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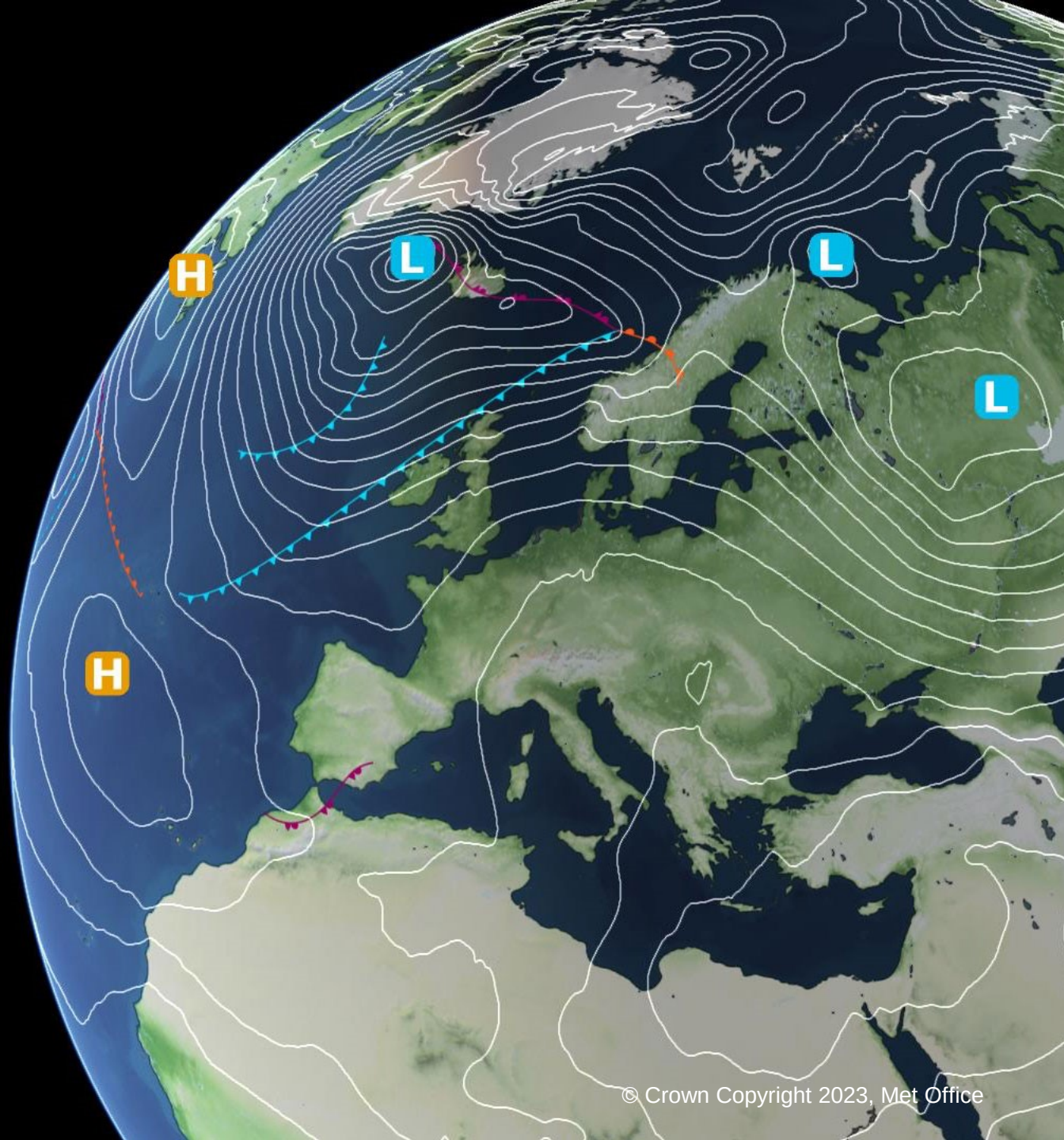
Meteorological Data SWIM Services: Met Office UK

David Sutton

Senior Product Manager

2026



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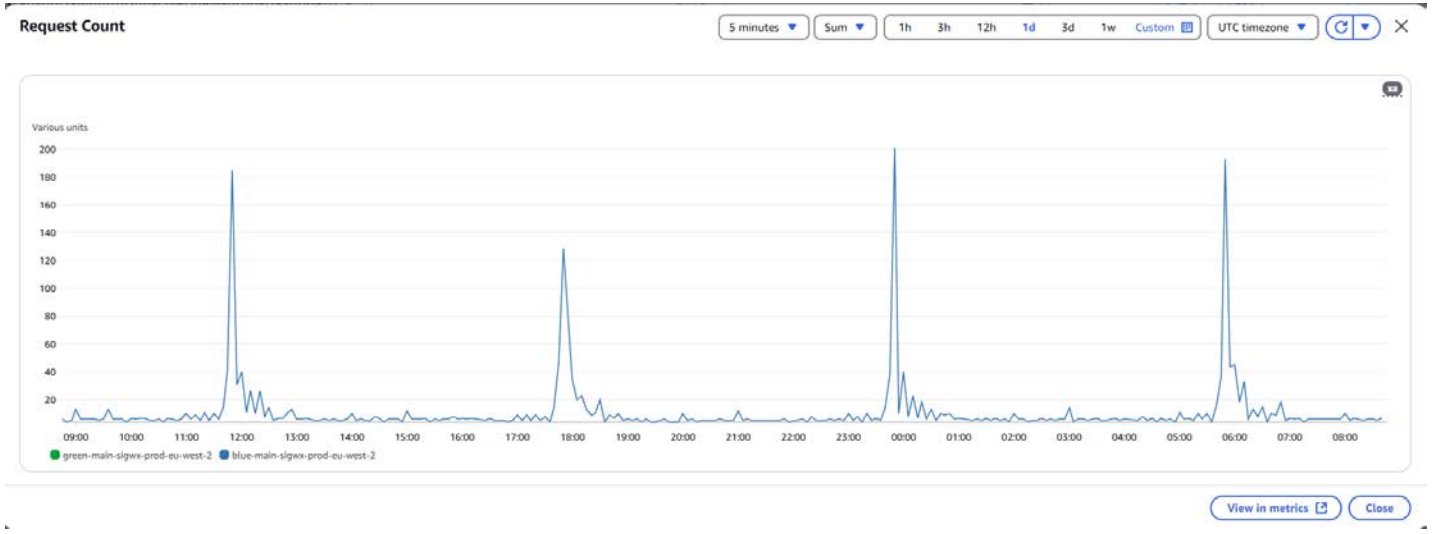
Summary:

- SWIM YP & EDR policy for ALL Aviation activities
- Focus: machine:machine weather data via API, Global, big data, T+6 out to T+120, =<10KM res
- API mechanisms include:
- Dynamic Request Response (any Long, Lat, Height, Date, Time and weather parameter): 99.99%
- Pre-defined pre-generated geo-spatial chunks (request by an identifier): 99.999%
- Publish Subscription Notifications (we tell you if there is valid data for you to request): 99.999%
- Weather data as a payload in the response to your API request (small files 20MB)
- Weather data and a validity token for you to collect from a re-direct address (big files 200MB+)
- Archive of API user usage for cost recovery and non-repudiation

- MO supercomputer generates NWP every 6hrs, we only expose data from the latest model update to successfully arrive
- MO move towards ‘ensemble forecasting’
- MO APIM API catalogue and try out

- Future SWIM API’s
- Web Map Layers
- Charts and PDF’s
- AutoTAFS



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Information services provided by the Met Office

