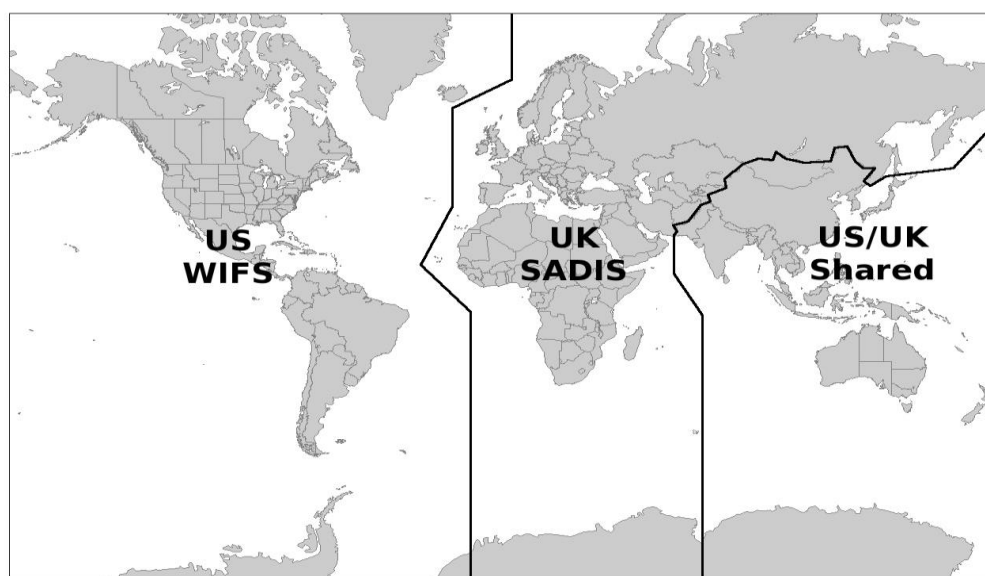

Figure 1 – Area of responsibility for SADIS and WIFS.

1.3.6. Authorized access to the SADIS API by an end user is subject to the direction in the appropriate ICAO Regional Air Navigation Plan and will only be granted after authorization by the ICAO State concerned. The authorization will be based upon advice from the meteorological authority of the State concerned as defined in ICAO Annex 3, Chapter 1, and Chapter 2, 2.1.4, and will be communicated to ICAO and also to the United Kingdom Met Office (as the SADIS Provider) by the authorizing State itself.

1.3.7. It is the prerogative of each State to determine the distribution of the OPMET information and WAFS forecasts to users, in the State concerned, as well as means, links and information flow to be used for this purpose. In view of this, it is for each State to determine the users in the State concerned to be provided with the authorized access to the SADIS.

1.3.8. If the Meteorological Authority has previously granted access to use the SADIS FTP this will be honored for the SADIS API unless the SADIS provider is notified otherwise.

1.3.9. A list of authorized SADIS user organizations will be maintained and published by the SADIS Provider.

1.3.10. The SADIS API can be used by WIFS API users in the event of an outage if authorized by the WIFS provider and the full SADIS API account registration procedure has been completed. Backup users should only make use of the SADIS API during times of a WIFS API outage, and outside of these periods the backup should not be used more frequently than is necessary to ensure that switchover processes work. Usage will be monitored to ensure this facility is not abused.

1.4. Permitted Use

1.4.1. The data provided on SADIS can be used for activities related to the aviation industry, and can be integrated and visualized within your systems, however you must not use the data sets to initialize your own numerical weather prediction models.

1.4.2. If your organization has rights under ICAO Annex 3, Chapter 2 for the provision of meteorological services to operators, flight crew, air traffic service units, airport management and others concerned with the conduct of international air navigation the data available on SADIS may be shared to third parties in your area of responsibility. If this is the case the SADIS provider should be notified (this is purely so we can assess the global benefit that WAFS data has).

1.4.3. Without the rights described in paragraph 1.5.4 the data held on SADIS should not be retransmitted or redistributed outside of your organization in their original form.

1.4.4. Data from the SADIS API should be downloaded to a central server in your organization before being cascaded out to individual workstations or devices. A fair use policy is in place, with limitations described in chapters 4, 5 and 6, and API usage will be monitored to ensure this is adhered to.

1.5. SADIS API registration

1.5.1. In order to use the SADIS API, a registration process needs to be completed – even for existing SADIS FTP users. This consists of the following:

- Completion of a registration form
- Agreeing to a set of SADIS API user terms and conditions which are available to view here: https://www.metoffice.gov.uk/services/transport/aviation/regulated/sadis/info/sadis-api-service-summary
- Onboarding to the Met Office API management system (to get an authentication key so that the API can be accessed). Instructions on this process will be sent to you separately once the previous two steps have been completed.

1.5.2.   If your State is not currently a SADIS using State, then an additional step to get approval from your Met Authority will need to be completed before SADIS access can be granted.

1.5.3.   The registration process can be instigated by e-mailing the SADISmanager@metoffice.gov.uk

1.6.   SADIS cost allocation and recovery

1.6.1.   A mechanism for the recovery of the operating costs of SADIS incurred by the SADIS Provider State is in place. The SADIS cost allocation and recovery scheme is based on mandatory participation by the SADIS user States and is administered by the ICAO SADIS Cost Recovery Administrative Group (SCRAG).

1.6.2.   States included in the United Nations list of Least Developed Countries are exempt from the cost recovery scheme. The participating States will contribute towards the scheme in proportion to the number of Available Tonne Kilometers (ATKs) performed in scheduled services (international and domestic) in the preceding calendar year by air carriers based in the territory of the State and recover these contributions from the airspace users through en route charges. A copy of the agreement for sharing of costs for SADIS is available at: http://www.icao.int/sustainability/Joint-Financing/Pages/SCRAG-Reports.aspx via the link in the first paragraph of the webpage.

1.6.3.   Use of SADIS is dependent on the users' State paying their annual SADIS invoice (if applicable).

Chapter 2. PRODUCTS AND DATA AVAILABLE ON SADIS

2.1. Introduction

2.1.1. Three types of data are available on the SADIS API: WAFS gridded data, WAFS Significant Weather forecasts (SIGWX) and OPMET data.

2.1.2. The WAFS data sets are produced by the two World Area Forecast Centres (WAFCs); WAFC London and WAFC Washington. The United Kingdom is both the SADIS Provider State and the WAFC London Provider State. Similarly, the United States is the WIFS Provider State and the WAFC Washington Provider State.

2.1.3. The WAFS gridded forecasts have a number of applications for users, e.g. to calculate specific leg winds for detailed flight planning, or to create charts of selected map areas or routes using visualization software. WAFS SIGWX forecasts are designed for situational awareness.

2.2. WAFS Gridded Data

2.2.1. The WAFS gridded forecasts have a number of applications for users, e.g. to calculate specific leg winds for detailed flight planning, or to create charts of selected map areas or routes using visualization software.

2.2.2.

a) upper wind;

b) upper-air temperature;

c) upper-air humidity;

d) geopotential altitude of flight levels;

e) direction, speed and flight level of maximum wind;

f) flight level and temperature of tropopause;

g) horizontal extent and flight levels of base and top of cumulonimbus (CB) clouds;

h) icing severity; and

i) turbulence severity;

2.2.3. Table 1 summarises the data sets that are available. They are are based on a latitude/longitude regular grid at a 0.25° x 0.25° horizontal resolution.

2.2.4. WAFS data is produced for data at specific flight levels. For example, flight level 300 (FL300) at 1000ft vertical intervals (for example FL050, FL060, FL070) and the vertical range of the data is shown in Table 1. Appendix A gives a more detailed overview of the data sets and contains the exact pressure level values that correspond to each flight level.

2.2.5. The Icing Severity, Turbulence Severity and Cumulonimbus fields are a harmonised data set which is created by blending together the WAFC London and WAFC Washington model output. Both WAFC's use the same blending process and input data sets.

2.2.6. Table 2 details the forecast time-steps that will be provided for the WAFS gridded data sets.

Parameter	Vertical levels

Wind (u and v components), temperature, and geopotential altitude	FL050 to FL600 at 1000ft vertical intervals
Humidity	FL050 to FL180 at 1000ft vertical intervals
Flight level and temperature of tropopause	These are not provided for specific levels
Maximum wind (u and v components) and height of maximum wind	These are not provided for specific levels
Icing severity	FL050 to FL300 at 1000ft vertical intervals
Turbulence severity	FL100 to FL450 at 1000ft vertical intervals
CB horizontal extent, CB base, and CB top	These are not provided for specific levels

Table 1 – Flight level ranges for WAFS gridded data at 0.25° horizontal resolution.

Parameter	1-hourly intervals	3-hourly intervals	6-hourly intervals
Wind, temperature, geopotential altitude	6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24 hours	27, 30, 33, 36, 39, 42, 45 and 48 hours	54, 60, 66, 72, 78, 84, 90, 96, 102, 108, 114 and 120 hours[1]
Flight level and temperature of tropopause			
Direction, speed and flight level of maximum wind			
Humidity			
CB horizontal extent, CB base, and CB top	6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24 hours	27, 30, 33, 36, 39, 42, 45 and 48 hours	Not provided
Icing			
Turbulence			

Table 2 – Fixed valid times for the WAFS gridded data at 0.25° horizontal resolution. Times shown are after the time (0000, 0600, 1200, 1800 UTC) of the synoptic data on which the forecasts were based.

2.2.7.   The WAFS gridded data sets are all provided using the WMO GRIB Edition 2 (GRIB2) code form (WMO FM 92 IX Ext. GRIB refers), and will usually be available to users at the following times:

- WAFC London (EGRR) 0.25-degree non-hazard data 04:30, 10:30, 16:30 and 22:30 UTC.
- WAFC London (EGRR) 0.25-degree hazard data 04:20, 10:20, 16:20 and 22:20 UTC.
- WAFC Washington (KWBC) 0.25-degree non-hazard data 04:45, 10:45, 16:45 and 22:45 UTC.
- WAFC Washington (KWBC) 0.25-degree hazard data 05:00, 11:00, 17:00 and 23:00 UTC.

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[1] WAFC London will only be able to provide data past 66 hours for the 0000 and 1200 forecast issues initially.

2.2.8.   A limited selection of data is available based on a latitude/longitude regular grid at a 1.25° x 1.25° horizontal resolution for those unable to process those fields at the higher resolution and these are summarized in table 3. These parameters are available for 6, 9, 12, 15, 18, 21, 24, 27, 30, 33 and 36 hours after the time (0000, 0600, 1200, 1800 UTC) of the synoptic data on which the forecasts were based.

1.25-degree horizontal resolution Parameter	Vertical levels
Wind (u and v components), temperature, and geopotential altitude	FL050, FL080, FL100, FL140, FL180, FL210, FL240, FL270, FL300, FL320, FL340, FL360, FL390, FL410, FL450, FL480, FL530.
Humidity	FL050, FL080, FL100, FL140, FL180
Flight level and temperature of tropopause	These are not provided for specific levels
Maximum wind (u and v components) and height of maximum wind	These are not provided for specific levels

Table 3 – Flight level ranges for WAFS gridded data at 1.25° *horizontal resolution.*

2.2.9.   1.25-degree data sets will usually be available to users at the following times:

- WAFC London (EGRR) 1.25-degree non-hazard data: 04:00, 10:00, 16:00 and 22:00 UTC.
- WAFC Washington (KWBC) 1.25-degree non-hazard data: 04:00, 10:00, 16:00 and 22:00 UTC.

2.3.   WAFS Significant Weather (SIGWX) forecasts ** Operational from Nov 2024**

2.3.1.   IMPORTANT: The SIGWX data sets currently available on the SADIS API are provided for set up/testing purposes only until November 2024. An official announcement will be made to tell you when you can start to use them operationally. Initially only WAFC London data will be available and WAFC London will continue to make adjustments to optimise the production of the data sets and the appearance of the charts. The format of the IWXXM files should not change and can therefore be used to set up your systems.

2.3.2.   WAFC London and WAFC Washington produce forecasts of global SIGWX four times daily. SIGWX forecasts are designed to be used for situational awareness. The following parameters are included in the forecasts:

a) Jet Stream information (speed, direction, and height);

b) OCNL CB and FRQ CB;

c) MOD and SEV Turbulence;

d) MOD and SEV Icing;

e) flight level of tropopause; and

f) tropical cyclones, sandstorms, volcanic eruptions and the release of radioactive material into the atmosphere.

2.3.3.   Each WAFC will use their own wind and tropopause gridded data sets to create the jet stream and tropopause features will use the WAFC gridded data sets, so there will be small differences between

issuing centres. Turbulence, icing and cumulonimbus features are based on the blended data sets, so if the blending process has been successful at both WAFCs these features will be identical.

2.3.4.   The SIGWX forecasts encompass the air space that lies between FL100 and FL600 and are produced for fixed valid times of 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45 and 48 hours after the time (0000, 0600, 1200, 1800 UTC) of the synoptic data on which the forecasts were based.

2.3.5.   These forecast data sets should be available at approx. 06:00, 12:00, 18:00 and 00:00 UTC. Please note that in November 2024 the time at which these charts is issued is expected to be adjusted, and could be around 1 hour earlier than the times listed.

2.3.6.   SIGWX forecasts are provided in IWXXM format, and will follow the schema created by WMO. The latest schematrons are published on https://schemas.wmo.int/iwxxm/.   Currently version 1.1.0 of the schematron is in use.

2.3.7.   Visualization standards for SIGWX are described in ICAO Annex 3. Using the IWXXM format data enables users to choose a map coverage area, map projection, colour schemes which suits their specific needs, and if displayed on screen different map layers can be switched on and off. Chapter 7 contains guidance on how to visualize each feature.

2.3.8.   The WAFCs will not be providing "paper copy" charts for this new data set, and if required users will need to create these from their own visualisations of the digital data. However, the WAFCs will provide a set of three charts (one Mercator global view, and two polar stereograph views) for every model run that will enable users to check that the digital SIGWX data is being correctly represented. These are not designed for and should not be used as briefing charts.

2.4.   OPMET data

2.4.1.   In the context of the SADIS API, the term "OPMET" is used to collectively refer to all the data types listed in table 4 which lists them and the start of their WMO designator (TT). Appendix B gives a more detailed description of the available OPMET data sets.

2.4.2.   The TAC and IWXXM format data listed in Table 4 is exchanged over the Aeronautical Fixed Service (AFS). This uses the Aeronautical Fixed Telecommunication Network (AFTN) or ATS Message Handling System (AMHS) described in ICAO Annex 10 — *Aeronautical Telecommunications*, Volume II — *Communication Procedures.* This data is collected by the London Regional OPMET Centre (which is also an interregional gateway) and supplied directly to SADIS.

2.4.3.   ICAO Meteorological Information Exchange Model (IWXXM) format OPMET is defined in WMO-No 306 *Manual on Codes Volume I:3 Representations derived from data models*.   It is exchanged internationally via AMHS and is described in detail in ICAO Doc 10003 – *Manual on the ICAO Meteorological Information Exchange Model.*

2.4.4.   OPMET data that is routed to SADIS in collective bulletins is split into individual pieces of data by the SADIS API before it is published at five-minute intervals.

2.4.5.   The "SADIS OPMET Catalogue" gives a detailed listing of the TAC format data normally available on SADIS.   The catalogue is available on https://www.icao.int/airnavigation/METP/Pages/Public-Documents.aspx (in the MOG-SADIS/WIFS Reference Documents section).   The content of the catalogue is created comparing data from ROC London, SADIS, ICAO DOC 7910 and the eANP List of Aerodromes.

