

ECMWF Open Data Programme

Maartje Kuilman

Analyst, Forecast Department
Maartje.Kuilman@ecmwf.int



Introduction

Open data has been recognised as one of the main tools to **maximise the socio-economic benefits** of investments in weather and climate data production

Open data is a **key part of the ECMWF Strategy** between now and 2030.

To realise the full potential of open policies, data need to be **easily accessible** and with the appropriate supporting information to allow users to derive information.

Open data - Definition

Open Data: data that can be **used**, **modified**, and **shared by anyone for any purpose** but may be subject to **delivery or service charges**

e.g. ECMWF Non-Valid Products via MARS WebAPI - data has an open licence (CC-BY-4), but a service fee applies to access the data via WebAPI

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No additional restrictions: You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

Open Data – Key definitions

Open Data: data that can be **used, modified, and shared by anyone for any purpose** but may be subject to **delivery or service charges**

e.g. ECMWF Non-Valid Products via MARS WebAPI - data has an open licence (CC-BY-4), but a service fee applies to access the data via WebAPI

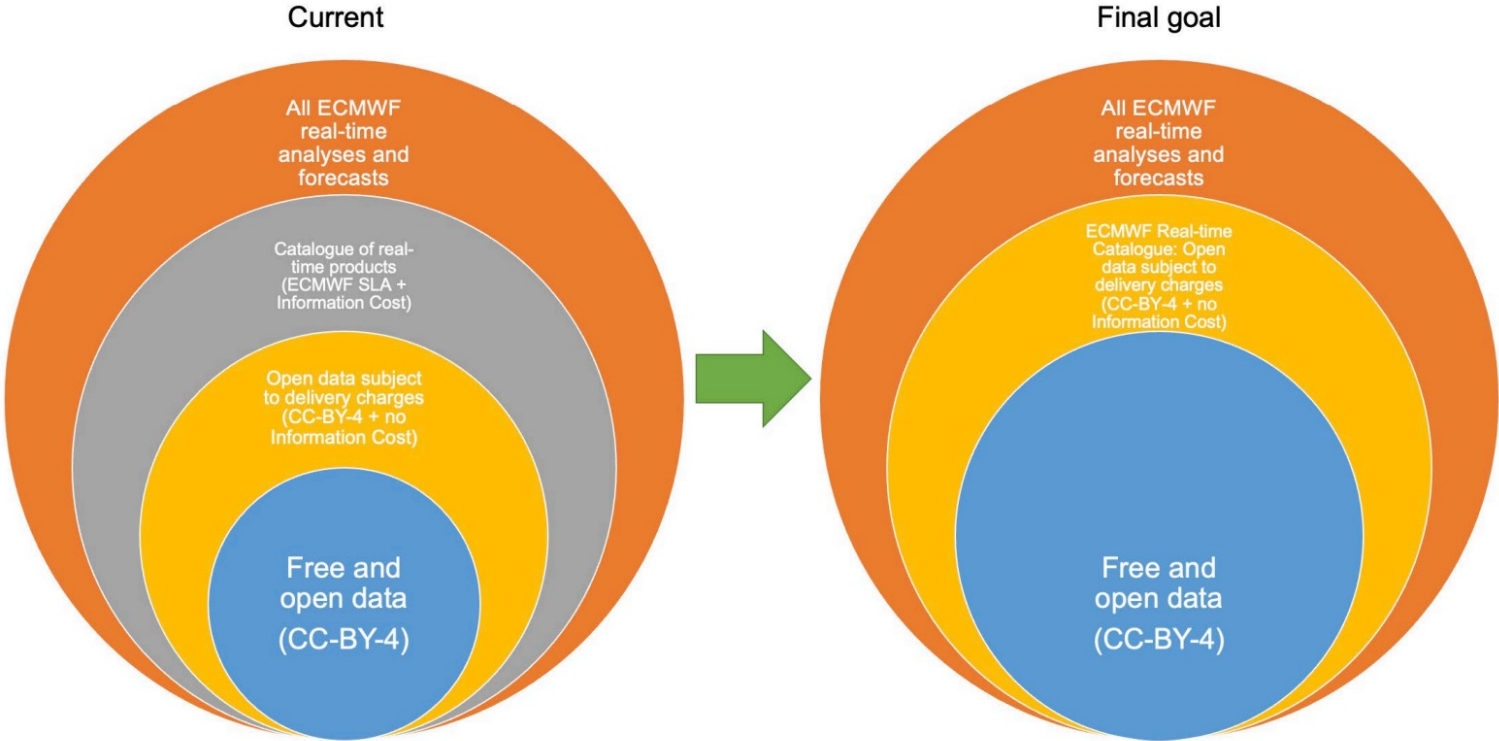
Free Data: data that can be accessed **without charge** but may be subject to certain **restrictions** on its **use, modification, or sharing**. For example, some data may be available for free but only for **personal, noncommercial use**, or it may be available for academic use but not for commercial purposes.