- SADIS API – *provides the WAFS (World Area Forecast System) gridded and SIGWX data sets, as well as OPMET data (in traditional alphanumeric format and IWXXM)*
- VAAC London QVA (Quantitative Volcanic Ash) API – *provides QVA forecasts for eruptions that occur its area of responsibility (primarily Iceland)*
- 3D Radar API - *pan European 3D radar composite data*
- 4D Trajectory API – a pay per API request commercial service

- Most services use the Open Geospatial Consortium Environmental Data Retrieval Framework https://ogcapi.ogc.org/edr/. 3D Radar uses the older Web Feature Services framework
- All conform to the EUROCONTROL SWIM yellow profile and are published in the EUROCONTROL SWIM registry https://eur-registry.swim.aero/services

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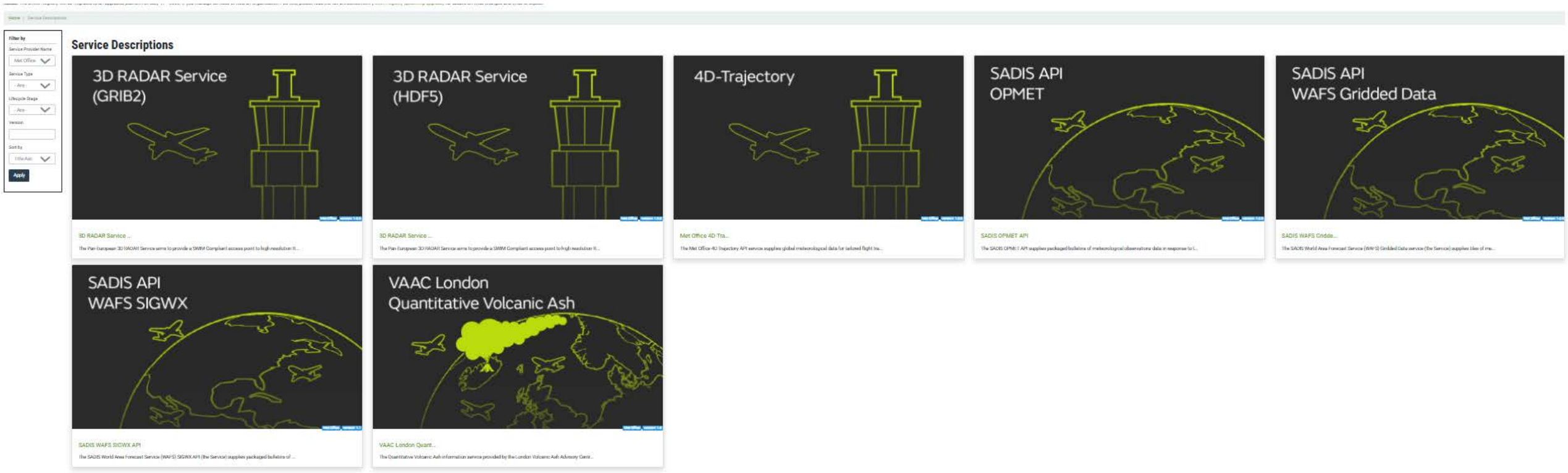
Filter by
Service Provider Name
Met Office
Service Type
Lifecycle Stage
Version
Sort by
Title Asc
Apply
Service Descriptions
3D RADAR Service (GRIB2)
3D RADAR Service ...
3D RADAR Service (HDF5)
3D RADAR Service ...
4D-Trajectory
Met Office 4D Tra...
SADIS API OPMET
SADIS OPMET API
SADIS API WAFS Gridded Data
SADIS WAFS Gridde...
SADIS API WAFS SIGWX
SADIS WAFS SIGWX API
VAAC London Quantitative Volcanic Ash
VAAC London Quant...

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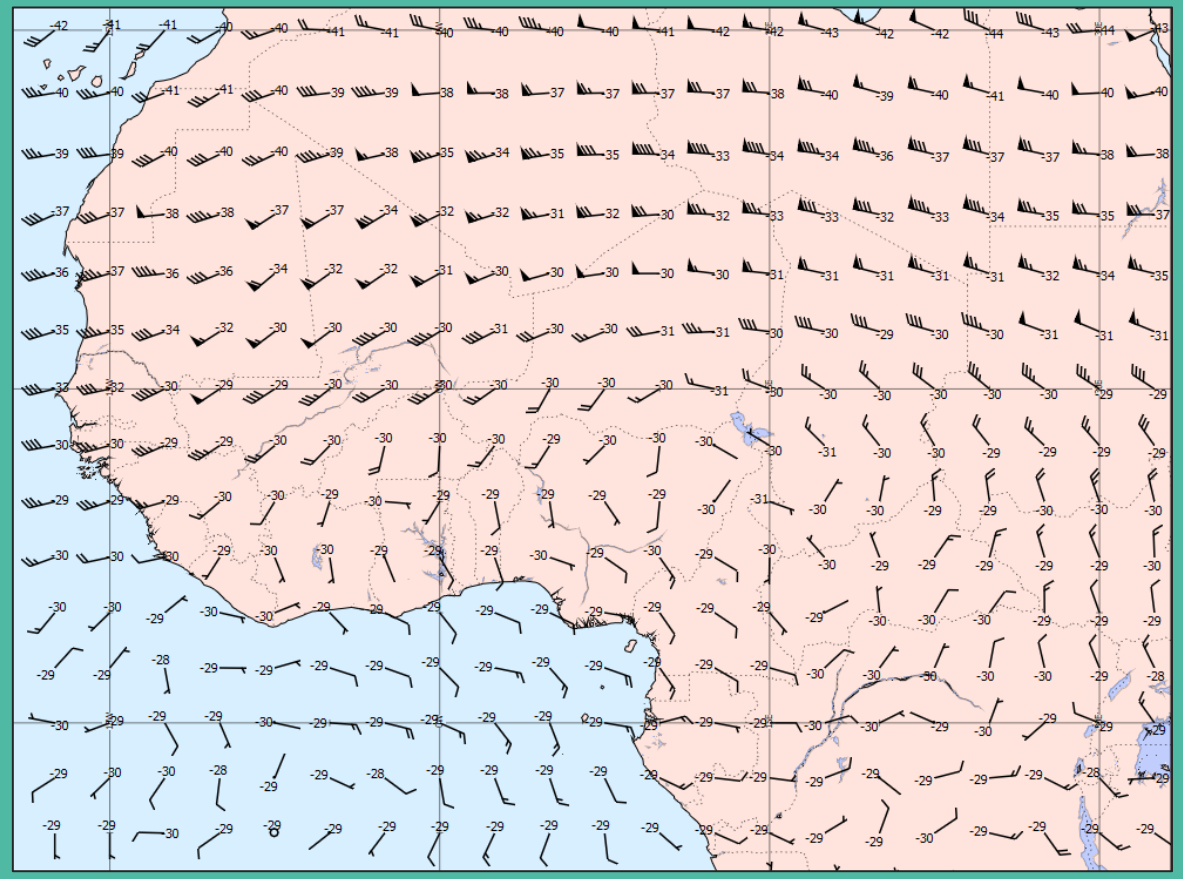
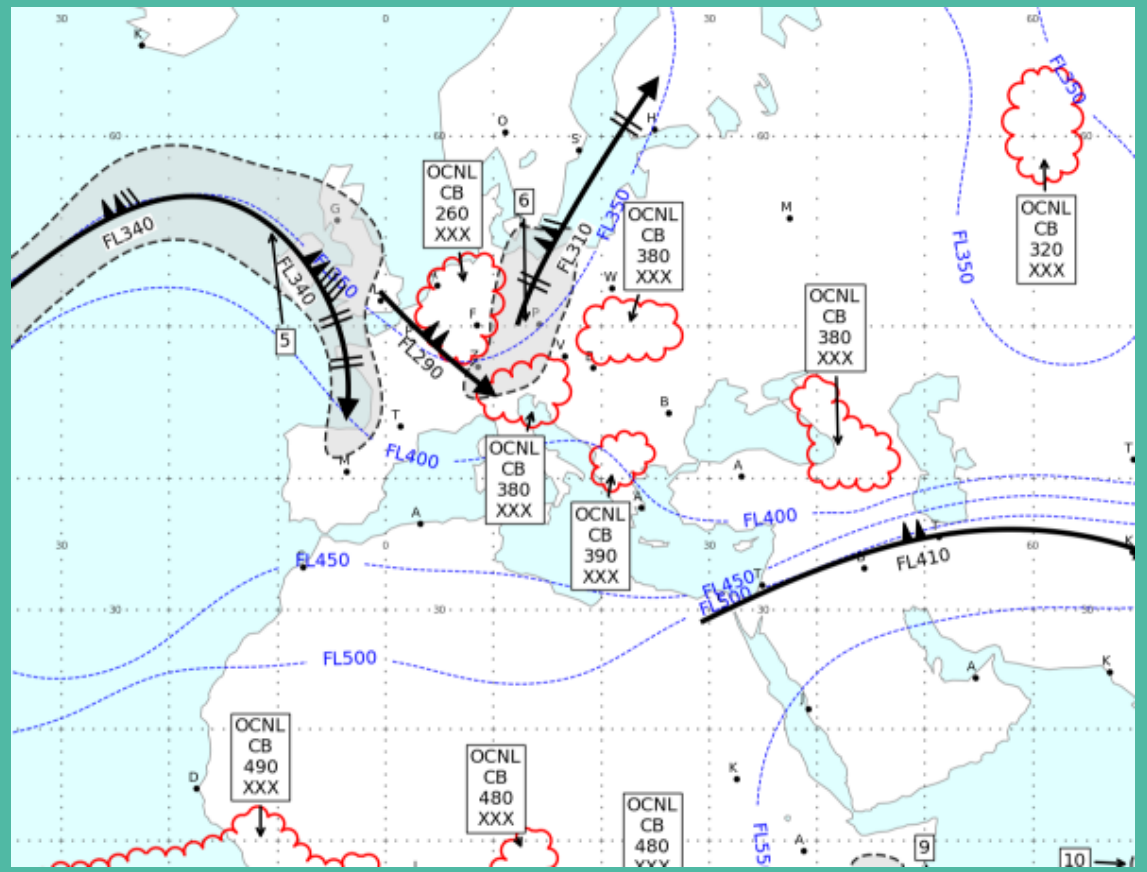
SADIS API