2.4.6.   New OPMET data sets may be added if they become a provision under ICAO Annex 3.

Traditional Alphanumeric Format (TAC)	IWXXM format	Graphics (.PNG)
METAR (SA) and SPECI (SP)	METAR (LA) and SPECI (LP)	Volcanic Ash Advisory Graphic (PFXD)
TAF (FC, FT)	TAF (LC, LT)	Tropical Cyclone Advisory Graphic (PZXD)
SIGMET (WC, WS, WV)	SIGMET (LS, LV, LY)	
AIRMET (WA)	AIRMET (LW)	
GAMET (FA)	Volcanic Ash Advisory (LU)	
Special AIREP (UA)	Tropical Cyclone Advisory (LK)	
Volcanic Ash Advisory (FV)	Space Weather Advisory (LN)	
Tropical Cyclone Advisory (FK)		
Space Weather Advisory (FN)		
ASHTAM/VA NOTAM (NW)		
Nuclear Emergency Messages (NN)		
Notices (NO)		

Table 4 – OPMET data types available on the SADIS API

Chapter 3. API SPECIFICATION

3.1.   API Conformance

3.1.1.   In accordance with the ICAO Global Air Navigation Plan (GANP) (Doc 9750) https://www4.icao.int/ganpportal/ the SADIS API has been built in accordance with the System Wide Information Management (SWIM) requirements. SWIM consists of Standards, Infrastructure and Governance, enabling the management of Air Navigation Services related information and its exchange between qualified parties via interoperable services.

3.1.2.   The SADIS API conforms to the EUROCONTROL SWIM 'Yellow Profile' technical specification https://www.eurocontrol.int/publication/eurocontrol-specification-swim-technical-infrastructure-ti-yellow-profile and uses the Open Geospatial Consortium (OGC) Environmental Data Retrieval (EDR) API framework https://ogcapi.ogc.org/edr/.

3.1.3.   Both the SADIS API and the WIFS API are harmonized where possible to enable each service to act as the backup for the other should problems arise.

3.1.4.   The known differences between the SADIS and WIFS API's are described in section 8.3.

3.1.5.   The SADIS API comprises of three elements: one providing OPMET data, one providing the WAFS gridded data, and one providing the WAFS SIGWX data. The function of each is described in the following sections.

3.2.   Access and Authentication

3.2.1.   When access to SADIS is granted, users will be provided with information on how to sign up to the Met Office API developer portal. This will include application names for you to use (this will be set by the SADIS manager).

3.2.2.   Where possible registrations should be made with an organizational e-mail address,

3.2.3.   Consideration should be given to who manages the API registration for your organisation so that you don't lose your access to the developer portal should someone leave. Please note that during the registration process there will be a step in which you have 30 minutes in which to enter a verification code, so if you have a high degree of latency in your e-mail system this may not leave you much time.

3.2.4.   OAuth2 tokens are used for authentication and are valid for 60 minutes, after which a new token is required. Users are advised to set up an automated process to run that refreshes the token just prior to them expiring.

3.2.5.   During the token transition, if there is a request in-flight using the old token this may fail, so re-try logic should be applied.

Chapter 4. Using the WAFS gridded element of the SADIS API

4.1. General Information

4.1.1.   General information on the Gridded element of the API can be found using the following commands:

- https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/ is the API landing page

- https://gateway.api-management.metoffice.cloud/ sadis-wafs-gridded-data/1.0/api gives general information on the API specification

- https://gateway.api-management.metoffice.cloud/ sadis-wafs-gridded-data/1.0/conformance gives information on the specification that the API confirms to.

4.1.2.   In accordance with the OGC-EDR API framework the WAFS gridded data is organized into a series of collections. A request for https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/collections will return a JSON format file which describes <u>all</u> the available collections as well as range of metadata relating to each collection.

4.1.3.   The available collections are shown in table 5 below. Data sets for both WAFC London (EGRR) and WAFC Washington (KWBC) are available.

collectionId (WAFC London Data)	Description	collectionId (WAFC Washington Data)
egrr_WAFS_windtempgeo_0p25	This collection contains u and v wind, temperature and geopotential altitude data for multiple flight levels at a 0.25 degree horizontal resolution.	kwbc_WAFS_windtempgeo_0p25
egrr_WAFS_humidity_0p25	This collection contains relative humidity data for multiple flight levels at a 0.25 degree horizontal resolution	kwbc _WAFS_humidity_0p25
egrr_WAFS_tropjet_0p25	This collection contains tropopause height and temperature, height of the maximum wind (i.e. Jet stream) and the maximum u and v wind at 0.25 degree horizontal resolution	kwbc _WAFS_tropjet_0p25
egrr_WAFSHZDS_blended_ice_0p25	This collection contains the harmonized icing forecast for multiple flight levels at a 0.25 degree horizontal resolution[3].	kwbc_WAFSHZDS_blended_ice_0p25
egrr_WAFSHZDS_blended_turb_0p25	This collection contains the harmonized turbulence forecast for multiple flight levels at a 0.25 degree horizontal resolution[3].	kwbc_WAFSHZDS_blended_turb_0p25
egrr_WAFSHZDS_blended_cb_0p25	This collection contains the harmonized cumulonimbus base, top and extent forecasts a 0.25 degree horizontal resolution[3].	kwbc_WAFSHZDS_blended_cb_0p25

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[3] If the harmonization/blending process is successful the data in the EGRR collection will be almost identical to the KWBC equivalent.

egrr_WAFS_windtempgeo_1p25	This collection contains u and v wind, temperature and geopotential height data for multiple flight levels at a 1.25-degree horizontal resolution.	kwbc _WAFS_windtempgeo_1p25
egrr_WAFS_humidity_1p25	This collection contains relative humidity data for multiple flight levels at a 1.25-degree horizontal resolution	kwbc _WAFS_humidity_1p25
egrr_WAFS_tropjet_1p25	This collection contains tropopause height and temperature, height of the maximum wind (i.e. Jet stream) and the maximum u and v wind at 1.25-degree horizontal resolution	kwbc _WAFS_tropjet_1p25

Table 5 – WAFS Gridded data available data collections

4.1.4.   The API only makes the most recently produced set of model data available. This is then updated four times daily with the data typically first available at the times shown in table 6. Hazard data refers to data found in the "WAFSHZDS_blended_turb", "WAFSHZDS_blended_ice" and "WAFSHZDS_blended_cb" collections, whilst non-hazard data is data found in the "windtempgeo", "humidity" and "tropjet" collections. Data within each of these groupings will only be published when all individual parameters/timesteps are available.

	Model Run			
	00 UTC	06 UTC	12 UTC	18 UTC
EGRR 1.25 non-hazard* data	04:00 UTC	10:00 UTC	16:00 UTC	22:00 UTC
EGRR 0.25 non-hazard* data	04:30 UTC	10:30 UTC	16:30 UTC	22:30 UTC
EGRR hazard data	04:20 UTC	10:20 UTC	16:20 UTC	22:20 UTC
KWBC 1.25 non-hazard* data	04:00 UTC	10:00UTC	16:00 UTC	22:00 UTC
KWBC 0.25 non-hazard* data	04:45 UTC	10:45 UTC	16:45 UTC	22:45 UTC
KWBC hazard data	05:00 UTC	11:00 UTC	17:00 UTC	23:00 UTC

Table 6 – typical publishing time for the gridded data sets.

4.1.5.   https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/collections/collectionId (where the collectionId is one of those listed in table 5) for example https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/collections/egrr_WAFS_windtempgeo_0p25

4.1.6.   The information you get back when making a query type shown in 4.1.2 and 4.1.5 contains a range of metadata about the collection that has been queried, including the available pressure levels, forecast validity times, and parameters.

4.1.7.   This metadata also includes "temporal" information which describes the "interval" over which the data in each collection is valid for. The first time listed will give the validity time for the T+06 data, and this should be used to determine whether it is a data set that has already been downloaded or whether it is a newly published data set.

```
"temporal": {
  "interval": [
        "2024-01-12T12:00:00Z",
        "2024-01-15T00:00:00Z"
    ]
```

4.1.8.   Polling one collection within each grouping of data (shown in table 9) should be sufficient to find out if it has updated, as all collections within that grouping will update at the same time. If the temporal information has not advanced by 6 hours then we suggest that you re-try your request at 5 or 10 minute intervals. There will be occasions where a model run is later than normal.

4.1.9.   Including /items on the end of the query, for example https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/collections/egrr_wafs_windtempgeo_0p25/items will provide metadata on the specific data files that are available for download within that collection. These are defined by their "id" which is uses the "$T_1T_2T_3A_1$ $A_2B_1B_2B_3\_$ $B_1B_2B_3$FLnnn" code form included in table 7.

$T_1T_2T_3A_1$ $A_2B_1B_2B_3\_$ $B_1B_2B_3$FLnnn	Description	Options
T_1	Always start with Y (Y stands for GRIB)	**Y**
T_2	Designates parameter as	**UV** = u and v winds **T** = temperature **R** = relative humidity **H** = geopotential height, and height of tropopause **I** = icing severity **L** = turbulence severity **B** = cumulonimbus
T_3	To designate whether output is probabilistic or deterministic	**D** = deterministic **P** = probabilistic (for future WAFS data sets)
A_1	Resolution	**X** = 1.25 **Y** = 0.25
A_2	Spatial Coverage	**G** = Global **A1, A2, A3, A4, A5, A6, A7, A8** = Tile region number. See figure 1 for coverage areas
$B_1B_2B_3$	Starting forecast timestep in hours	e.g. "024" or "054" See table 10 for permissible options
_	To separate Starting and Ending forecast timesteps	Underscore character
$B_1B_2B_3$	Ending forecast timestep in hours	e.g. "030" or "066" See table 8 for permissible options
FL	To denote which flight levels will be returned	FLALL = all available flight levels FL998 for trop field only FL999 for max wind field only FL001 for CB extent FL002 for CB base FL003 for CB top

Table 7 – item file naming decode

4.1.10.   So for example within the "egrr_wafs_windtempgeo_0p25" collection you will find data with the "id" in the form YUVDYG006_008FLALL

Decode: Y = GRIB2 data   UV = u and v winds

D = deterministic   Y = 0.25 degree resolution

G = global coverage tile   FLALL = data for all available vertical levels

006-008 = range of timesteps (in this case T+6, T+7 and T+8)

4.1.11.   U and V wind components are always provided together, as they are both necessary in order to compute the wind speed and direction.

4.1.12.   Collection data that is provided at a 0.25 degree horizontal resolution is available as data with global coverage as well as eight different "tiles". These are shown in figure 1. Users are encouraged to think carefully about whether a regional tile (or two) meets their operational requirement, and to download those to help reduce the overall volume of data being handled.
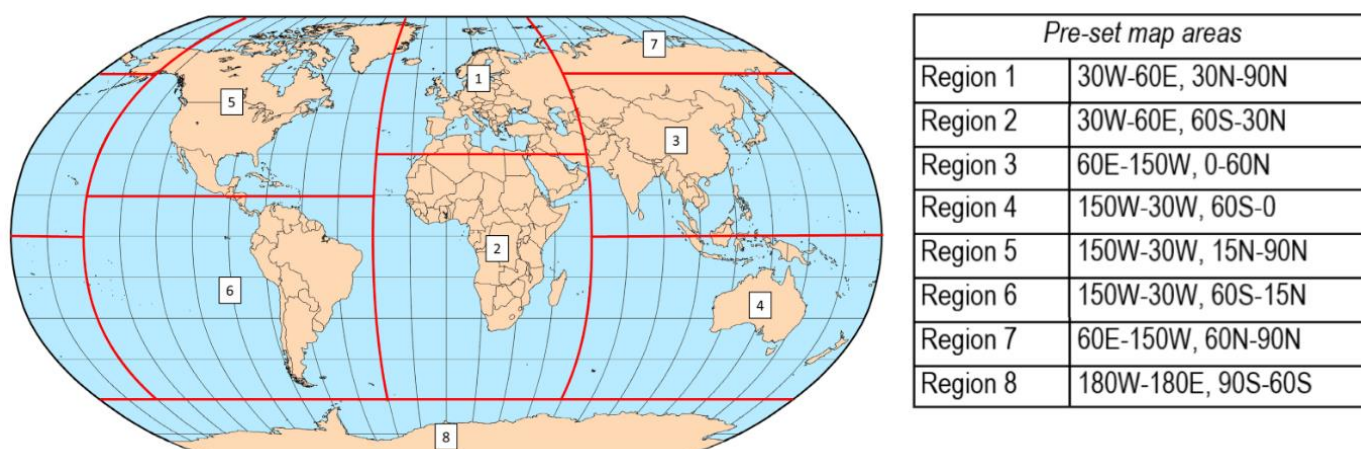

Pre-set map areas	
Region 1	30W-60E, 30N-90N
Region 2	30W-60E, 60S-30N
Region 3	60E-150W, 0-60N
Region 4	150W-30W, 60S-0
Region 5	150W-30W, 15N-90N
Region 6	150W-30W, 60S-15N
Region 7	60E-150W, 60N-90N
Region 8	180W-180E, 90S-60S

Figure 1 – Regional tiles available for 0.25-degree resolution data sets.

4.1.13.   It will not be possible for users to define their own region, but this capability may be developed in the future..

4.1.14.   At the present time all forecast vertical levels for the chosen data set will be provided. These are documented in Appendix A. Please note that an exact pressure level is used for the data (instead of the nearest standard pressure level) in order to accommodate all of the flight levels.

4.1.15.   The data is grouped into "items" containing three forecast timesteps. The permitted timestep groupings are shown in table 8.

Timestep groupings at 0.25° resolution		Timestep groupings at 1.25° resolution	
	$B_1B_2B_3\_ B_1B_2B_3$ in the item name		$B_1B_2B_3\_ B_1B_2B_3$ in the item name
T+006, T+007, T+008	006_008	T+006, T+009, T+012	006_012
T+009, T+010, T+011	009_011	T+015, T+018, T+021	015_021
T+012, T+013, T+014	012_014	T+024, T+027, T+030	024_030
T+015, T+016, T+017	015_017	T+033, T+036	033_036
T+018, T+019, T+020	018_020		
T+021, T+022, T+023	021_023		
T+024, T+027, T+030	024_030		
T+033, T+036, T+039	033_039		
T+042, T+045, T+048[1]	042_048		
T+054, T+060, T+066[2]	054_066		
T+072, T+078, T+084	072_084		
T+090, T+096, T+102	090_102		
T+108, T+114, T+120	108_120		

Note:
[1] *Cumulonimbus, icing and turbulence parameters only go up to timestep T+048.*
[2] *For the 06Z and 18Z model updates, EGRR datasets only go up to timestep T+066.*

Table 8 – permitted timestep groupings

4.2. Requesting Data

4.2.1.   In order to download a complete set of WAFS data a series of download requests would need to be made that encompasses all the different "itemId" types within each separate collection. After initial polling has identified that new data sets are available (see 4.1.7 and 4.1.8) queries for individual items can be made.

4.2.2.   Requests must take this form: https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/collections/collectionId/ItemId (where the collectionId is one of those listed in table 7 and the ItemId is one of those listed in Appendix C).

4.2.3.   Examples of the query types needed to download these individual files is shown below:

https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/collections/egrr_wafs_windtempgeo_0p25/items/YUVDYG006_008FLALL

https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/collections/egrr_wafs_windtempgeo_0p25/ items/YTDYA4018_020FLALL

https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/collections egrr_WAFS_tropjet_0p25/items/YHTDYG021_023FL998

https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0/collections egrr_WAFSHZDS_blended_turb_0p25/items/YLDYG042_048FLALL

4.2.4.   A full set of the permissible "ItemId" codes is included in Appendix C.

4.2.5.   Table 9, below, shows the number of individual queries that would be required to get a full set of gridded data for a single tile.

	T+0, T+12 model run	T+6, T+18 model run
WAFC London (EGRR) 0.25-degree non-hazard data	104	80
WAFC London (EGRR) 0.25-degree hazard data	45	45
WAFC London (EGRR) 1.25-degree non-hazard data	32	32
WAFC Washington (KWBC) 0.25-degree non-hazard data	104	104
WAFC Washington (KWBC) 0.25-degree hazard data	45	45
WAFC Washington (KWBC) 1.25-degree non-hazard data	32	32

Table 9 – number of requests required to collect a full set of data.