e.g. ECMWF Valid Products provided for research purposes without charge but with restrictions on the use (ECMWF SLA applies). Also, TIGGE and S2S datasets – provided free for research and with latency (CC-BY-NC-4)

Free and Open Data: data that can be **used, modified, and shared by anyone for any purpose** and accessed **without charges**

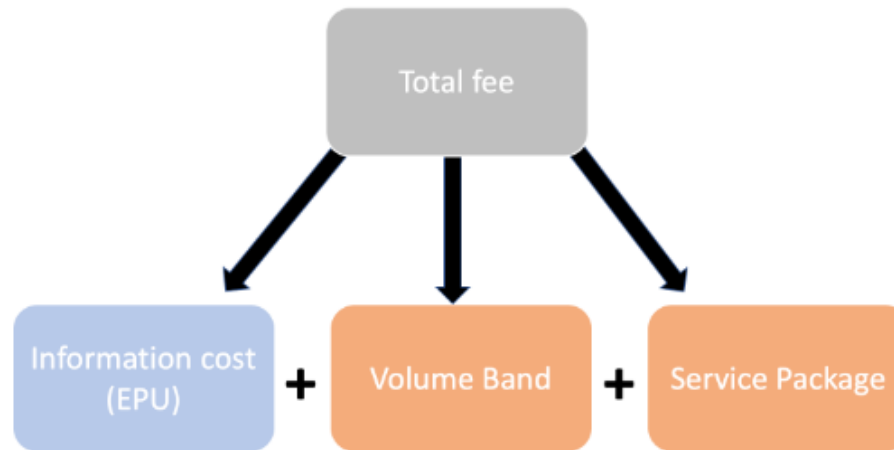
e.g. ECMWF Open Data: <https://www.ecmwf.int/en/forecasts/datasets/open-data> and Open Charts (both CC-BY-4)

Open data goal



Steps towards Open Data: Service Charge Model

In July 2022, we moved to a Service Charge Model for ECMWF Real-Time Data
Users still pay Information Cost based on the ECOMET Product Unit (EPU) price (currently 0.25 EUR)



Steps towards Open Data – Small business discount

Small business discount for 'micro businesses':

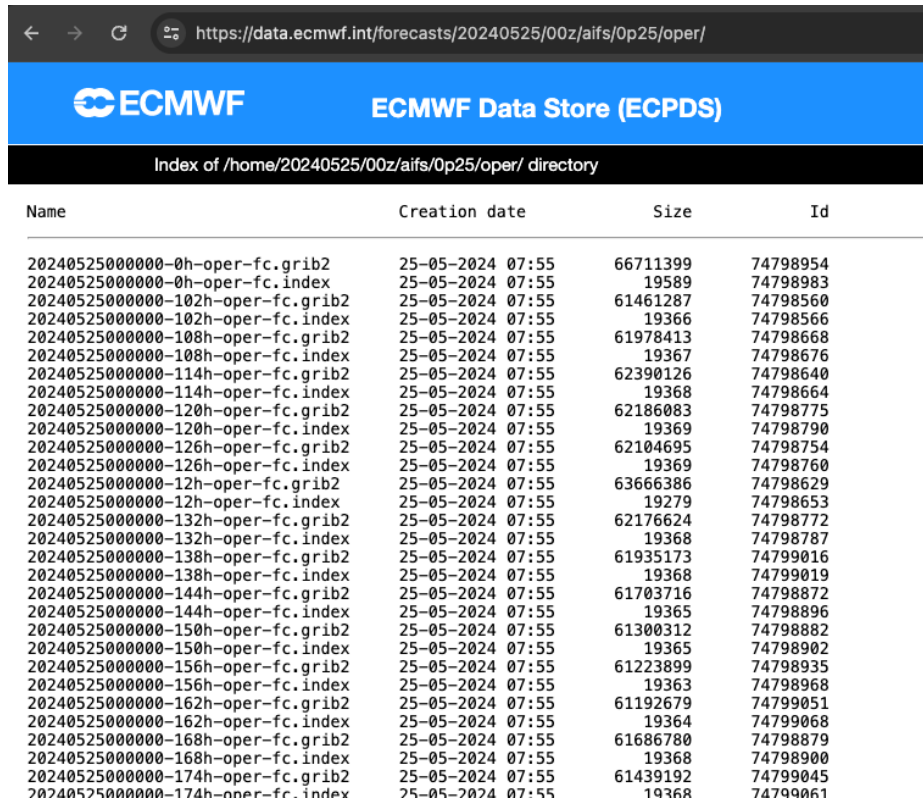
- Staff headcount ≤ 10
- Annual turnover/Balance sheet ≤ 2 million EUR