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SADIS API

- Became operational in March 2024 for the WAFS Gridded and OPMET data
- Became operational on 8 April 2025 for WAFS SIGWX
- SADIS focusses on bulk data transfer

- Confirms to the Open Geospatial Consortium Environmental Retrieval API standards https://ogcapi.ogc.org/edr/
- SADIS API API conforms to EUROCONTROL SWIM yellow profile
- Is published in the EUROCONTROL SWIM registry https://eur-registry.swim.aero/services

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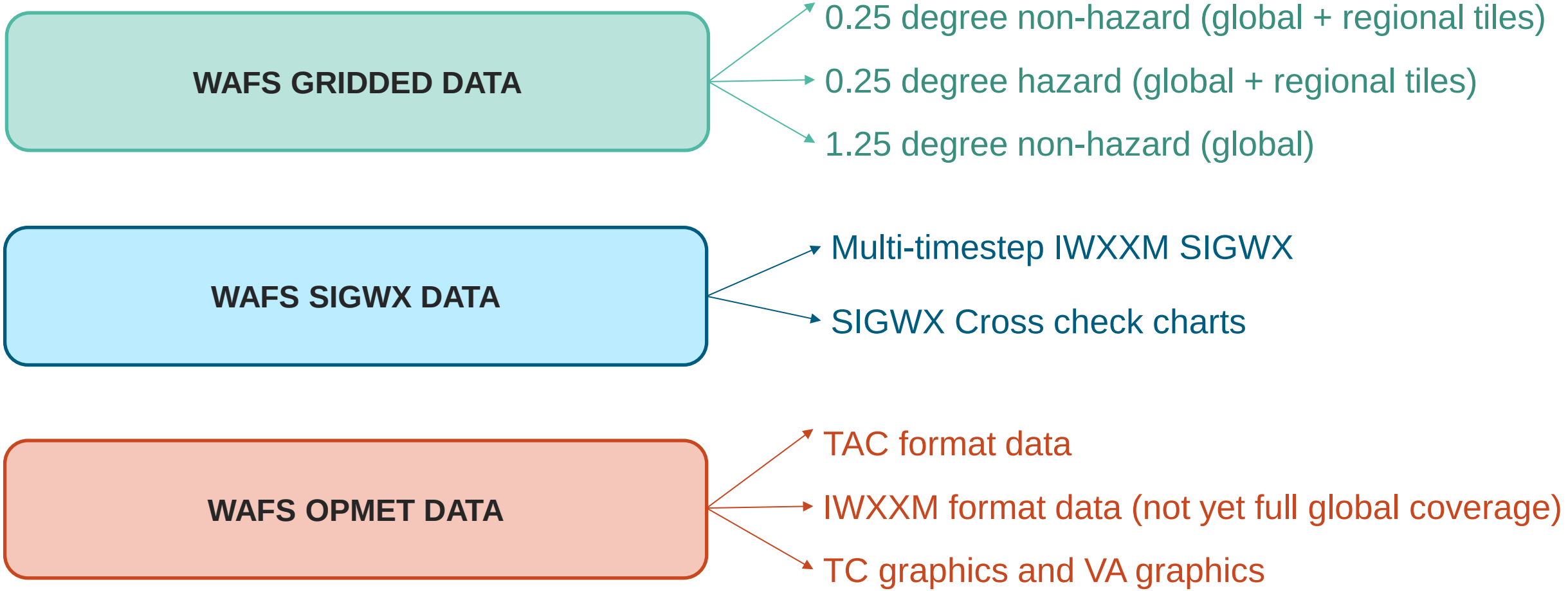
SADIS API ELEMENTS

Data Sets



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SADIS API

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WAFS GRIDDED COLLECTIONS

GRIDDED DATA
https://gateway.api-management.metoffice.cloud/sadis-wafs-gridded-data/1.0

- egrr_wafs_windtempgeo_0p25
- egrr_wafs_humidity_0p25
- egrr_wafs_tropjet_0p25
- egrr_wafshzds_blended_ice_0p25
- egrr_wafshzds_blended_turb_0p25
- egrr_wafshzds_blended_cb_0p25