4.2.6.   Please do not submit requests for an entire set of gridded data simultaneously, please make the requests over a longer period of time, perhaps on a collection by collection basis.

4.3.   Restrictions

4.3.1.   A limitation on the number of requests that can be made by a user[4] is being imposed to protect the system from unreasonable downloading practices. This will equate to 5000 individual requests day which is sufficient for users to do the following:

- Take a full set of EGRR data for the global tile and a full set of KWBC data for the global tile

- Take a full set of EGRR data for a regional tile and a full set of KWBC data for a regional tile

- Take a full set of EGRR data for two different regional tiles and a full set of KWBC data for two different regional tiles

- Take a full set of EGRR data for three different regional tiles (but please note if you are using this many regional tiles it is probably sensible to take the global tile instead).

4.3.2.   In addition to the total daily limit to the number of requests, there will be a maximum request rate (burst) of 500 requests per minute.

4.3.3.   If this allowance does not meet your needs please contact the SADIS manager who can provide you with additional API accounts (for example for backup systems).

4.3.4.   The SADIS manager will monitor the number and volume of downloads made to ensure that the SADIS API is operating effectively.

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[4] SADIS backup users (i.e. primary WIFS API users) accounts will be monitored to ensure the SADIS API is not being used on a daily basis and instead is only being used when needing to use it as a failover from the WIFS API.

4.3.5.   SADIS API download limits will be in place to make sure that individual users don't make an unreasonable number of downloads. The following guidance is provided:

1) If a single regional tile suits, please use that. 2) Two or three regional tiles can be downloaded. If more than three are required, please use the global tile instead. 3) If your operations are global, then just take the global tile. The SADIS provider would be very grateful for users to carefully consider what data they really need and download that, rather than simply taking everything. There is no reason to take the global tile for a data set as well as a regional version.

4.4.   Data Payloads

4.4.1.   A successful response will return a "302 Found" response with a "Location" header which provides a unique URL which can be used to access the requested data set. This URL is valid for a 1 hour period only. When following the Redirected URL, you will get a 200 response and the requested binary GRIB data, which you can save as a GRIB2 file in your systems.

4.4.2.   The downloaded data file will contain a series of individual GRIB files, one after the other, which encompass all the levels and timesteps for that request.

4.4.3.   The size of downloaded data files varies with the different parameter types. Typical file sizes for the global tiles are shown in table 10.

Parameter and resolution	Typical size of the downloaded data file
0.25 degree U and V Wind	338MB
0.25 degree Temperature and Geopotential Height	168MB
0.25 degree Turbulence	120MB
0.25 degree Relative Humidity	60MB
0.25 degree maximum U and V Wind	14MB
0.25 degree Icing	14MB
All other 0.25 degree parameters, and all 1.25 parameters	<10MB

Table 10 – typical downloaded file sizes

4.4.4.   If your request is unsuccessful, one of the following response types will be returned:

400 Invalid Request	The request is invalid in some way. This could include: • An invalid "collectionId" was used • The URL is incorrect in some way.
401 Unauthorized 403 Forbidden	Valid security credentials were not provided, or the token has expired.

404 Requested data Not Found	The requested data is not available. This could be an error in the collectionId or itemId, or could occur if attempting to request EGRR data for beyond 66-hours for the 06 UTC and 18 UTC model runs.
500 Internal Server 502 Bad Gateway 504 Gateway Timeout	Unexpected server error, please retry.

Table 11 – Response message types when query is invalid in some way.

Chapter 5. Using the SIGWX element of the SADIS API

IMPORTANT: The SIGWX data sets currently available on the SADIS API are for set up/testing purposes only until November 2024. An official announcement will be made to tell you when you can start to use them operationally. Initially only WAFC London (EGRR) data will be available and WAFC London will be working on the system up to November 2024.

There are still some final adjustments to fully optimise the charts appearance, and a few thresholds used for creating objects may also be changed. It is also possible that for time to time data may go missing as there will be no support outside of normal working hours. We will notify you of any planned changes.

The format of the IWXXM files should not change and can therefore be used to set up your systems.

The SADIS manager is happy to get feedback and see your visualisations of the IWXXM data.

5.1.   General Information

5.1.1.   General information on the SIGWX element of the API can be found using the following commands

> https://gateway.api-management.metoffice.cloud/sadis-wafs-sigwx/1.0/ is the API landing page

- https://gateway.api-management.metoffice.cloud/sadis-wafs-sigwx/1.0/api gives general information on the API specification

- https://gateway.api-management.metoffice.cloud/sadis-wafs-sigwx/1.0/conformance gives information on the specification that the API confirms to.

5.1.2.   In accordance with the OGC-EDR API framework the WAFS SIGWX data is organized into a series of collections. These are shown in table 12 below. Data sets for both WAFC London (EGRR) and WAFC Washington (KWBC) are available.

Collection Name (WAFC London Data)	Description	Collection Name (WAFC Washington Data)
egrr_iwxxm_forecasts	This collection contains the IWXXM files	kkci_iwxxm_forecasts
egrr_charts_global	This collection contains the Mercator charts that can be used for checking the IWXXM has been properly visualized	kkci_charts_global
egrr_charts_northpole	This collection contains the Northern Hemisphere Polar Stereographic charts that can be used for checking the IWXXM has been properly visualized	kkci_charts_northpole
egrr_charts_southpole	This collection contains the Southern Hemisphere Polar Stereographic charts that can be used for checking the IWXXM has been properly visualized	kkci_charts_southpole

Table 12 – WAFS SIGWX available data collections

5.1.3.   The API only makes the most recently produced set of data available. This is then updated four times daily at 05:50UTC, 11:50UTC, 17:50UTC and 23:50UTC. Note: These times may be adjusted in November 2024 when the data becomes operational.

5.1.4.   Running the https://gateway.api-management.metoffice.cloud/sadis-wafs-sigwx/1.0/collections query will return a JSON format file which describes all the available collections as well as metadata relating to each collection.

5.1.5.   This metadata includes "temporal" information which describes the interval over which data in each collection is valid for. The first time will equate to the T+06 forecast, and the second the T+48 forecast validity date/time. <u>This should be used to determine whether it is a data set that has already been downloaded or whether it is a newly published data set</u>.

```
"temporal": {
  "interval": [
        "2024-01-12T12:00:00Z",
        "2024-01-14T12:00:00Z"
    ]
```

5.1.6.   If the temporal information has not advanced by 6 hours then we suggest that you re-try the request at 5-minute intervals.

5.1.7.   Querying an individual collection, for example https://gateway.api-management.metoffice.cloud/ sadis-wafs-sigwx/1.0/collections/egrr_iwxxm_forecasts/ will return metadata relating to that specific collection.

5.2.   Requesting Data

5.2.1.   For SIGWX data it is possible to specify which specific forecast time step, or time steps are downloaded with a single request.

5.2.2.   <u>All</u> available forecast timesteps can be retrieved with the following query https://gateway.api-management.metoffice.cloud/sadis-wafs-sigwx/1.0/collections/egrr_charts_global/locations/GLOBAL (omitting a dateTime string)

5.2.3.   Use of the dateTime query parameter allows an individual forecast timestep to be requested. For example requesting data valid at 06Z on the 15th November 2023:

https://gateway.api-management.metoffice.cloud/sadis-wafs-sigwx/1.0/collections/egrr_iwxxm_forecasts/locations/GLOBAL?dateTime=2023-11-15T06:00:00Z

5.2.4.   The dateTime query can also be used to request all data between a bounded interval. For example requesting data valid between 06Z and 18Z (inclusive) on the 15th November 2023 : https://gateway.api-management.metoffice.cloud/sadis-wafs-sigwx/1.0 /collections/egrr_iwxxm_forecasts/locations/GLOBAL?dateTime=2023-11-15T06:00:00Z/2023-11-15T18:00:00Z

5.2.5.   The dateTime query can also be used to request data from a half bounded interval (e.g. every item from the specified time forwards: https://gateway.api-management.metoffice.cloud/ sadis-wafs-sigwx/1.0 /collections/egrr_iwxxm_forecasts/locations/GLOBAL?dateTime=2023-11-15T06:00:00Z/..

5.3. Restrictions

5.3.1. A limitation on the number of requests that can be made by a user will be applied to protect the system from unreasonable downloading practices. This will equate to 1000 individual requests per day, but it should be noted that it is possible to download all EGRR and KWBC iwxxm files and charts with just 32 individual requests per day.

5.3.2. This would permit a user to comfortably take full set of IWXXM data and accompanying cross-check charts from both WAFC London and Washington (which can actually be achieved in 8 requests!)

5.4. Data Payloads

5.4.1. A successful request for data will return a "302 Found" response code which provides a redirect link in the Location header of the response which can be used to download the requested data set.

5.4.2. For the IWXXM data, a single xml format file is returned. This file contains the requested data and its name reflects the forecast time-steps, issuing centre, and model run date/time for example "SIGWX06-36_EGRR_20240104T000000Z.xml"

5.4.3. Within the xml data file that is returned a <collect:MeteorologicalBulletin> wrapper is used and then each individual time-step is contained within sets of <collect:meteorologicalInformation> and </collect:meteorologicalInformation> tags.

5.4.4. For charts, a single zip file is returned. This file contains the requested data and its name reflects the chart type, issuing center, forecast timesteps included, and model date/time for example "PGN06-48_EGRR_20240104T000000Z.zip" which contains the north polar view charts (PGN), for all timesteps (06-48) issued by WAFC London (EGRR) and for the 00Z model run on 4th January 2024.

5.4.5. When unzipped this file would have individual files named in a similar form e.g. "PGN09_EGRR_20240104T000000Z.png"

5.4.6. An example of the global image is shown below. They aren't designed to be printed on a single sheet of A3 or A4 paper and aren't for use as briefing charts. The images are at a resolution that will allow users to check their visualization matches what the WAFC's have forecast by zooming in to the image.
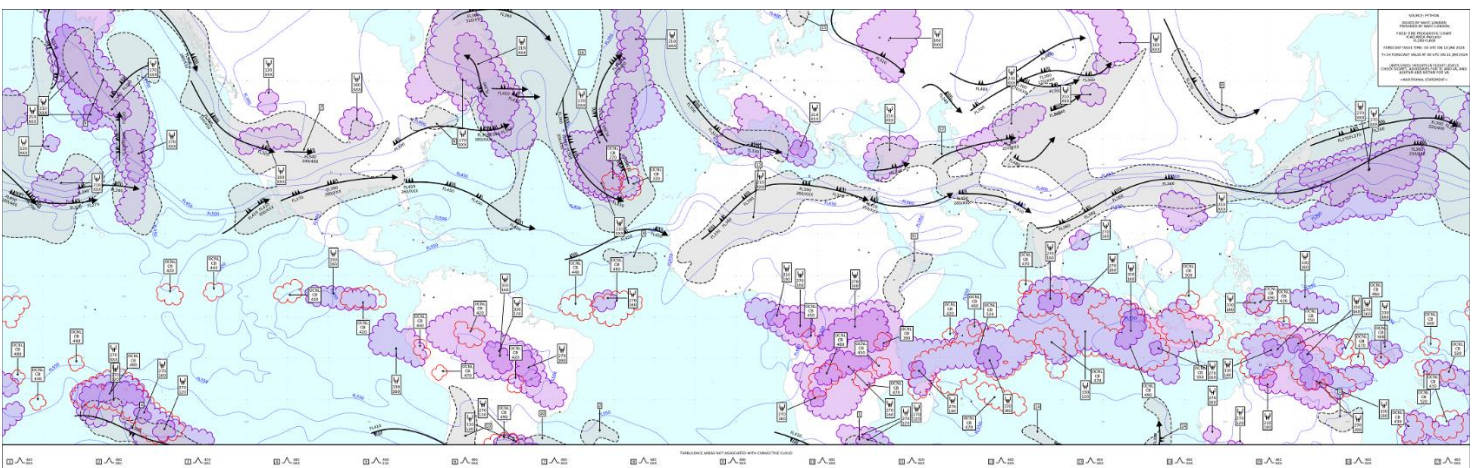

Figure 2 – "global" SIGWX map provided for set up and cross-checking purposes

5.4.7.   Additional changes to the presentation of these charts, and the algorithms/thresholds used for each feature are likely to be made prior to the system becoming fully operational in November 2024 as the final product is optimized.
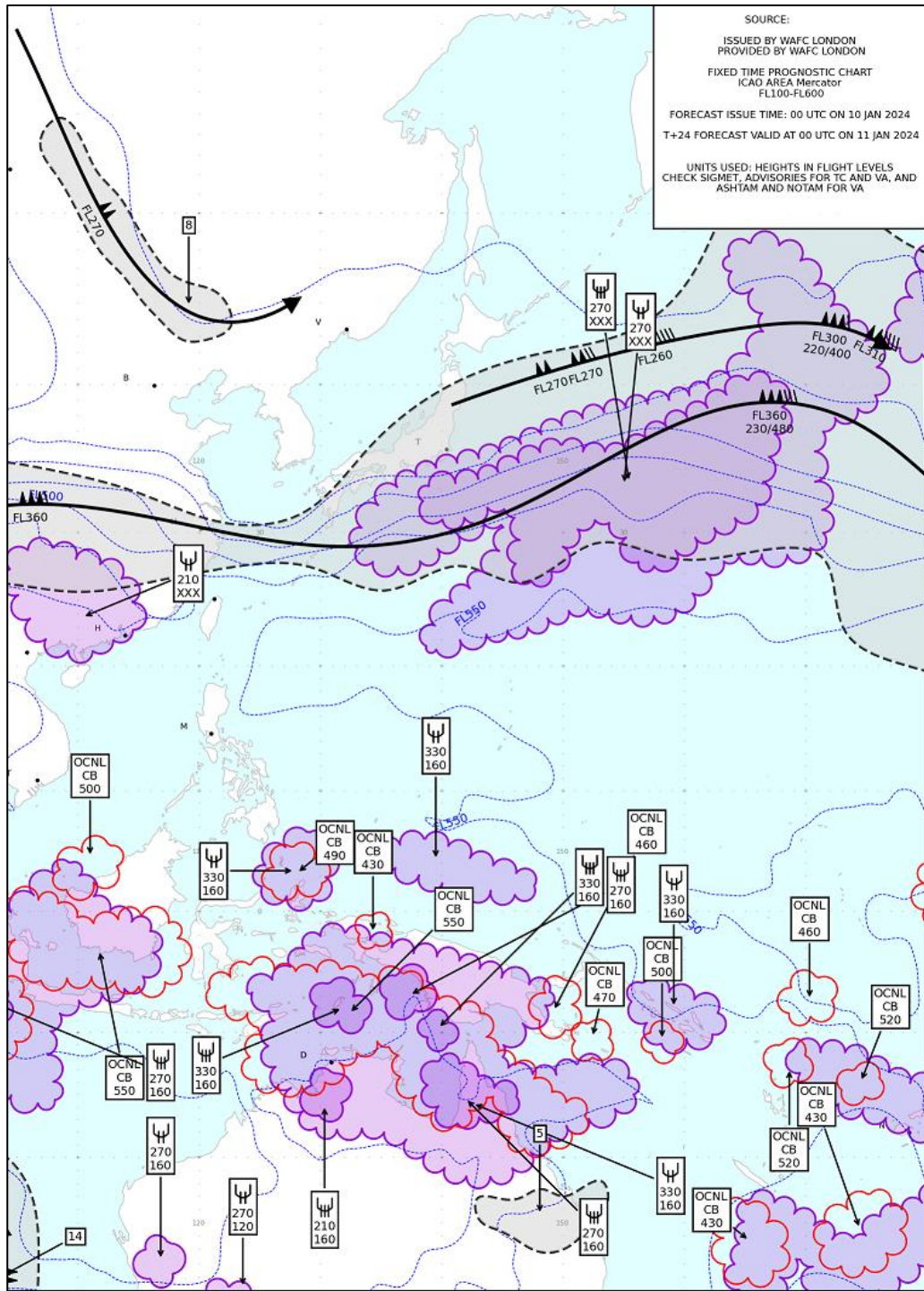

Figure 3 – Zoomed in section of figure 2 to show the detail. Blue contours = tropopause height, red scalloped areas = cumulonimbus areas, purple scalloped areas = icing areas, grey shaded area encompassed by a dashed line = moderate or severe turbulence.