Applies to:

- Standard commercial licences
- Archive commercial licences

Steps towards Open Data: ECMWF Open data

Released the “ECMWF Open Data (real-time)” dataset: a subset of the real-time forecast data made available for the public **free of charge** (CC-BY-4.0)

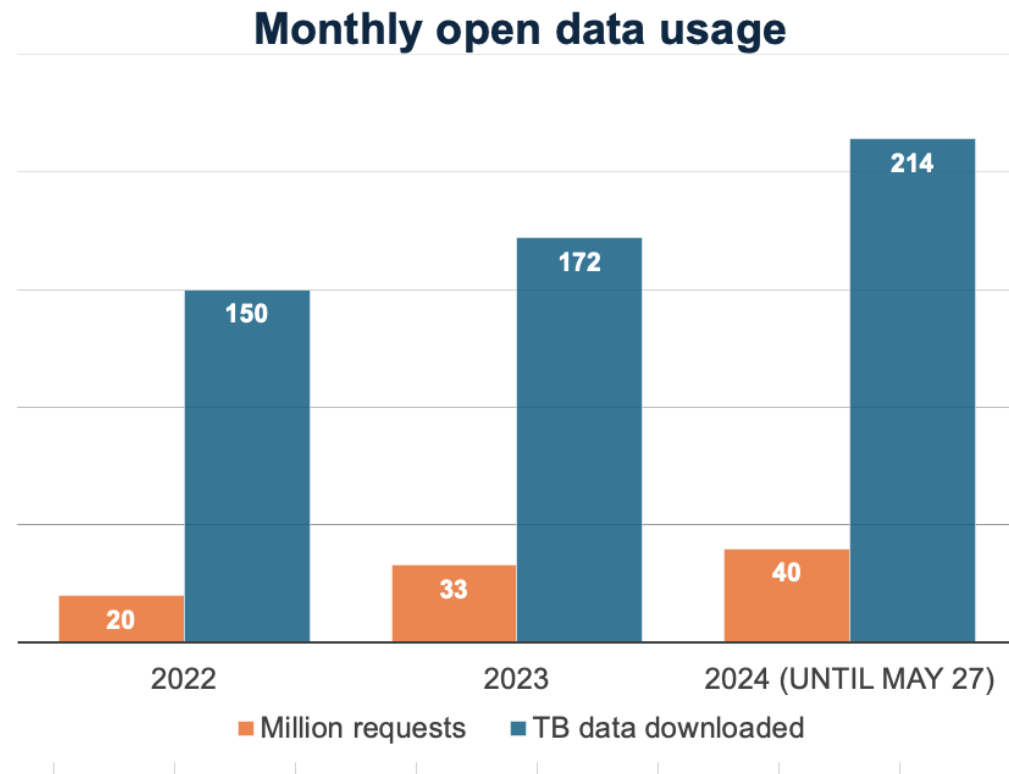


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20240525000000-174h-oper-fc.index	25-05-2024 07:55	19368	74799061



Open data usage – Open data portal

- Parameters are made available via an FTP service since January 2022
- Growth in uptake from 2022 until present:



The challenge of moving to open data

As data becomes **cheaper**, the data becomes **more accessible** to smaller organisations (and bigger ones!)

Increase in users, promotion and availability of data becomes a 'self-promoter'!