COLLECTION ID

- egrr_wafs_windtempgeo_0p25
- egrr_wafs_humidity_0p25
- egrr_wafs_tropjet_0p25

COLLECTION ID

METADATA

- General Information
- API Conformance
- Available collections

THERE ARE ALSO KWBC VERSIONS OF THESE COLLECTIONS CONTAINING WAFC WASHINGTON DATA

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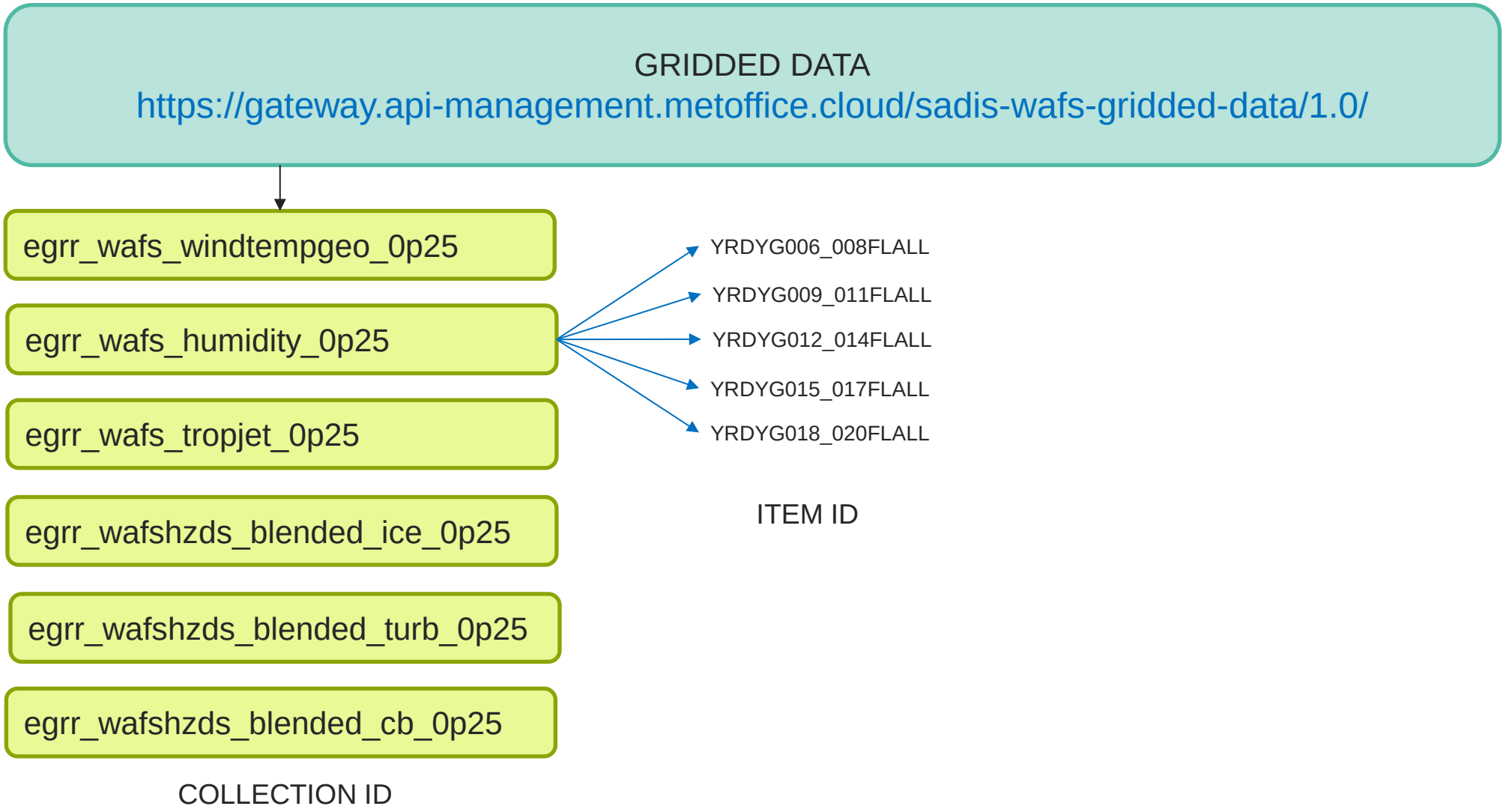
WAFS GRIDDED COLLECTIONS



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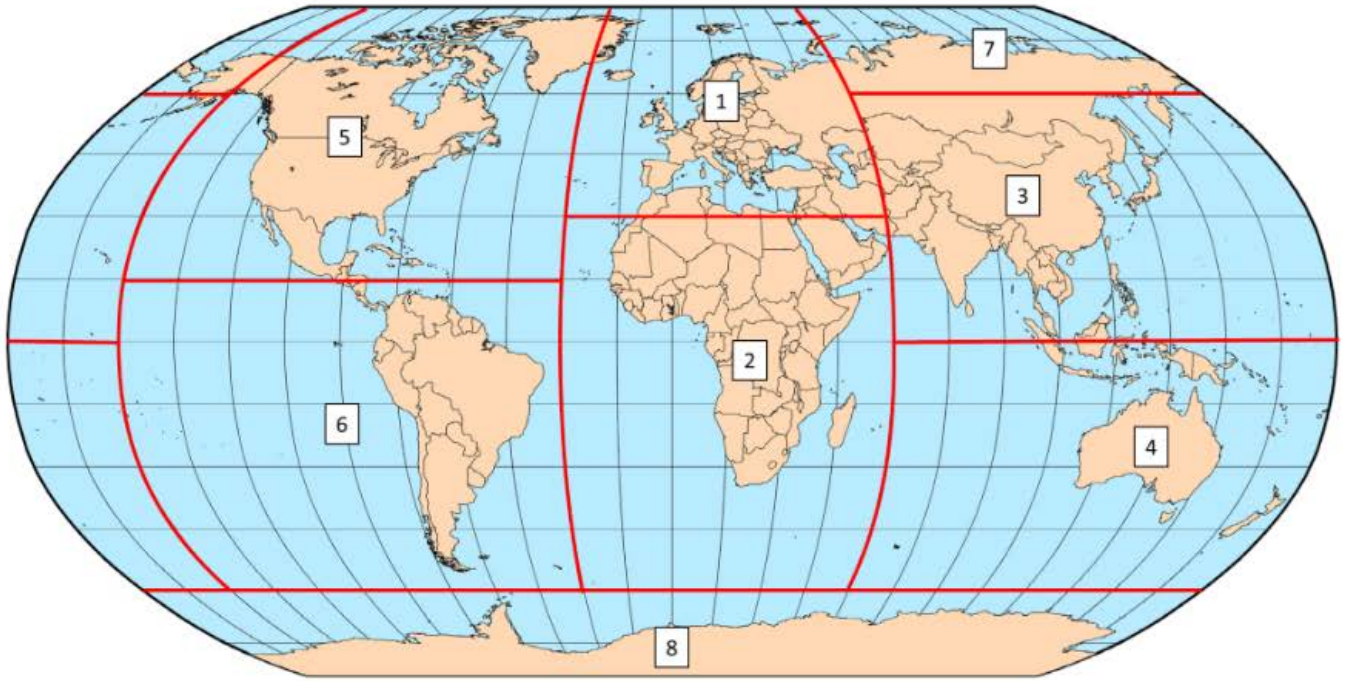
AVAILABLE REGIONAL TILES