5.4.8.   A range of other response message types will be returned if the request cannot be fulfilled.

400 Invalid Request	The request is invalid in some way. This could include: • An invalid "id" was used • An incorrect collectionId or locationId was used • The URL is incorrect in some way.
401 Unauthorized 403 Forbidden	Valid security credentials were not provided, or the token has expired.
404 Not Found	The request is valid, but no data is available. This would occur if attempting to request data for invalid time range.
429 Too Many Requests	Too many requests have been sent. You might see this error code when rate limits are applied. See Restrictions above.
500 Internal Server Error	A valid or invalid request was made but the system was unable to serve the request due to an error. Retrying after a certain amount of time may help but if this persists then you may have to trigger failover options.

Table 13 – Response message types when query is invalid in some way.

Chapter 6. Using the OPMET element of the SADIS API

6.1. General Information

6.1.1.   General information on the OPMET element of the SADIS API in JSON format can be found using the following commands:

- https://gateway.api-management.metoffice.cloud/sadis-opmet/1/ is the API landing page
- https://gateway.api-management.metoffice.cloud/sadis-opmet/1/api gives general information on the API specification
- https://gateway.api-management.metoffice.cloud/sadis-opmet/1/conformance gives information on the specification that the API confirms to.

6.1.2.   In accordance with the OGC-EDR API framework the OPMET data is organized into a series of collections. These are shown in table 14 below.

Collection Name	Description
tac_opmet_reports	This collection contains METAR, TAF, SPECI, SIGMET (all types), AIRMET, GAMET and special AIREPs in the traditional alphanumeric code format. This data is available in regional subsets, as described in table 15.
iwxxm_opmet_reports	This collection contains METAR, TAF, SPECI, SIGMET (all types) and AIRMET, in IWXXM format. This data is available in regional subsets, as described in table 15.
tac_advisory_reports	This collection contains tropical cyclone advisories, volcanic ash advisories, space weather advisories, nuclear emergency messages, and NOTAM/ASHTAM relating to volcanic eruptions in the traditional alphanumeric code format.
iwxxm_advisory_reports	This collection contains tropical cyclone advisories, volcanic ash advisories and space weather advisories in IWXXM format.
graphical_reports	This collection volcanic ash graphics and tropical cyclone graphics in .png format.
notices	This collection contains various notification messages issued by the European Regional OPMET Centres (ROC London, ROC Toulouse, ROC Vienna and ROC Moscow) and the Regional OPMET Data Bank in Brussels.

Table 14 – OPMET API collection names

6.1.3.   Running the https://gateway.api-management.metoffice.cloud/ads-sadis-opmet/0.0.1/collections query will return a JSON format file which describes all the available collections as well as metadata relating to each collection.

6.1.4.   For the "iwxxm_opmet_reports" and "tac_opmet_reports" global coverage data sets as well as regional data sets will be available. The regional data sets are broadly aligned with the ICAO regions, and the content of each is described in table 15.

locationId	ICAO "CCCC"
EUR-NAT	**E*** **L*** **B*** **U***
NAM-CAR	**C*** **K*** **M*** **T*** **P***
SAM	**S***
AFI	**G*** **D*** **F*** **H***
MID	**O***
ASIA-PAC	**A*** **N*** **R*** **V*** **W*** **Y*** **Z***
GLOBAL	all ICAO codes

Table 15 – OPMET API regional collection names

6.1.5.   It is possible that for a few airports, their data may not be in the regional collection that you expect it to be. For example: Madeira (part of Portugal) has an ICAO code which starts with "L" therefore would be in the EUR-NAT collection, but the Canary Islands (part of Spain) have an ICAO code that starts with G and will therefore be found in the AFI collection.

6.2.   Requesting Data

6.2.1.   To request data from one of the "opmet_reports" collections the following convention is used: https://gateway.api-management.metoffice.cloud/sadis-opmet/1/collections/:collectionId/locations/ :locationId?datetime=2023-09-05T09:30Z/PT5M where the "collectionId" is either "tac_opmet_reports" or "iwxxm_opmet_reports" and the "locationId" is one of the options shown in table 15. For example:

- https://gateway.api-management.metoffice.cloud/sadis-opmet/1/collections/ tac_opmet_reports/locations/GLOBAL?datetime=2023-09-05T09:30Z/PT5M would return TAC format METAR/TAF/SIGMET etc data received in the 5 minute period up to 09:30UTC on the 5th September 2023 anywhere in the globe.
- https://gateway.api-management.metoffice.cloud/sadis-opmet/1/collections/ iwxxm_opmet_reports/locations/EUR-NAT?datetime=2023-10-08T21:50Z/PT5M would return IWXXM format METAR/TAF/SIGMET etc data received in the 5 minute period up to 21:50UTC on the 8th October 2023 that is valid for the EUR-NAT ICAO region.

6.2.2.   To request data from one of the other collections the "locationId" must always be GLOBAL as regional data is not provided.

6.2.3.   The datetime string at the end of the query indicates the start of the five minute period for which data is being requested, and must fall on a standard 5 minute interval. For example 09:30 and 09:35 are valid, but 09:31, 09:32, 09:33 and 09:34 are not valid queries.

- For notices the data is updated every 30 minutes at hh:15 and hh:45, with PT30M used to indicate the time period so requests would take the form shown below. https://gateway.api-management.metoffice.cloud/sadis-opmet/1/collections/ notices/locations/GLOBAL?datetime=2023-09-05T09:15Z/**PT30M** would return any notices received in the 30 minute period up to 09:15UTC on the 5th September 2023.

- https://gateway.api-management.metoffice.cloud/sadis-opmet/1/collections/ notices/locations/GLOBAL?datetime=2023-09-05T09:45Z/**PT30M** would return any notices received in the 30 minute period up to 09:45UTC on the 5th September 2023.

6.2.4.   Timesteps up to 36 hours in the past can be requested.

6.3.   Restrictions

6.3.1.   A limitation on the number of requests that can be made by a user per day[5] will be applied to protect the system from unreasonable downloading practices. This will equate to 5000 individual requests per day.

6.3.2.   A reasonable download profile is to request the following:

- Data from each collection every 5 minutes (30 minutes for notices) and a single "locationID" (e.g. just the EUR-NAT collection, or the GLOBAL collection) for the "iwxxm_opmet_reports" and "tac_opmet_reports" collections.
- Data from each collection every 5 minutes (30 minutes for notices) and two or three different "locationID" (e.g. the EUR-NAT and MID regions) for the "iwxxm_opmet_reports" and "tac_opmet_reports" collections.

> The SADIS provider would be very grateful for users to carefully consider what data they really need and download that, rather than simply taking everything. There is no reason to take a regional data set and the global data set from the same collection.

6.4.   Data payloads

6.4.1.   Valid API requests will return a "301 - Moved Permanently" response in which the location header will provide a presigned URL from which the requested data can be downloaded.

---

[5] SADIS backup users will be subject to a lower weekly/monthly threshold as the SADIS API should only be used when needing to failover from the WIFS API.

6.4.2.   A zip file will be returned in which the data is separated into directories of different data types.

For example a five minute file downloaded from the "tac_opmet_reports" directory would look something like this when unzipped:

```
TAC_opmet_reports_Global_20231012T1505_20231012T1510.zip
          📁AIREP
                    📂UARS61_RURD_121505_c514f80c5226f8d39e36c04e25f8767e
          📁METAR
                    📂SAAE31_VTBD_121500_a892ed2c43ce2771019830ce701b8344
                    📂SAAU32_YPCC_121500_21863aa473c5676e56f05e78102319a5
          📁SIGMET
                    📂WSAU21_YMMM_121505_7a4588357223102e5fe8d4018d73210c
                    📂WSMA31_FIMM_121500_014b948b9b979554b75ecaf641119e59
          📁TAF

                    📂FCRE31_FMEP_121100_AAA_62de21312d8ef366f47694759cb40400
                    📂FCTS31_DTKA_121500_01acb57ad591cb97b347978a21366d99
                    📂FTUS24_KLAS_121506_AAA_1a3a077b72ca7adbd28129e427b24512
```

6.4.3.   If there are no files of a particular type, then that folder would be omitted from the zip file.

6.4.4.   The file naming convention uses information from the bulletin header of the message or collection of messages that was received by the SADIS system, plus a unique identification code.

6.4.5.   A range of other response message types will be returned if the request cannot be fulfilled.

202 Accepted	The request is valid, but the file is still being built (i.e. its not quite ready). You should try your request again in 30 seconds.
400 Bad Request	The request is invalid in some way. The response will tell you how it is invalid. This could include: • A missing, incorrect or invalid datetime query parameter was used (e.g. you have used a datetime for more than 36 hours ago or in the future) • An incorrect collectionId or locationId was used • The URL is incorrect in some way.
401 Unauthorized	Valid security credentials were not provided, or the token has expired.
404 Not Found	Incorrect URL

Table 16 – Response message types when query is invalid in some way.

Chapter 7. Visualising WAFS data sets

7.1. Introduction

7.1.1.   Whilst the SADIS API provides the mechanism for moving data between the SADIS provider and individual user organisations, it will need to undergo additional processing in order to visualise the data and to use it in calculations to plan safe and efficient flights.

7.1.2.   Users intending to use the gridded data will need a data processing system that is able to decode and display GRIB2 format data for their specific purposes. Visualization software will be needed to produce wind and temperature charts, or SIGWX charts according to the guidance in ICAO Annex3 and ICAO Doc 8896 - *Manual of Aeronautical Meteorological Practice*.

7.1.3.   Data downloaded from SADIS should be made available to a user by visual reference on a screen display, or printed e.g. as flight documentation, as necessary. All products utilising WAFS data should include a clear reference to the validity times of the data and possibly also reference to synoptic hour on which the forecast is based. For example

   "Valid at 12UTC on 23 October 2023, based on 18 UTC data on 22 October 2023"

   "T+24 forecast valid at 12UTC 23 October 2023".

7.1.4.   Display packages may enable users to manipulate the information presented to the workstation. This may be a useful feature for users who wish to use their workstation for the production of national products, however it is important that users appreciate that any modification to the meteorological content of information available on SADIS invalidates that information as being a de facto WAFS forecast. In such a case, the forecast becomes a national product. It is imperative that such a change be clearly reflected in the legend that would be assigned to the forecast.

7.1.5.   It should be noted that there is an obligation for States to retain flight documentation for at least 30 days in case of an enquiry (ICAO Annex 3, 9.3.4).

7.2. Data visualisation systems

7.2.1.   Information on some SADIS workstation and software providers is available here: https://www.metoffice.gov.uk/services/transport/aviation/regulated/sadis/software/suppliers (this is not an exhaustive list). When assessing software users should ensure it works with the new SADIS/WIFS API and is able to display the new multi-timestep SIGWX forecasts.

7.2.2.   Detailed guidance material has been developed by the SADIS provider to enable users to assess the capability and functionality of software in using the data sets provided on SADIS. The "SADIS Workstation Evaluation Guide" is published here: https://www.icao.int/airnavigation/METP/Pages/Public-Documents.aspx

7.2.3.   The data visualisation system should be able to:

   a) display all WAFS gridded data types on a map in an appropriate colour scheme with appropriate scales and legends;

   b) pan and zoom the map area, and change the map projection

   c) toggle different layers of gridded data on and off;

   d) ensure that the standard ICAO areas are available on the system as map area defaults;

   e) produce wind and temperature charts from the GRIB data in the appropriate ICAO Annex 3 format;

  f) produce SIGWX charts from the IWXXM SIGWX data in according to the conventions in ICAO Annex 3 and other guidance documentation

  g) produce charts that span the international date line, and cover all of the standard ICAO areas; and,
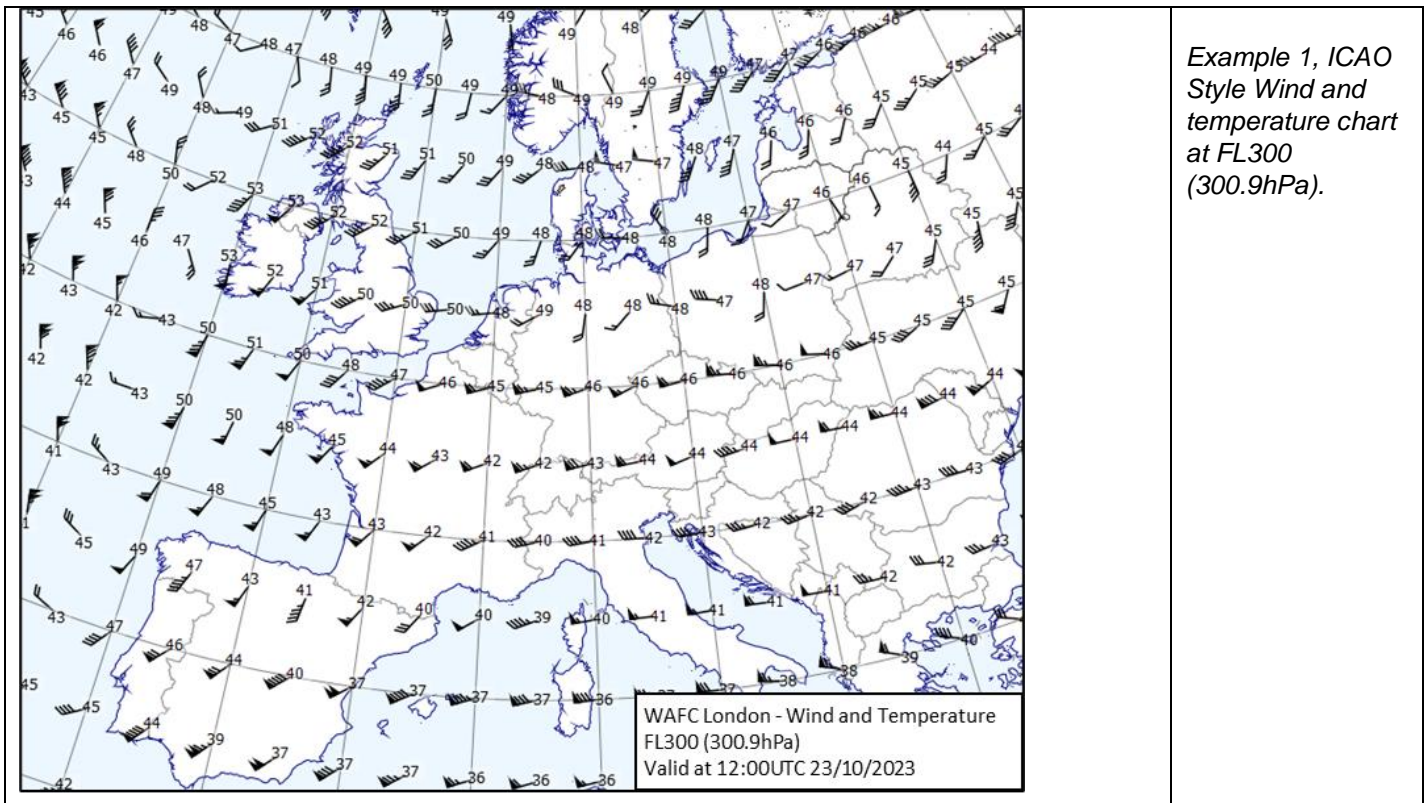
  h) print the screen display;
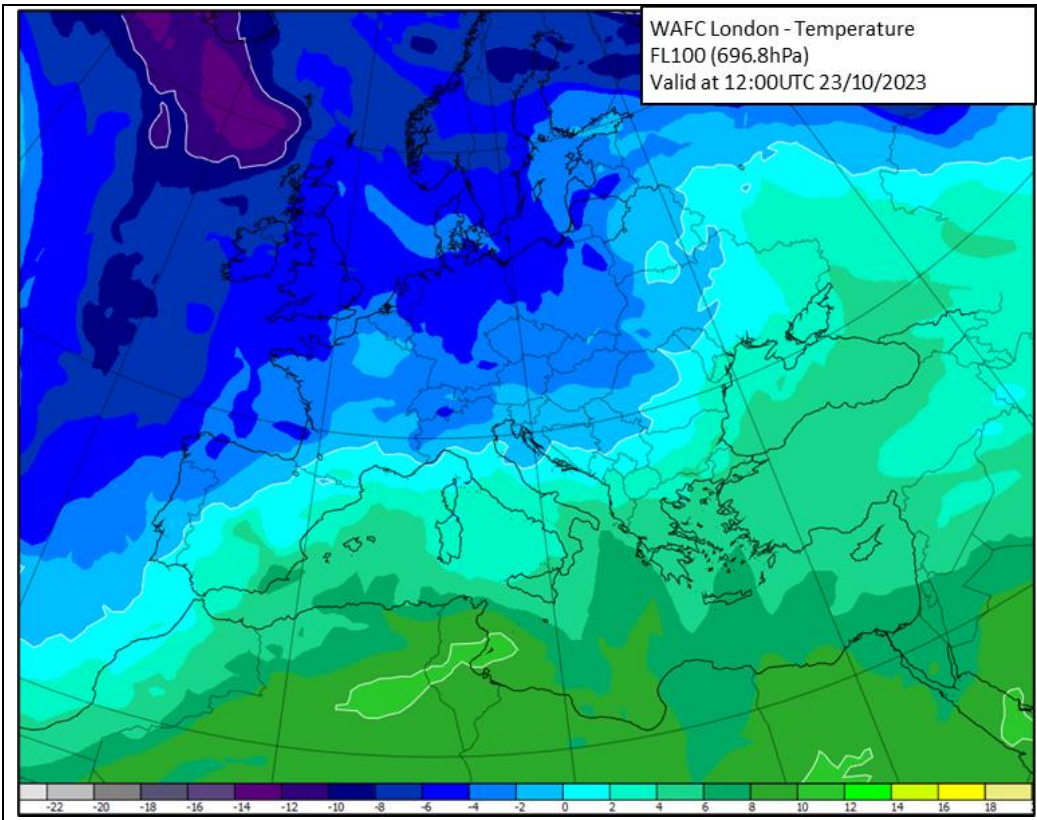
7.2.4. For OPMET data the system should also be able to:

  a) display all OPMET data types in alphanumeric format on a map or as lists;

  b) update automatically as new data becomes available;

  c) sort OPMET by Flight Information Region (FIR), country or route;

  d) alert users when advisory messages are received

  e) print lists of OPMET data in a human readable form

7.2.5. IWXXM format OPMET data is available on the SADIS API, but data with full global coverage is not available yet. Nevertheless, SADIS users are encouraged to start looking at the processing and display of the IWXXM data.
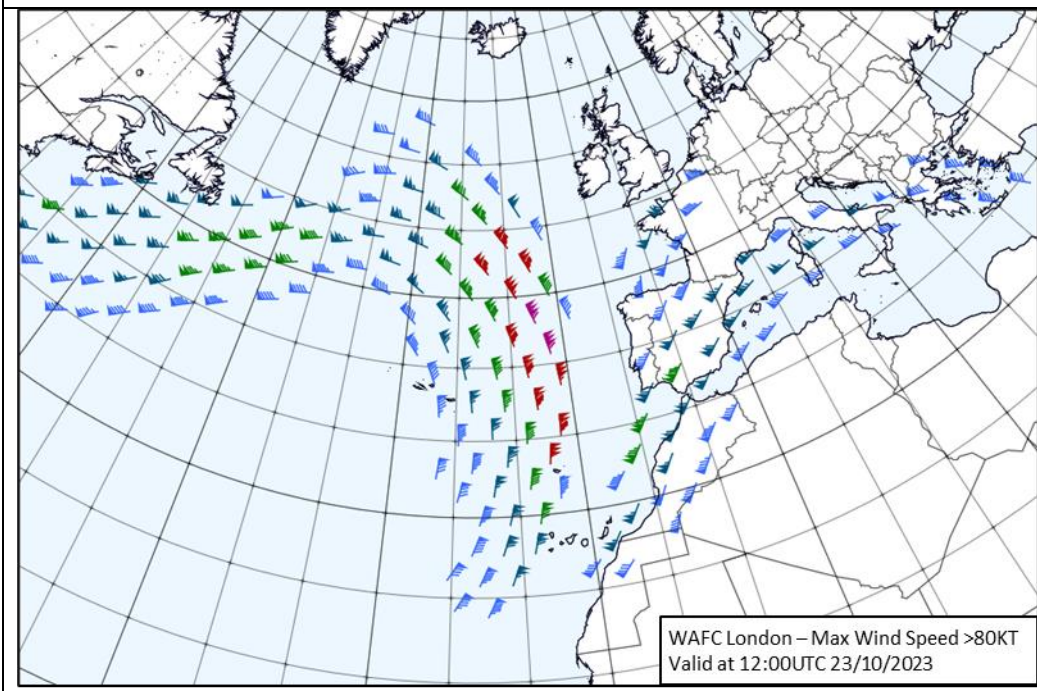
7.3. Gridded Data

7.3.1. Examples of ways in which the wind, temperature, geopotential altitude, relative humidity and tropopause data sets can be visualized are shown below. Users are free to choose the presentation style, colour scheme, and map projection that fits their organisational needs but should take into account the guidance in ICAO Annex 3 (Appendix 1, Model SN).


Example 1, ICAO Style Wind and temperature chart at FL300 (300.9hPa).

WAFC London - Wind and Temperature
FL300 (300.9hPa)
Valid at 12:00UTC 23/10/2023

WAFC London - Temperature
FL100 (696.8hPa)
Valid at 12:00UTC 23/10/2023

Example 2, Temperature in Celsius at FL100 (696.8hPa)

WAFC London – Max Wind Speed >80KT
Valid at 12:00UTC 23/10/2023

Example 3, Maximum wind speed and direction shown as wind fletches. Only wind speeds of 80KT or more are displayed.

WAFC London – Max Wind Speed >80KT
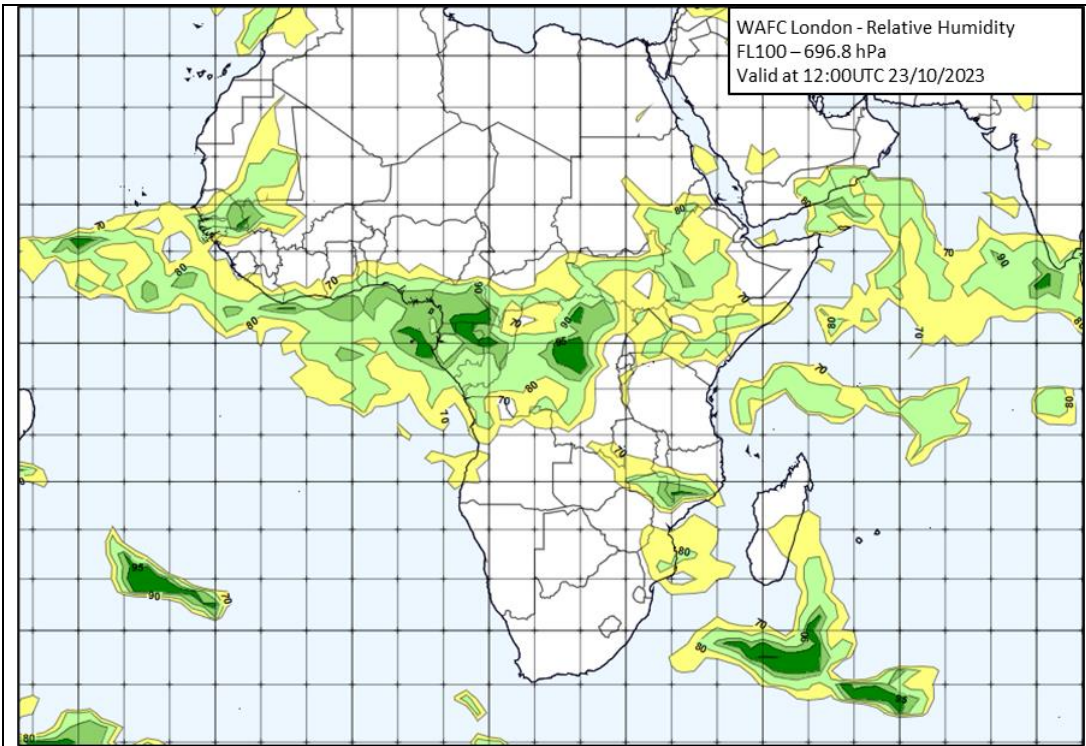Valid at 12:00UTC 23/10/2023
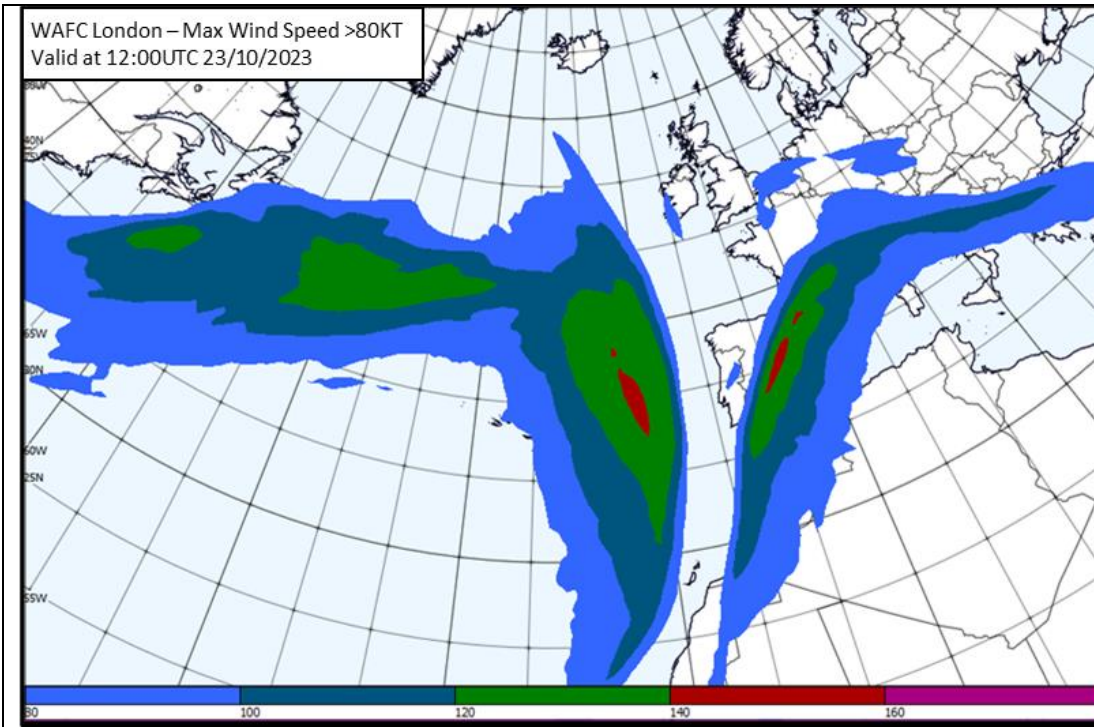
Example 4, Maximum wind speed shown as wind contours. Only wind speeds of 80KT or more are displayed.

WAFC London – Geopotential Altitude
FL340 – 250.0hPa
Valid at 12:00UTC 23/10/2023

Geopotential Height (gpm)
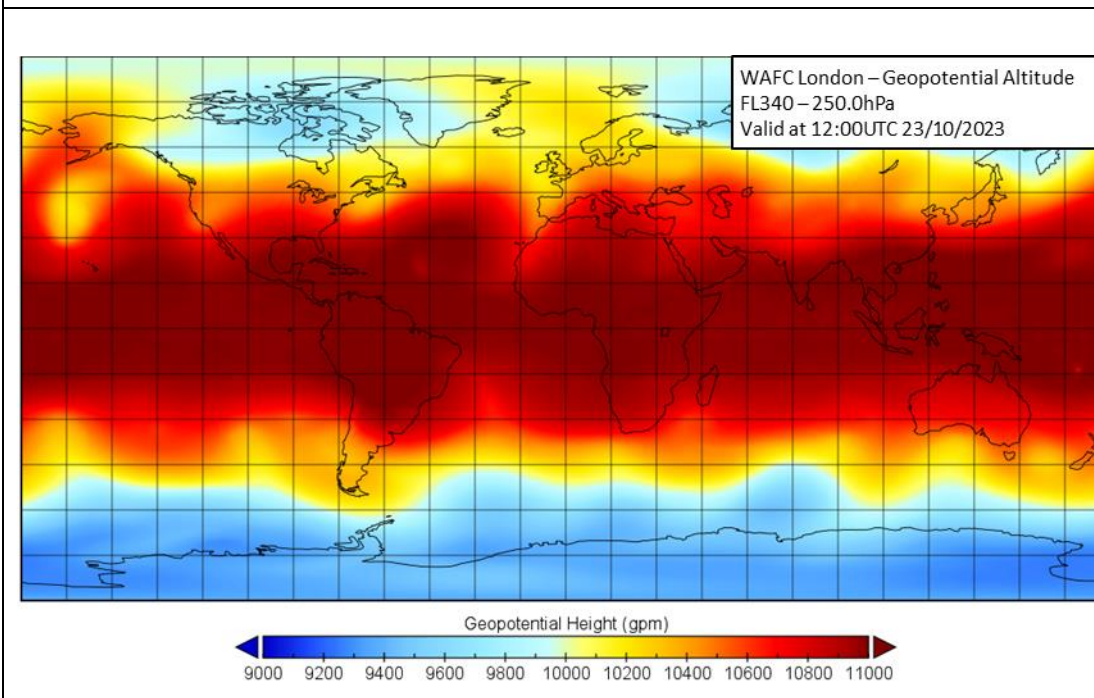
Example 5, Geopotential Altitude at FL340 (250.0hPa)

WAFC London - Relative Humidity
FL100 – 696.8 hPa
Valid at 12:00UTC 23/10/2023

*Example 6,
Relative Humidity
at FL250
(250.0hPa)*

WAFC London Tropopause Altitude
Valid at 12:00UTC 23/10/2023
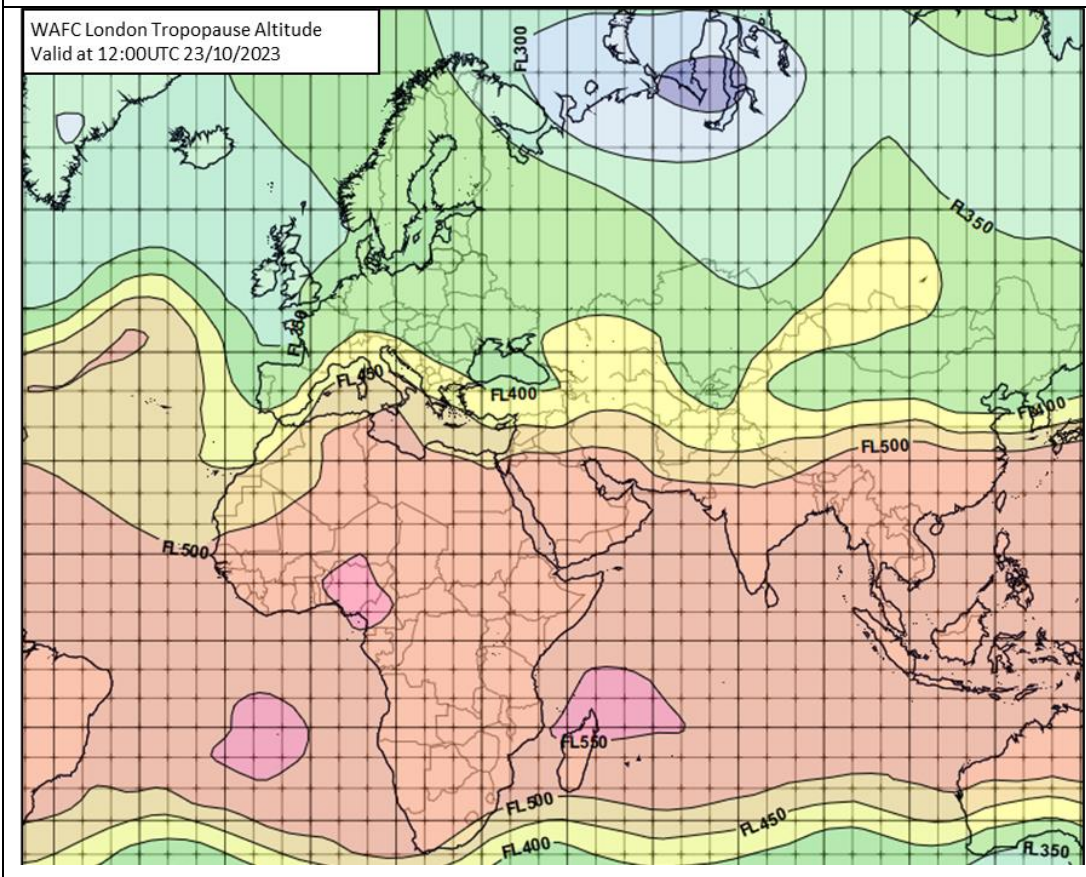
*Example 7,
Tropopause
Altitude displayed
as Flight levels.*

7.3.2.   The WAFS turbulence severity data set provides a forecast of clear air and orographic turbulence as an Eddy Dissipation Rate (EDR) which is defined in ICAO Annex 3 as follows:
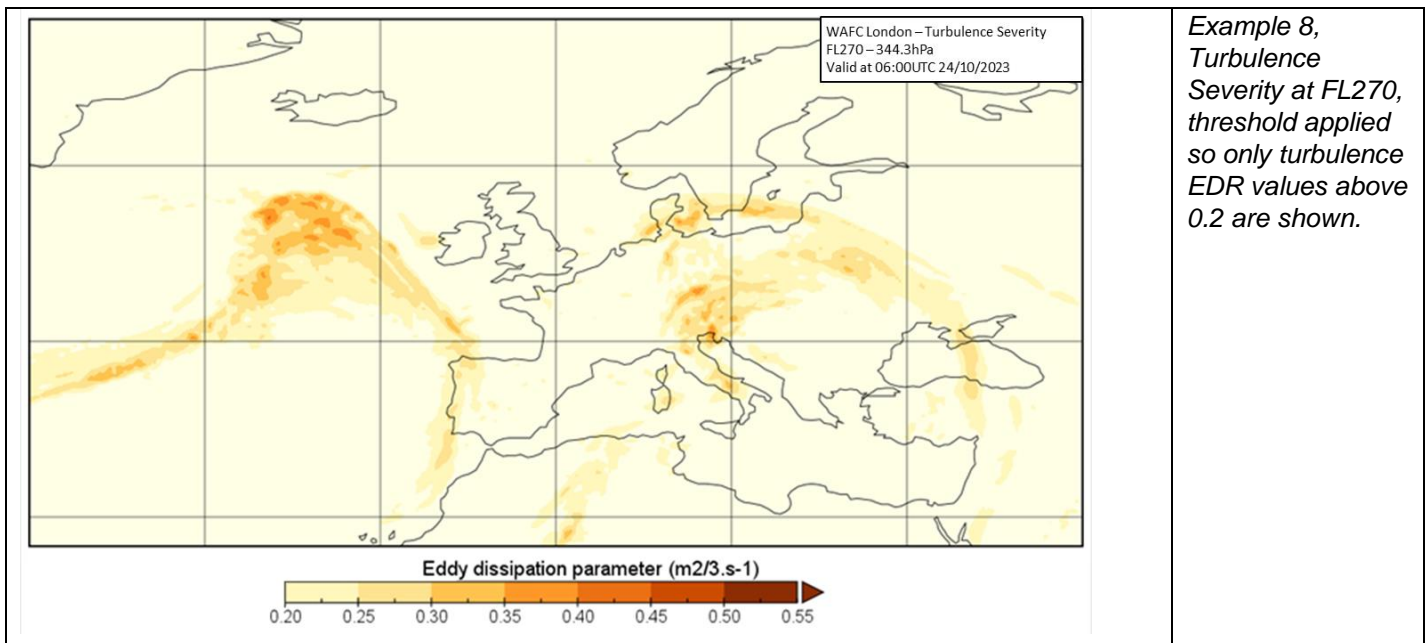
Appendix 4 – 2.6

"EDR is an aircraft-independent measure of turbulence. However, the relationship between the EDR value and the perception of turbulence is a function of aircraft type, and the mass, altitude, configuration and airspeed of the aircraft. The EDR values given below describe the severity levels for a medium-sized transport aircraft under typical en-route conditions (i.e. altitude, airspeed and weight).
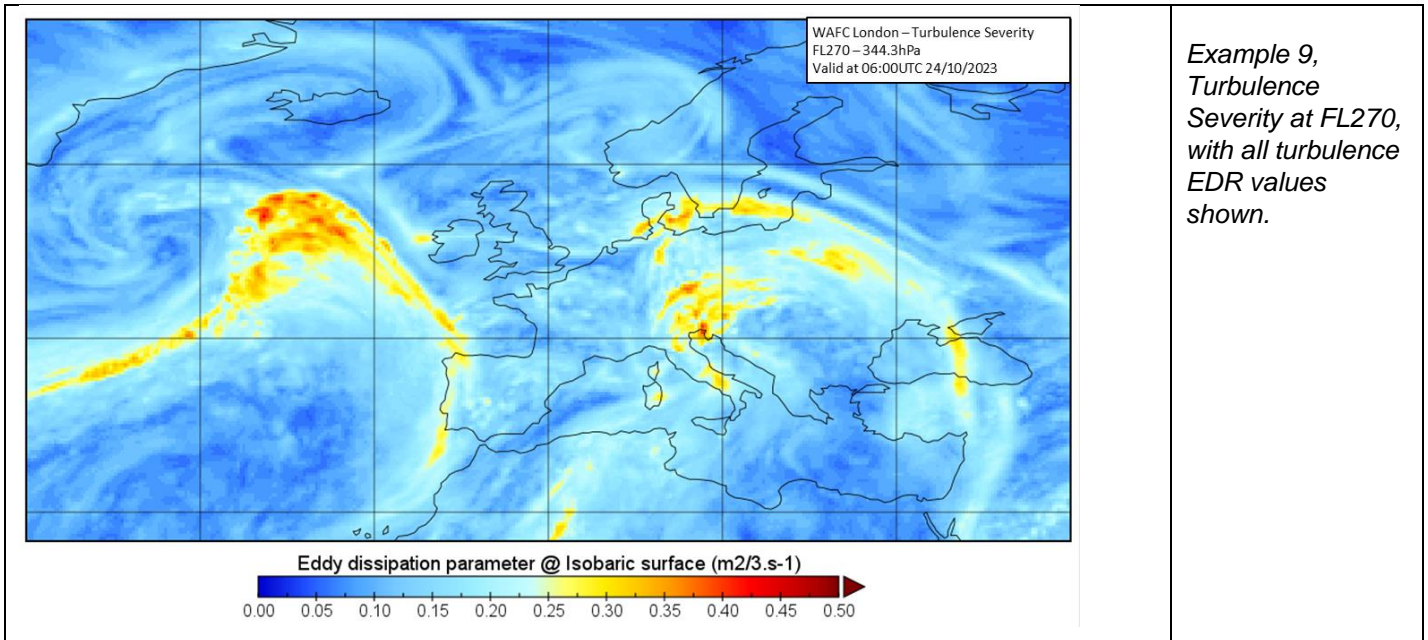
Turbulence shall be considered:
   a) severe when the peak value of EDR equals or exceeds 0.45;
   b) moderate when the peak value of EDR is equal to or above 0.20 and below 0.45;
   c) light when the peak value of EDR is above 0.10 and below 0.20; and
   d) nil when the peak value of EDR is below or equal to 0.10.

7.3.3.   Severity levels for other sizes of transport aircraft are not defined, but you would expect that for a "heavy" aircraft type to experience moderate and severe turbulence would require higher EDR values than is shown in Annex 3.

7.3.4.   Example 8 and 9 show two different ways that the turbulence could be visualised. Example 8 has thresholding applied so that only EDR values above 0.2 are shown, and example 9 shows all forecast values. If the EDR values that relate to a specific type of aircraft are known, then these could be used for aircraft specific turbulence forecasts instead of the values shown in ICAO Annex 3.

WAFC London – Turbulence Severity
FL270 – 344.3hPa
Valid at 06:00UTC 24/10/2023

Eddy dissipation parameter (m2/3.s-1)

0.20   0.25   0.30   0.35   0.40   0.45   0.50   0.55

Example 8, Turbulence Severity at FL270, threshold applied so only turbulence EDR values above 0.2 are shown.

Example 9, Turbulence Severity at FL270, with all turbulence EDR values shown.

7.3.5.   Icing Severity is a categorical assessment of icing where 0=NIL, 1=trace, 2=light, 3=moderate and 4=severe.
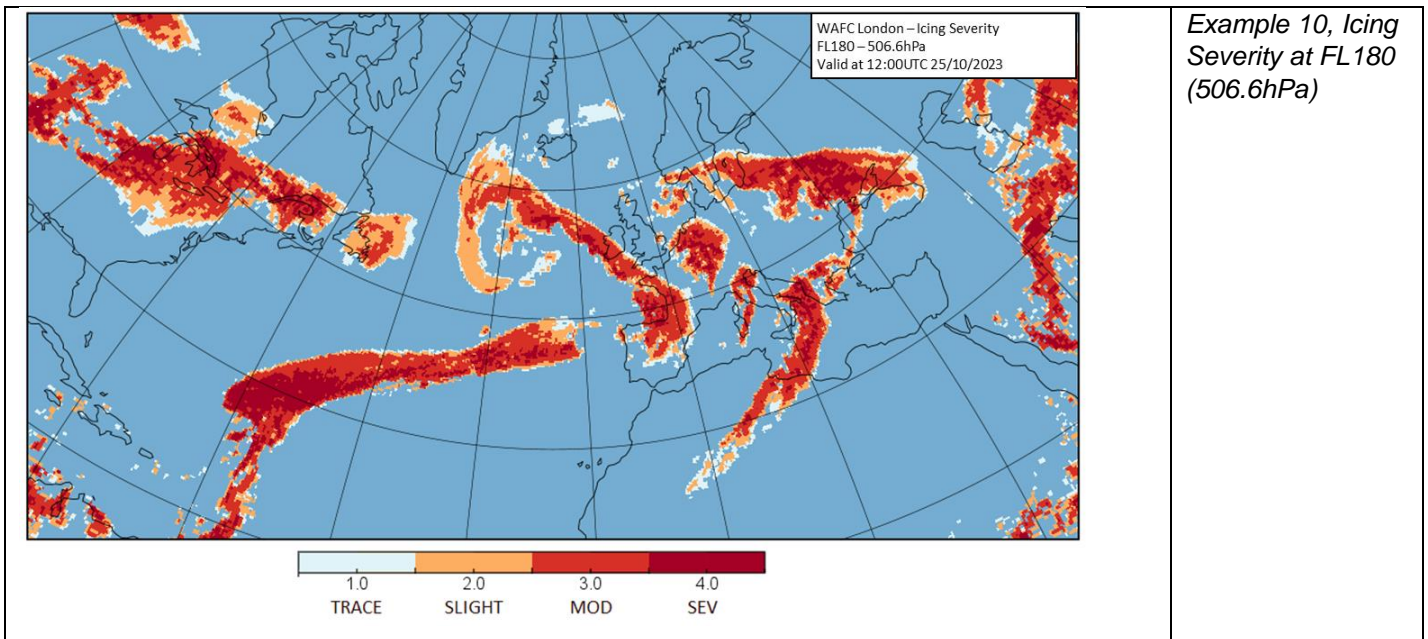
Example 10, Icing Severity at FL180 (506.6hPa)

7.3.6.   Cumulonimbus Base top and extent is also provided. Cumulonimbus bases and tops are given in metres, and should be converted to feet for display purposes. Cumulonimbus extent is a value between 0 and 1, with higher values indicating a greater spatial coverage. The cumulonimbus extent value should not be used literally, i.e. a value 0.5 doesn't directly equate to the lower boundary for the "OCNL" coverage categorisation.