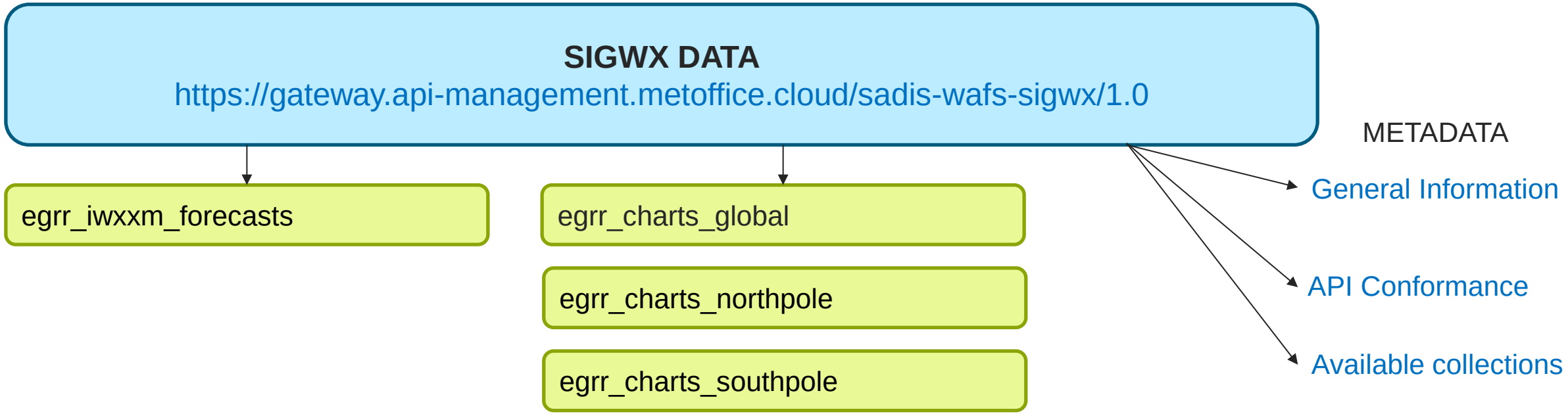
All data is available as a global “tile”. The 0.25 degree data is also available for 8 regional tiles.



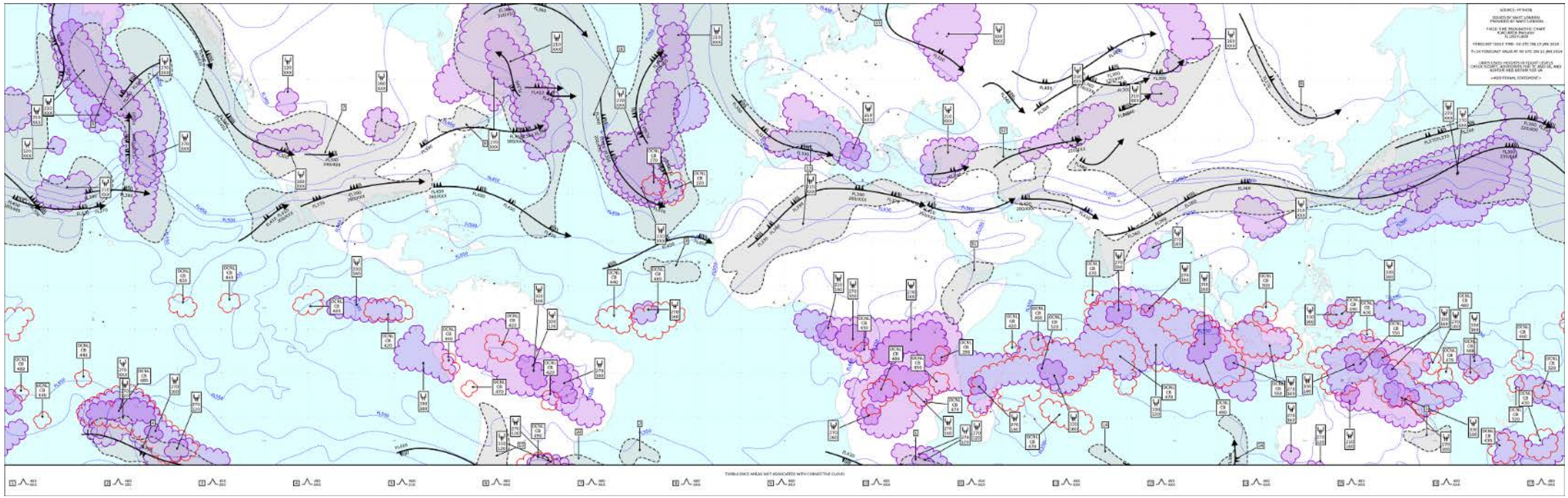
Pre-set map areas	
Region 1	30W-60E, 30N-90N
Region 2	30W-60E, 60S-30N
Region 3	60E-150W, 0-60N
Region 4	150W-30W, 60S-0
Region 5	150W-30W, 15N-90N
Region 6	150W-30W, 60S-15N
Region 7	60E-150W, 60N-90N
Region 8	180W-180E, 90S-60S

You always get all the available model levels and is grouped into 3 timestep “bundles”

WAFS SIGWX COLLECTIONS



THERE ARE ALSO KKCI VERSIONS OF THESE CONTAINING WAFC WASHINGTON DATA



Example cross-check chart

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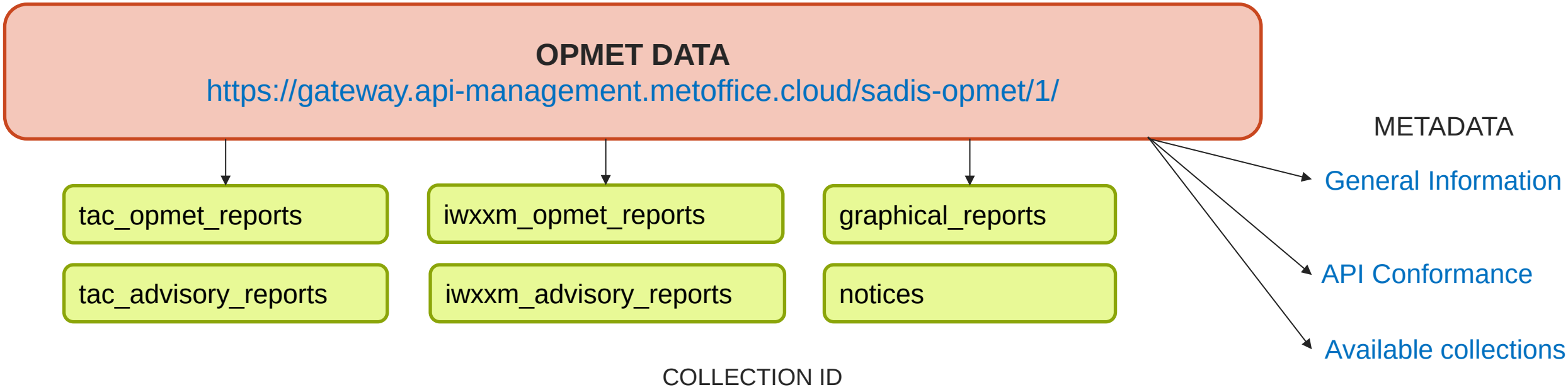
OPMET COLLECTIONS



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WHAT IS IN EACH COLLECTION:

Collection Name	Collection contains:	Update frequency
tac_opmet_reports	METAR, TAF, SPECI, SIGMET (all types), AIRMET, GAMET and special AIREPs in the traditional alphanumeric code format.	5 minutes
iwxxm_opmet_reports	METAR, TAF, SPECI, SIGMET (all types) and AIRMET, in IWXXM format.	5 minutes
tac_advisory_reports	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.	5 minutes
iwxxm_advisory_reports	Tropical cyclone advisories, volcanic ash advisories and space weather advisories in IWXXM format.	5 minutes
graphical_reports	This collection volcanic ash graphics and tropical cyclone graphics in .png format.	5 minutes
notices	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.	20 minutes