Example 11, Cumulonimbus base
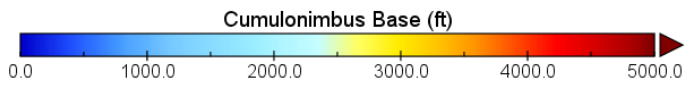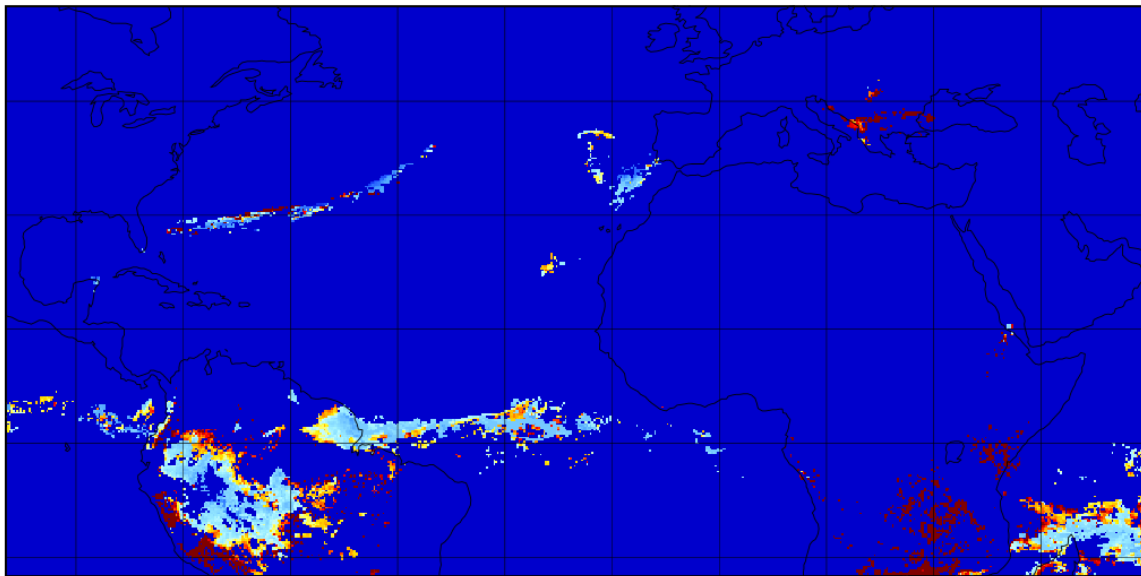
Example 12, Cumulonimbus Top
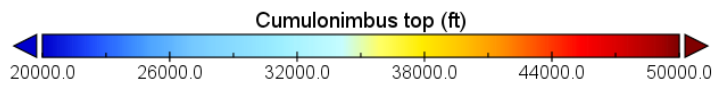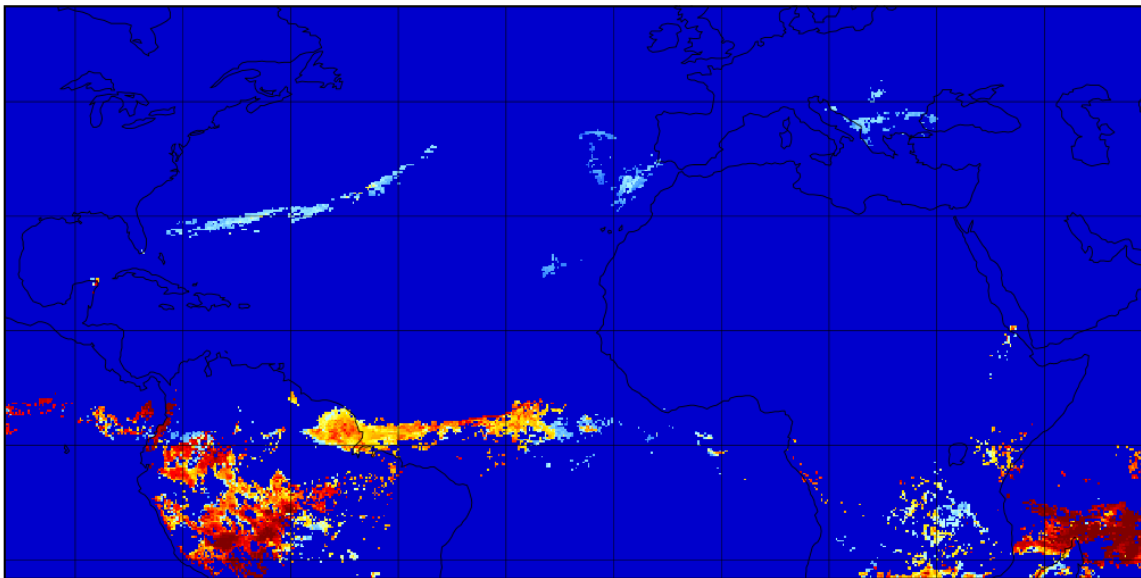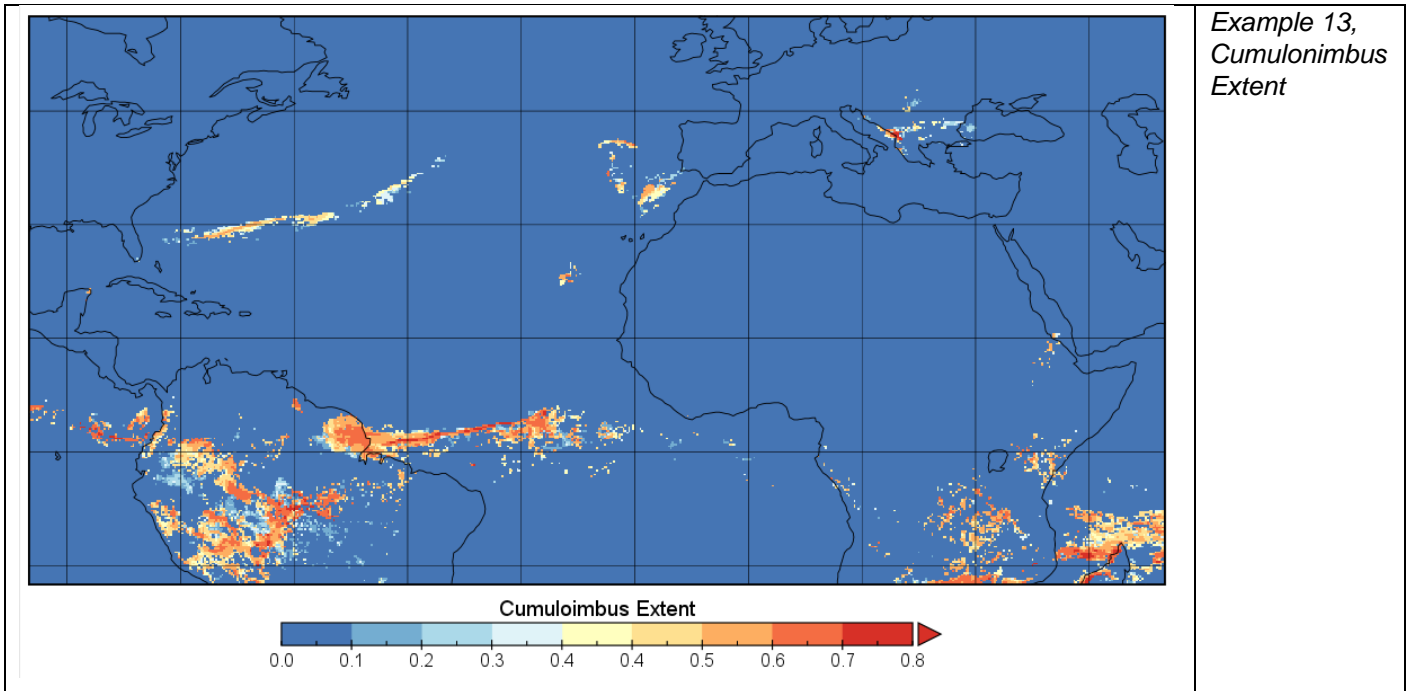
Example 13, Cumulonimbus Extent

7.4. WAFS SIGWX forecasts
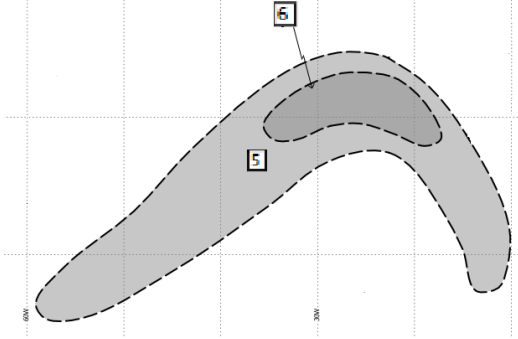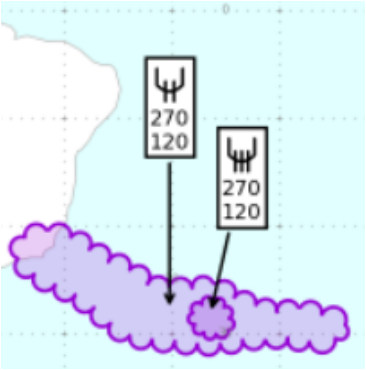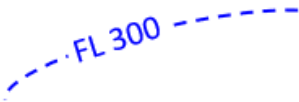
7.4.1.   All the position/shape information for necessary for each SIGWX feature type is included within the IWXXM file itself, however information on colour scheme and presentation style is not.

7.4.2.   Guidance on the presentation of WAFS SIGWX forecasts can be found in ICAO Annex 3 Appendix 1 in the following sections: Model SWH – Significant Weather Chart High Level and MODEL SN – Sheet of notifications used in flight documentation. Please note that these examples and the guidance text will with time be changed in ICAO Annex 3 (and moved to the new PANS-MET) in November 2025 to reflect the changes made to the to the SIGWX forecasts.
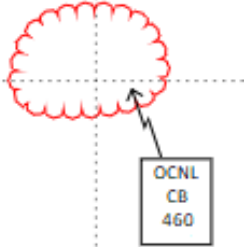
7.4.3.   Charts can be produced according to the ICAO fixed areas that are defined in ICAO Annex 3, but by using the IWXXM data set users are able to customize the map coverage area and map projection to whatever meets the needs of their operation.

7.4.4.   A summary of SIGWX presentation styles as well as a suggested colour scheme is shown in figure 13 below.

Parameter	Visualisation Style
Jet Stream	Black arrow used to indicate direction, with pennants and feathers to indicate speed.
	Change bars can be used where there is insufficient space for full pennants/feathers.
	If the max wind speed along the jet core is 120 knots or more, then the vertical extent (depth over which the wind speed is 80kt or more) should be marked.

Cumulonimbus cloud	Areas of OCNL or FRQ CB cloud should be marked by a scalloped area. Amount and CB top information shown as a label or call out. Suggested colour: Red Note: CB base information is not included as part of the IWXXM information as it is almost always below the lower boundary of the SIGWX (i.e. below FL100).	OCNL CB 460
Turbulence	Areas of moderate (MOD) or severe (SEV) turbulence should be marked with a thick dashed line. Two tone shading can be used to differentiate between the different turbulence intensities. Suggested colour: Grey Areas can be labelled with either the turbulence information on the label, or using a numbered box that links to the information in a legend. 5 OCNL 380 XXX 6 380 270	6 5
Icing	Areas of MOD or SEV icing, and the base and top of the hazard should be marked by a scalloped area. Suggested colour: Purple The icing object could be shaded in purple, with two different tones used to differentiate between areas of MOD and SEV icing.	270 120 270 120
Tropopause Height	Tropopause information is provided as contours 5000ft intervals. They should be marked by a thin dashed line with the flight level shown (prefixed with "FL"). Suggested colour: Blue	FL 300
Tropical Cyclones	Position information is provided up to and including T+24 if a Tropical Cyclone Advisory has been issued for it. Note: the legend for timesteps past T+24 will need to reflect that no tropical cyclone information is available. They should be marked with a tropical cyclone symbol (for the appropriate hemisphere) and the name of the TC. Northern hemisphere symbol. Southern hemisphere symbol	
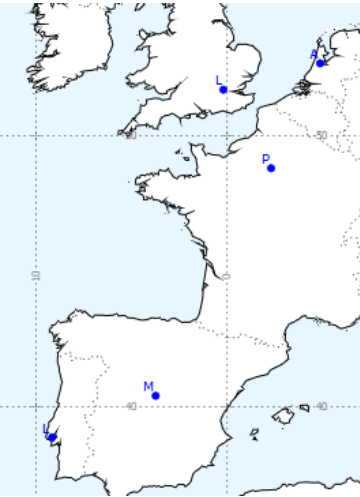
Volcanic Eruptions	Position information is provided for all timesteps if a Volcanic Ash Advisory has been issued for it. They should be marked on all timesteps with a volcano symbol and a call out box with that shows the name and location.
Radioactive Release	Position information is provided for all timesteps if a nuclear emergency message has been issued. They should be marked on all timesteps with a radioactive release symbol and a call out box with the name and location.
Map background	Land: White or pale brown/green colour, with major city locations or airports marked Ocean/Sea: Pale blue

Table 15, WAFS SIGWX visualisation styles

7.4.5.   A legend should be included on SIGWX visualisations that describes the validity date/time of the forecast data. A suggested style/format is shown in below:

```
            ISSUED BY WAFC {WAFC NAME}
        PROVIDED BY {PROVIDER ORGANISATION}


          FIXED TIME PROGNOSTIC CHART
              ICAO AREA X SIGWX
                 FL100-FL600


   FORECAST ISSUE TIME: <HH> UTC <DD> <MMM> <YYYY>


  T+XX FORECAST VALID AT <HH> UTC ON <DD> <MMM> <YYYY>
```

```
            UNITS USED: HEIGHTS IN FLIGHT LEVELS
CHECK SIGMET, ADVISORIES FOR TC AND VA, AND ASHTAM AND
                     NOTAM FOR VA


                 <ADDITIONAL STATEMENT>
```

Legend notes:

7.4.6.   Within the legend:
- ICAO Area can be omitted for custom area charts.
- As a full set of SIGWX forecast timesteps will be issued every 6 hours, it should be made clear what the issue time, and the validity of the chart is so that users can be certain they have the most recently published data.
- The legend should contain a statement that states the units used, and advises users to check SIGMETs, Tropical Cyclone Advisories, Volcanic Ash Advisories, ASHTAM and NOTAMs for Volcanic Ash.
- The "Additional Statement" should say: "TC INFORMATION IS NOT PROVIDED FOR THIS TIMESTEP" for data for T+27 onwards
- In the event that a radiological incident is occurring the "Additional statement" should urge users to consult SIGMET and NOTAM relating to the radiological incident should also be included.

Chapter 8. Support

8.1. Support

8.1.1.   End users of the SADIS are encouraged to contact the SADIS Provider in the event of problems. The SADIS Provider staff will assist where possible to resolve problems experienced by users if the fault lies within the SADIS. It may of course be the case that the fault is with the user's own software, equipment or internet connection. Under such circumstances, the supplier of the original hardware/software or the user's Internet service provider should be contacted.

8.1.2.   If support is required, please report the issue to:

24-HOUR HELPLINE/FAULTS DESK

Tel.: +44 (0) 330 135 4444

E-mail: servicedesk@metoffice.gov.uk

8.1.3.   The SADIS manager may also be able to offer support, but please note that this is only during normal working hours. Typically 9am – 5pm UK time, Monday to Friday.

SADIS MANAGER (Monday-Friday 9am-5pm UK time)

Tel: +44 (0) 330 135 0000 (and ask to be put through to the SADIS Manager)

E-mail: SADISmanager@metoffice.gov.uk

8.1.4.   A SADIS Workstation Evaluation Guide is available to enable users to check that their software or workstation is functioning to the required standard, and if deficiencies are detected to report the issue to the software provider. The guide will be updated to take account of the new WAFS data sets at the end of 2024.

8.1.5.   The SADIS provider is able to evaluate workstation providers software against a set of criteria https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/services/transport/aviation/sadis/workstationevalsfourthroundupdmog-3.pdf . These criteria will be updated to encompass the new WAFS data sets in due course. The evaluation is a paid service. Please contact the SADIS manager for information.

8.2. Backup

8.2.1.   In the unlikely event of a failure of the Secure SADIS API service, the SADIS provider will endeavour to issue an administrative message advising users to switch over to the backup WIFS API service.

8.2.2.   The WIFS API hosts the same WAFS gridded and WAFS SIGWX data sets, and similar OPMET content. Both the SADIS and WIFS API's use the same framework and a consistent design which should make it straightforward to switch across in the event of an outage.

8.2.3.   Authorized SADIS users wishing to access the WIFS API should contact the WIFS Provider via https://www.aviationweather.gov/wifs/   to organise an account.

8.2.4.   WIFS API access will be provided for backup purposes on condition that:

-   a SADIS account has been authorized and provided;

- there are no outstanding balances in respect of the SADIS cost recovery scheme; and

- use is restricted to backup purposes and periodic testing.

8.2.5.   It is the users own responsibility to set up their system to switch to WIFS in the event of a backup event, and it is advised that users to periodically test that their system is able to switch over effectively.

8.2.6.   The WIFS Provider monitors their system to ensure that authorized SADIS users only make use of the service during times of a SADIS outage. Outside of these periods the WIFS backup should not be used more frequently than one day per week.

8.3.   Differences between SADIS API and WIFS API

8.3.1.   The Met Office and NOAA worked closely together when designing and building the SADIS and WIFS API's to ensure a high degree of harmonisation in both systems. There are some differences:

8.3.2.   The authentication process and keys/tokens are different between systems,

8.3.3.   Responses to the SADIS API use a pre-signed URL (redirect) whilst the WIFS API will return the requested data sets directly as a response payload.

8.3.4.   There will be minor differences in the TAC OPMET data sets due to the way data is routed to the systems.

8.3.5.   There will be significant differences initially in the available IWXXM data, as the inter-regional exchange of data is not fully in place, so SADIS and WIFS initially will have access to different geographical regions.

Appendix A - Gridded data specification

Items marked with a blue X are also available at 1.25 degree horizontal resolution.