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HOW DO YOU GET THE DATA

1) Formal registration process has to be completed:
   - Registration form
   - Acceptance of the Met Office service terms and conditions
   - For SADIS only - due to the ICAO administered cost recovery process, organisations also have to be approved by their State Meteorological Authority
2) Met Office API developer portal is used to generate secure keys. The secure keys are used to create authentication tokens.
3) Users make https requests that look something like this:

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

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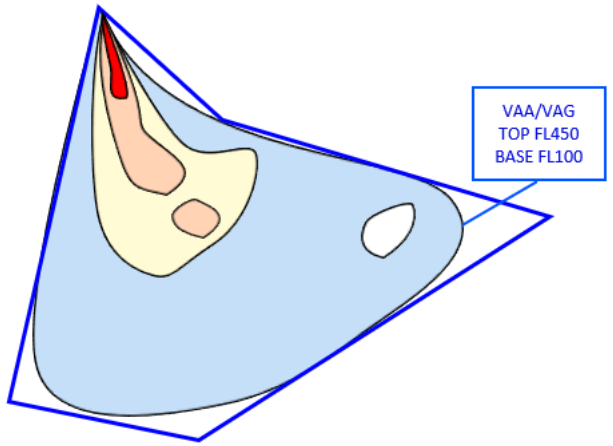
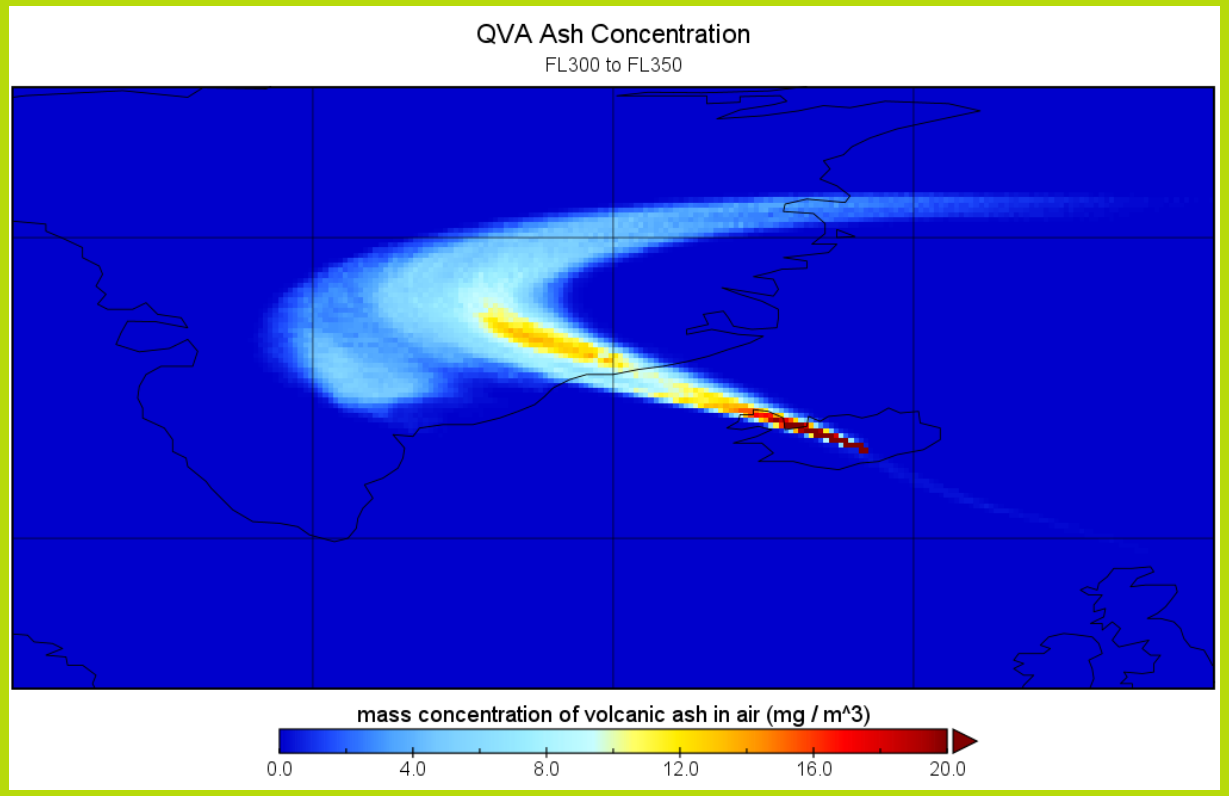
HOW DO USERS KNOW IF THE DATA IS NEW?

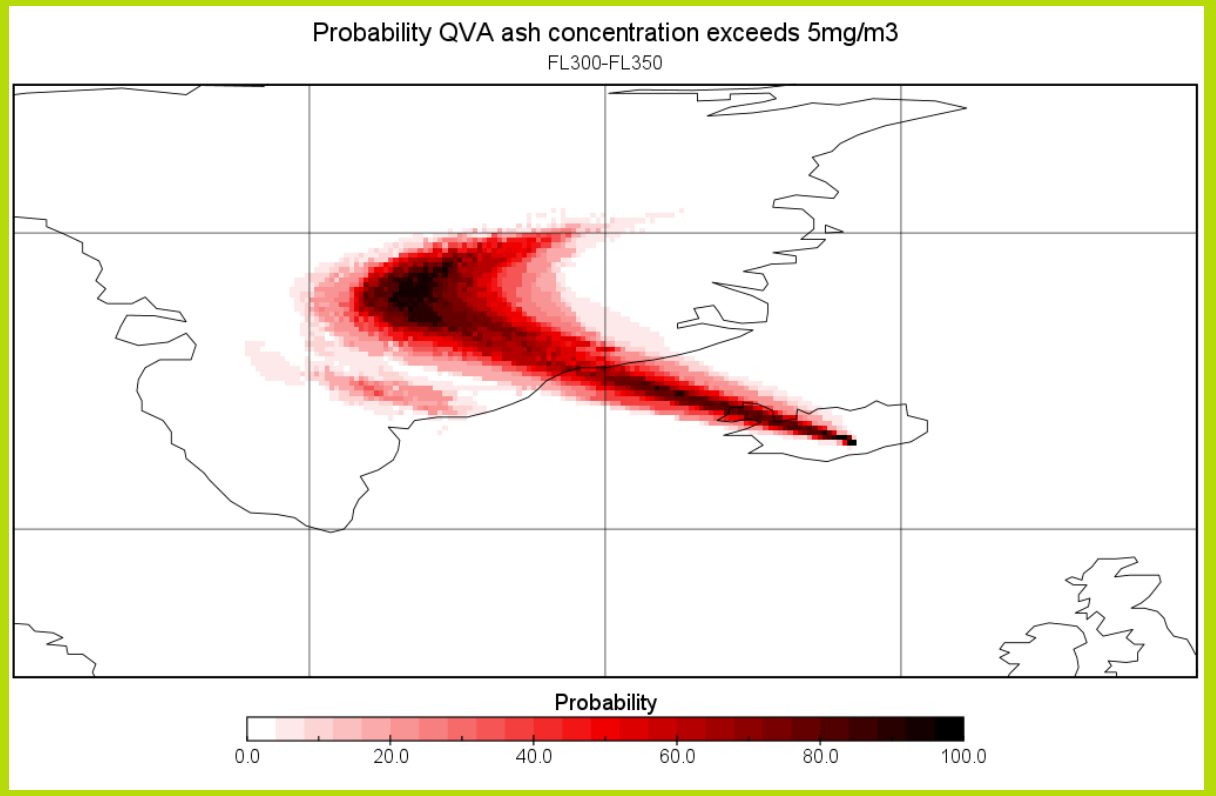
- For WAFS gridded data and WAFS SIGWX data, data is published on a repeating 6-hourly cycle. Only the latest model run of data is available at any one time
- Metadata within the API can be used to check whether it has updated

- For OPMET data updates every 5-minutes. 36 hours worth of data is held in the system.