Flight Level	Geopotential Altitude (FT)	ICAO Standard Atmosphere pressure level (hPa)	Wind	Temperature	Geopotential height	Relative Humidity	Turbulence Severity	Icing Severity
FL050	5000	843.1	X	X	X	X		X
FL060	6000	812.0	X	X	X	X		X
FL070	7000	781.9	X	X	X	X		X
FL080	8000	752.6	X	X	X	X		X
FL090	9000	724.3	X	X	X	X		X
FL100	10000	696.8	X	X	X	X	X	X
FL110	11000	670.2	X	X	X	X	X	X
FL120	12000	644.4	X	X	X	X	X	X
FL130	13000	619.4	X	X	X	X	X	X
FL140	14000	595.2	X	X	X	X	X	X
FL150	15000	571.8	X	X	X	X	X	X
FL160	16000	549.2	X	X	X	X	X	X
FL170	17000	527.2	X	X	X	X	X	X
FL180	18000	506.0	X	X	X	X	X	X
FL190	19000	485.5	X	X	X		X	X
FL200	20000	465.6	X	X	X		X	X
FL210	21000	446.5	X	X	X		X	X
FL220	22000	427.9	X	X	X		X	X
FL230	23000	410.0	X	X	X		X	X
FL240	24000	392.7	X	X	X		X	X
FL250	25000	376.0	X	X	X		X	X
FL260	26000	359.9	X	X	X		X	X
FL270	27000	344.3	X	X	X		X	X
FL280	28000	329.3	X	X	X		X	X
FL290	29000	314.9	X	X	X		X	X
FL300	30000	300.9	X	X	X		X	X
FL310	31000	287.4	X	X	X		X	
FL320	32000	274.5	X	X	X		X	
FL330	33000	262.0	X	X	X		X	
FL340	34000	250.0	X	X	X		X	
FL350	35000	238.4	X	X	X		X	
FL360	36000	227.3	X	X	X		X	

Flight Level	Geopotential Altitude (FT)	ICAO Standard Atmosphere pressure level (hPa)	Wind	Temperature	Geopotential height	Relative Humidity	Turbulence Severity	Icing Severity
FL370	37000	216.6	X	X	X		X	
FL380	38000	206.5	X	X	X		X	
FL390	39000	196.8	X	X	X		X	
FL400	40000	187.5	X	X	X		X	
FL410	41000	178.7	X	X	X		X	
FL420	42000	170.4	X	X	X		X	
FL430	43000	162.4	X	X	X		X	
FL440	44000	154.7	X	X	X		X	
FL450	45000	147.5	X	X	X		X	
FL460	46000	140.6	X	X	X			
FL470	47000	134.0	X	X	X			
FL480	48000	127.7	X	X	X			
FL490	49000	121.7	X	X	X			
FL500	50000	116.0	X	X	X			
FL510	51000	110.5	X	X	X			
FL520	52000	105.3	X	X	X			
FL530	53000	100.4	X	X	X			
FL540	54000	95.7	X	X	X			
FL550	55000	91.2	X	X	X			
FL560	56000	87.0	X	X	X			
FL570	57000	82.8	X	X	X			
FL580	58000	79.0	X	X	X			
FL590	59000	75.2	X	X	X			
FL600	60000	71.7	X	X	X			

In addition to the data sets listed above, the following is also available:

- Tropopause height and temperature
- Maximum u and v wind, and height of the maximum wind
- Cumulonimbus extent, base, and top.

Appendix B – OPMET Data sets

The following TAC format data sets are routed to SADIS API:

	WMO headers (T₁T₂A₁A₂ii CCCC)	
METAR	SA//// //// SP//// ////	All METARs and SPECIs routed internationally
TAF	FC//// //// FT//// ////	All TAFS routed internationally
SIGMET	WS//// //// WC//// //// WV//// ////	All SIGMETs routed internationally
AIRMET	WA//// ////	All AIRMET bulletins routed internationally
GAMET	FA//// ////	All AIRMET bulletins routed internationally
Special AIREP	UA//6/ ////	Special AIREP other than for volcanic ash
	UA//7/ ////	Volcanic Ash Special AIREP
Volcanic Ash Advisory (VAA)	FVAK(21-25) PAWU	Anchorage VAAC
	FVAG(01-05) SABM	Buenos Aires VAAC
	FVAU(01-10) ADRM	Darwin VAAC
	FVXX(01-03,05) EGRR	London VAAC
	FVCN(01-04) CWAO	Montreal VAAC
	FVFE01 RJTD	Tokyo VAAC
	FVXX(01-05) LFPW	Toulouse VAAC
	FVXX(20-27) KNES	Washington VAAC
	FVPS(01-05) NZKL	Wellington VAAC
Tropical Cyclone Advisory (TCA)	FKAU(01-06) ADRM	TCAC Darwin
	FKIN(20-21) VIDP	TCAC New Delhi
	FKIO20 FMEE	TCAC La Réunion
	FKNT(21-25) KNHC	TCAC Miami
	FKPZ(21-25) KNHC	TCAC Miami
	FKPA(21-25 PHFO	TCAC Honolulu
	FKPQ(30-33) RJTD	TCAC Tokyo
	FKPS 01 NFFN	TCAC Nadi
Space Weather Advisory	FNXX(01-04) KWNP	Washington Space Weather Centre, United States
	FNXX(01-04) EFKL FNXX(01-04) EGRR	PECASUS Space Weather Consortium
	FNXX(01-04) LFPW and FNXX(01-04) YMMC	ACFJ Space Weather Consortium
	FNXX(01-04) ZBBB FNXX(01-04) UUAG	China-Russia Space Weather Consortium
VA NOTAM and ASHTAM	NWXX01 EGRR	NOTAMS relating to Volcanic Ash and ASHTAMs are made available in accordance with 4.3a of Doc 9766 — Handbook on the International Airways Volcano Watch (IAVW) and 5.3.4 of Annex 15 - Aeronautical Information Services.

Where "/" represents any character at the appropriate position (wildcard routing).

The following IWXXM format data sets are routed to SADIS API:

IMPORTANT: the time this guide was published, only data for the EUR/NAT, ASI-PAC, and MID regions is available, and within the ASI-PAC and MID regions not all States are yet producing data in IWXXM format.

	WMO headers ($T_1T_2A_1A_2ii$ CCCC)	
METAR	LA//// //// LP//// ////	METARs and SPECIs routed internationally
TAF	LC//// //// LT//// ////	TAFS routed internationally
SIGMET	LS//// //// LY//// //// LV//// ////	SIGMETs routed internationally
	LY//// ////	Tropical cyclone SIGMETs routed internationally
	LV//// ////	Volcanic ash SIGMETs routed internationally
AIRMET	LW//// ////	All AIRMET bulletins that are routed to the SADIS gateway.
Volcanic Ash Advisory (VAA)	~~LUAK(21-25) PAWU~~	~~Anchorage VAAC~~
	~~LUAG(01-05) SABM~~	~~Buenos Aires VAAC~~
	LUAU(01-10) ADRM	Darwin VAAC
	LUXX(01-03,05) EGRR	London VAAC
	~~LUCN(01-04) CWAO~~	~~Montreal VAAC~~
	LUFE01 RJTD	Tokyo VAAC
	LUXX(01-05) LFPW	Toulouse VAAC
	~~LUXX(20-27) KNES~~	~~Washington VAAC~~
	LUPS(01-05) NZKL	Wellington VAAC
Tropical Cyclone Advisory (TCA)	LKAU(01-06) ADRM	TCAC Darwin
	LKIN(20-21) VIDP	TCAC New Delhi
	LKIO20 FMEE	TCAC La Réunion
	~~LKNT(21-25) KNHC~~	~~TCAC Miami~~
	~~LKPZ(21-25) KNHC~~	~~TCAC Miami~~
	~~LKPA(21-25 PHFO~~	~~TCAC Honolulu~~
	LKPQ(30-33) RJTD	TCAC Tokyo
	LKPS 01 NFFN	TCAC Nadi
Space Weather Advisory	~~LNXX(01-04) KWNP~~	~~Washington Space Weather Centre, United States~~
	LNXX(01-04) EFKL LNXX(01-04) EGRR	PECASUS Space Weather Consortium
	LNXX(01-04) LFPW and LNXX(01-04) YMMC	ACFJ Space Weather Consortium
	FNXX(01-04) ZBBB FNXX(01-04) UUAG	China-Russia Space Weather Consortium

Bulletins shown with strikethrough are not available at the time this user guide was published, but will become available once the inter-regional IWXXM exchange is fully in place.

The following graphical format advisories are routed to SADIS API:

	WMO headers ($T_1T_2A_1A_2ii$ CCCC)	
Volcanic Ash Advisory graphics (VAG)	PFXD(21-25) PAWU	Anchorage VAAC
	PFXD (01-05) SABM	Buenos Aires VAAC
	PFXD (01-10) ADRM	Darwin VAAC
	PFXD (01-03,05) EGRR	London VAAC
	PFXD (01-04) CWAO	Montreal VAAC
	PFXD 01 RJTD	Tokyo VAAC
	PFXD (09) LFPW	Toulouse VAAC
	PFXD (20-27) KNES	Washington VAAC
	PFXD (01-05) NZKL	Wellington VAAC
Tropical Cyclone Advisory graphic (TCG)	PZXD (01-05)FMEE	TCAC La Réunion

Note.1— Volcanic Ash Advisory graphics and Tropical Cyclone advisory graphics are only available on SADIS FTP when they are forwarded to the WAFC London messages switch by the TCAC concerned and following notification of the WMO AHL by the originator. Currently only one of the seven TCACs provide tropical cyclone advisories in graphical format for distribution via SADIS.

The following Notices sets are routed to SADIS API:

Bulletin Header	Contents
NOUK31 EGGY	SADIS Gateway (ROC London) advisory messages
NOUK32 EGGY	SADIS Gateway automatic monitoring messages.
NOUK33 EGGY NOUK34 EGGY	SADIS Gateway advisory messages to inform data providers and communications centres on missing data, and problems.
NOBX99 EBRR	European Data Management Group (DMG) METNOs describing changes to bulletins promulgated in the EUR Region
NOFR01 LFPW NOOS01 LOWM NORS01 UUUJ NOUK01 EGGY	European ROC administrative messages.

Appendix C – permissible "id" codes for gridded data sets

Data in the windtempgeo_0p25 collection	
Y[**UV,T, or H**]DYG006_008FLALL Y[**UV,T, or H**]DYG009_011FLALL Y[**UV,T, or H**]DYG012_014FLALL Y[**UV,T, or H**]DYG015_017FLALL Y[**UV,T, or H**]DYG018_020FLALL Y[**UV,T, or H**]DYG021_023FLALL Y[**UV,T, or H**]DYG024_030FLALL Y[**UV,T, or H**]DYG033_039FLALL Y[**UV,T, or H**]DYG042_048FLALL Y[**UV,T, or H**]DYG054_066FLALL Y[**UV,T, or H**]DYG072_084FLALL Y[**UV,T, or H**]DYG090_102FLALL Y[**UV,T, or H**]DYG108_120FLALL	Use: "UV" for wind data "T" for temperature data "H" for geopotential height data Data for 072_084, 090_102 and 108_120 will not be available for the 06UTC and 18UTC EGRR data sets.
Data in the humidity_0p25 collection	
YRDYG006_008FLALL YRDYG009_011FLALL YRDYG012_014FLALL YRDYG015_017FLALL YRDYG018_020FLALL YRDYG021_023FLALL YRDYG024_030FLALL YRDYG033_039FLALL YRDYG042_048FLALL YRDYG054_066FLALL YRDYG072_084FLALL YRDYG090_102FLALL YRDYG108_120FLALL	Use: "R" for relative humidity data Data for 072_084, 090_102 and 108_120 will not be available for the 06UTC and 18UTC EGRR data sets.
Data in the trop jet_0p25 collection	
Y[**H or T**]DYG006_008FL998 Y[**H or T**]DYG009_011FL998 Y[**H or T**]DYG012_014FL998 Y[**H or T**]DYG015_017FL998 Y[**H or T**]DYG018_020FL998 Y[**H or T**]DYG021_023FL998 Y[**H or T**]DYG024_030FL998 Y[**H or T**]DYG033_039FL998 Y[**H or T**]DYG042_048FL998 Y[**H or T**]DYG054_066FL998 Y[**H or T**]DYG072_084FL998 Y[**H or T**]DYG090_102FL998 Y[**H or T**]DYG108_120FL998	FL998 indicates it is tropopause data Use: "H" for tropopause height data "T" for tropopause temperature data Data for 072_084, 090_102 and 108_120 will not be available for the 06UTC and 18UTC EGRR data sets.
Y[**H or UV**]DYG006_008FL999 Y[**H or UV**]DYG009_011FL999 Y[**H or UV**]DYG012_014FL999 Y[**H or UV**]DYG015_017FL999 Y[**H or UV**]DYG018_020FL999 Y[**H or UV**]DYG021_023FL999 Y[**H or UV**]DYG024_030FL999	FL999 indicates it is maximum wind data Use: "H" for the height of the maximum wind "UV" for max v and v wind data

Y[**H or UV**]DYG033_039FL999 Y[**H or UV**]DYG042_048FL999 Y[**H or UV**]DYG054_066FL999 Y[**H or UV**]DYG072_084FL999 Y[**H or UV**]DYG090_102FL999 Y[**H or UV**]DYG108_120FL999	Data for 072_084, 090_102 and 108_120 will not be available for the 06UTC and 18UTC EGRR data sets.

Data in the blended_ice_0p25 collection	
YIDYG006_008FLALL YIDYG009_011FLALL YIDYG012_014FLALL YIDYG015_017FLALL YIDYG018_020FLALL YIDYG021_023FLALL YIDYG024_030FLALL YIDYG033_039FLALL YIDYG042_048FLALL	Use: "I" for icing data
Data in the blended_turb_0p25 collection	
YLDYG006_008FLALL YLDYG009_011FLALL YLDYG012_014FLALL YLDYG015_017FLALL YLDYG018_020FLALL YLDYG021_023FLALL YLDYG024_030FLALL YLDYG033_039FLALL YLDYG042_048FLALL	Use: "L" for turbulence data
Data in the blended_cb_collection	
YBDYG006_008FL001 YBDYG009_011FL001 YBDYG012_014FL001 YBDYG015_017FL001 YBDYG018_020FL001 YBDYG021_023FL001 YBDYG024_030FL001 YBDYG033_039FL001 YBDYG042_048FL001	Use: "B" for cumulonimbus data and "FL001" for cumulonimbus extent data
YHDYG006_008[**FL002 or FL003**] YHDYG009_011[**FL002 or FL003**] YHDYG012_014[**FL002 or FL003**] YHDYG015_017[**FL002 or FL003**] YHDYG018_020[**FL002 or FL003**] YHDYG021_023[**FL002 or FL003**] YHDYG024_030[**FL002 or FL003**] YHDYG033_039[**FL002 or FL003**] YHDYG042_048[**FL002 or FL003**]	Use: "B" for cumulonimbus data and "FL002" for cumulonimbus base data "FL003" for cumulonimbus top data

For all 0.25 degree files The "G" can be replaced with "A1", "A2", "A3", "A4", "A5", "A6", "A7" or "A8" to get a regional data set instead of the global file.

Data in the windtempgeo_1p25 collection	
Y[**UV,T, or H**]DXG006_012FLALL Y[**UV,T, or H**]DXG015_021FLALL Y[**UV,T, or H**]DXG024_030FLALL Y[**UV,T, or H**]DXG033_036FLALL	Use: "UV" for wind data "T" for temperature data "H" for geopotential height data
Data in the humidity_1p25 collection	
YRDXG006_012FLALL YRDXG015_021FLALL YRDXG024_030FLALL YRDXG033_036FLALL	Use: "R" for relative humidity data
Data in the trop jet_1p25 collection	
Y[**H or T**]DXG006_012FL998 Y[**H or T**]DXG015_021FL998 Y[**H or T**]DXG024_030FL998 Y[**H or T**]DXG023_036FL998	FL998 indicates it is tropopause data Use: "H" for tropopause height data "T" for tropopause temperature data
Y[**H or UV**]DXG006_012FL999 Y[**H or UV**]DXG015_021FL999 Y[**H or UV**]DXG024_030FL999 Y[**H or UV**]DXG033_036FL999	FL999 indicates it is maximum wind data Use: "H" for the height of the maximum wind "UV" for max v and v wind data