VAAC LONDON QVA API







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VAAC LONDON QVA API

- Contains deterministic and probabilistic QVA gridded forecasts and an IWXXM data set for “significant” volcanic eruptions occurring the VAAC London area of responsibility – primarily Iceland.
- Probabilistic data set is for four concentration thresholds:

Concentration thresholds
≥ 0.2 mg/m^3
≥ 2.0 mg/m^3
≥ 5.0 mg/m^3
≥ 10.0 mg/m^3

- Access will be granted to aviation industry users worldwide. It is free to use service. In the absence of real eruptions TEST data sets are regularly published

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VAAC London QVA API

GRIDDED DATA
https://gateway.api-management.metoffice.cloud/vaac-london-qva-gridded-data/1.0

OBJECTS/FEATURES
https://gateway.api-management.metoffice.cloud/vaac-london-qva-products/1.0

COLLECTION ID

qva_deterministic

qva_probabilistic

qvaci_iwxxm

ITEM ID

370010

383030

373030

370010

383030

373030

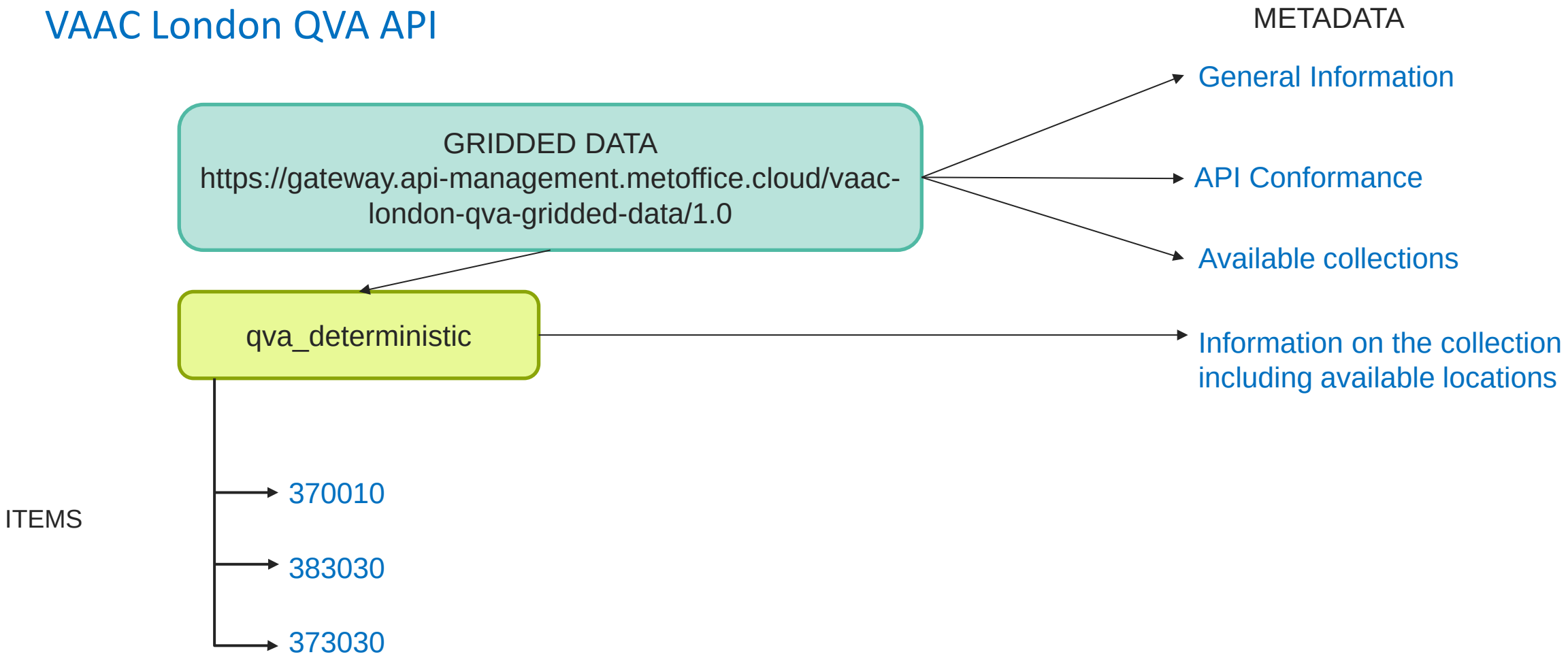
0.2mg/m³
2.0mg/m³
5.0mg/m³
10.0mg/m³

370010

383030

373030

VAAC London QVA API



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VAAC LONDON QVA NOTIFICATIONS SERVICE

- ActiveMQ Message broker with four topics that can be subscribed to.
- The Notification message contains the information on the volcano name, volcano number, publish time and the data (event) type and is sent each time new data sets are published.
- In addition a heartbeat (empty) message will is published every hour.

4D Trajectory

4DT (4-Dimensional Trajectory):

Long/Lat/Height(FL)/Date:Time queries

- Turbulence, Icing
- Wind U & Wind V, Temp and Rel. Humidity

Payload in API response

120 forecast points per API request 2021 – 2000 in 2026

e.g. 2400km trip at 10km resolution, 10 vertical levels = 20 API requests

40 requests per minute 24/7/365 – so SLA & Patching is important

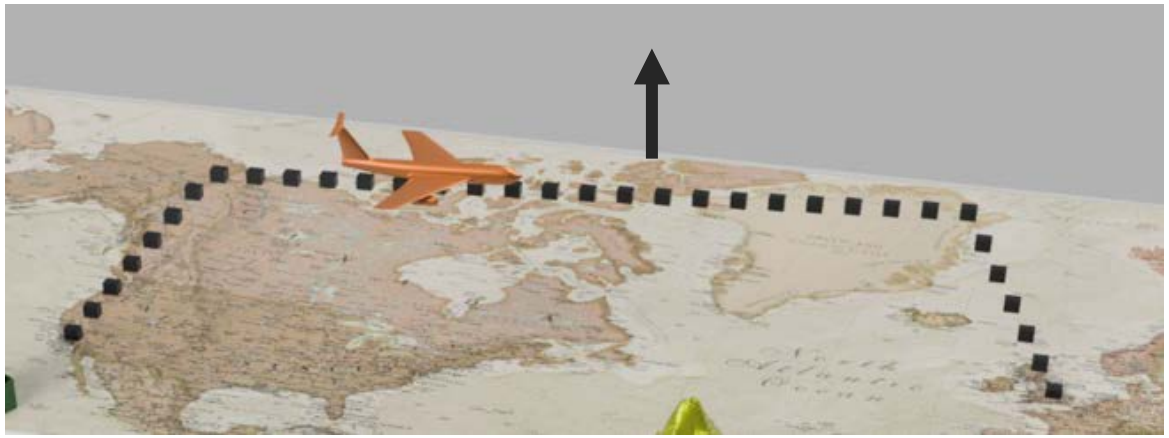
AWS Blue/Green deployment

1 million forecast points per day

Dynamic ‘in flight’ flight planning – saves fuel & CO2

Data generated dynamically as payload responses to user requests*

- Load & Capacity testing



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Example 4DT endpoints: 2 spot forecasts

https://.cloud/ads4dt/1.0/collections/commercial_main/instances/latest/trajectory?coords=LINESTRINGZM(45.62587 19.43607 390 2022-09-15T23:49:00Z,25.62587 29.43607 370 2022-09-15T22:49:00Z)&parameter-name=air_temperature,wind_u,wind_v,relative_humidity

Response .json: “air_temperature “values”: [242.0,250.0},“value”: “K”

3D RADAR

SESAR (Single European Skies Aviation Research):

Partnership with European Radar providers

3D&2D Radar ‘mosaic’, mins - HDF5, Grib2*

5 seconds – 8 MB.Zip

Payload in API response

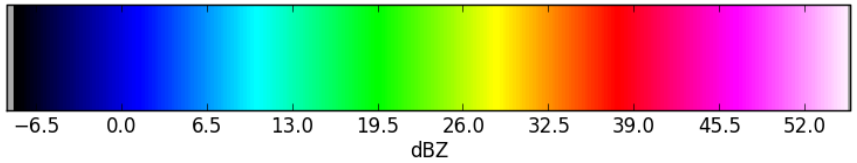
Pre-generated payloads cached

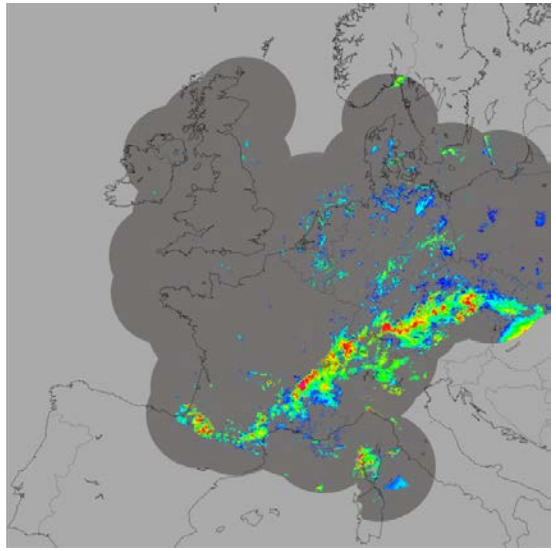
NOT EDR

https://ip61-ar.api.metoffice.gov.uk/api/v1/radar/low-res/hdf5
(3D&2D in 1 payload 2km resolution every 15 mins)

https://ip61-ar.api.metoffice.gov.uk/api/v1/radar/high-res/Grib2
(3D&2D in 1 payload 1km resolution every 5 mins)*

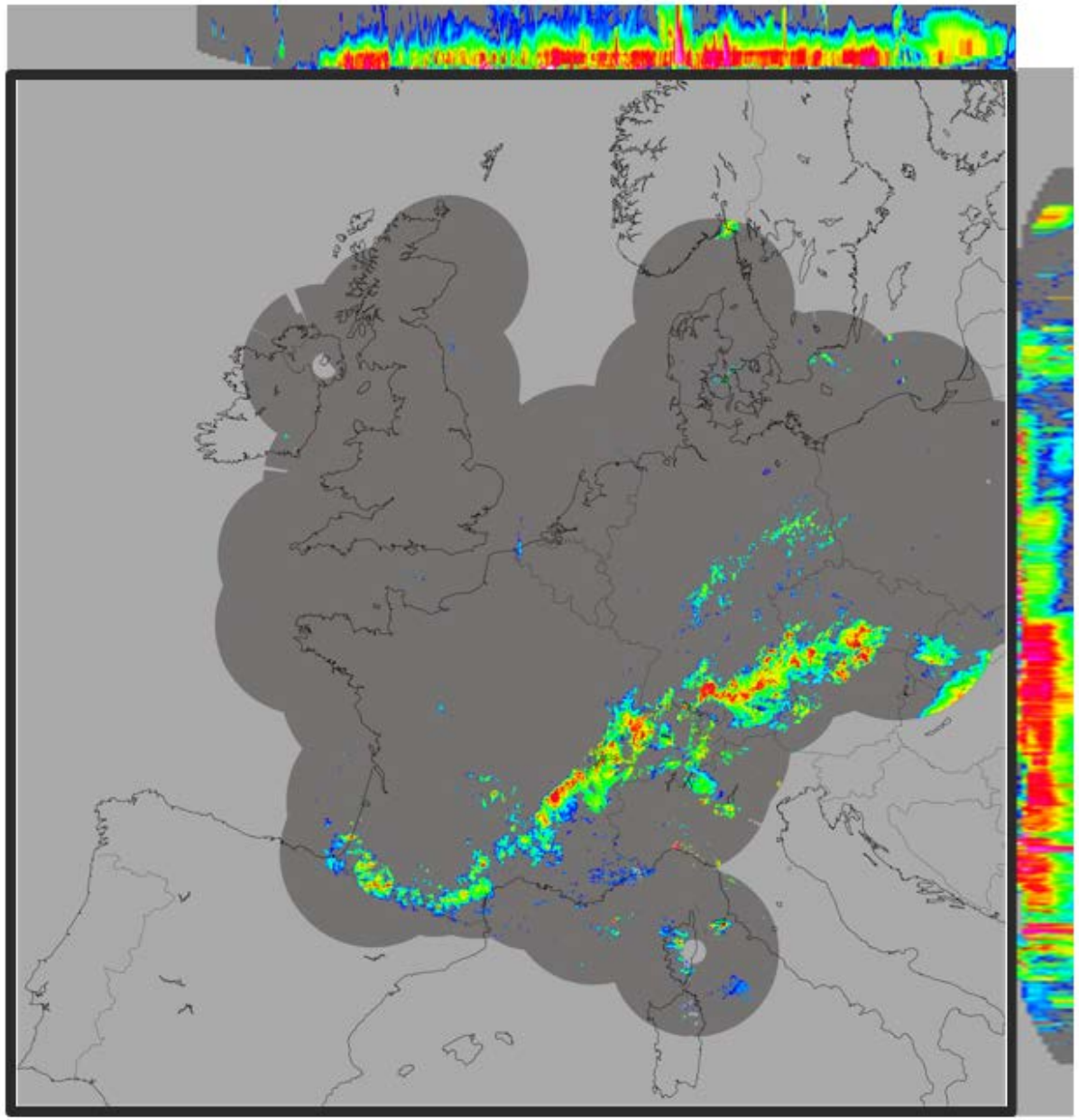
Output: 3D Radar & Derived 2D Output





Derived 2D Output:

Maximum reflectivity (ZMAX)



Learnings:

- Its all about API’s and API management
- Get a Solutions Architect
- Do User Research up front to justify there is a need for your proposed SWIM service and to set its scale
- 60% development, 40% operationalization. Cyber Security costs increasing…..
- Users want to define their own spatial subsets (lower availability)

- Pre-defined spatial subsets have higher availability but contain un-needed data
- Users ‘complain’ about poor availability NOT weather accuracy: They want consistency for their BAU

- Grow subject matter expertise in IWXXM and EDR
- Not all customers can afford cost of change to take up SWIM API’s (maintain legacy services)

- Private organizations faster to re-act and take up
- Educate business managers to understand API’s
- MO only puts new weather features in SWIM API services (not legacy FTP services)

- SWIM API’s are standards that set the course of the discussion

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Thank you for listening

Want to sign up ….

SADIS: SADISmanager@metoffice.gov.uk
QVA: QVA@metoffice.gov.uk