ECMWF Open Data Redistribution

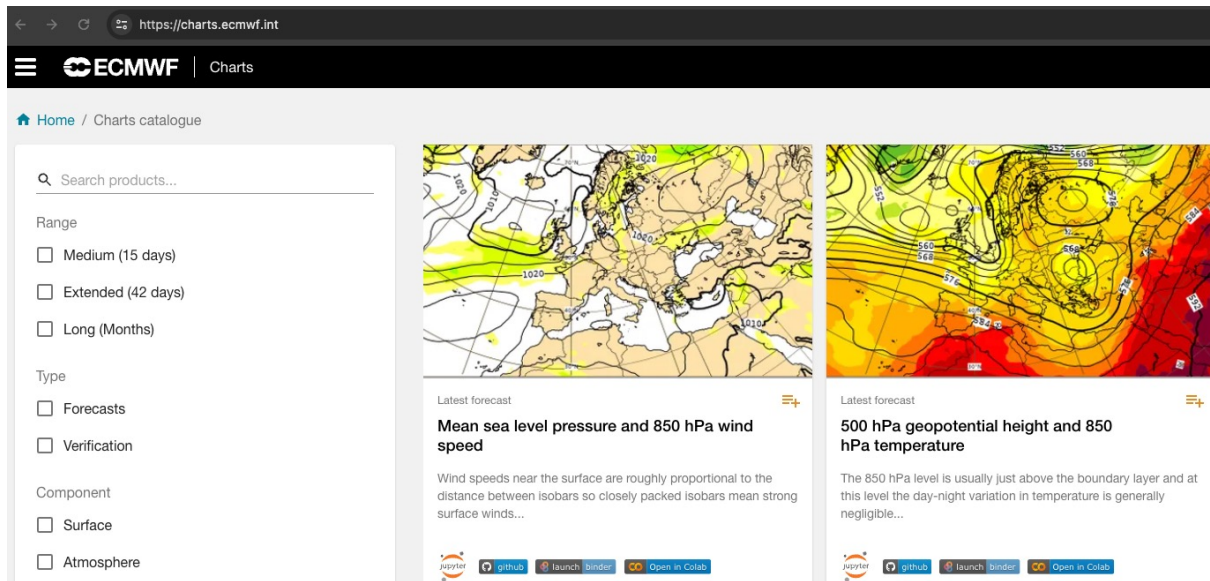
ECMWF Open Data are also redistributed by third parties:

- **Microsoft:** ~1.5 PB of data downloaded in 2023
- **Amazon AWS:** 4.8 TB downloaded per day in 2024
- **Google** (Also redistributing a subset of MARS archive for machine learning, started in June 2023): More than 400,000 accesses in the period July – December 2023.

Steps towards open data: Open Charts

All static charts in the **Open Charts Catalogue** under Creative Commons Attribution licence (CC-BY-4)

Around 250 charts available freely and openly on ECMWF OpenCharts

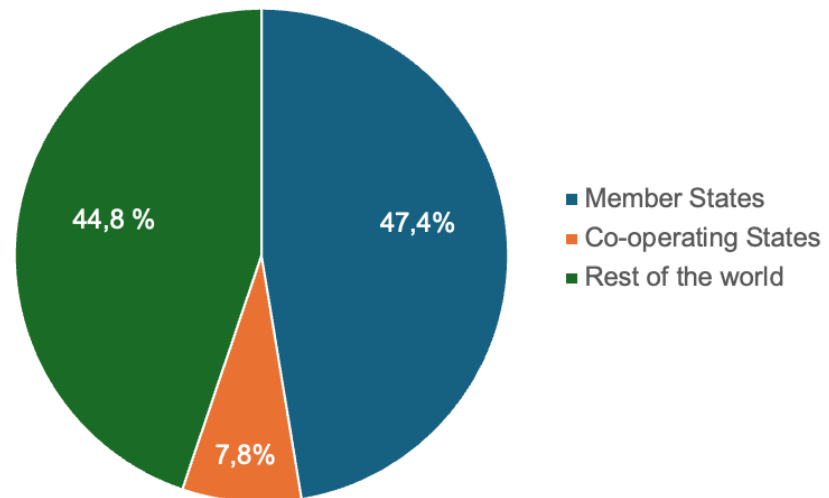


The screenshot shows the ECMWF OpenCharts website interface. At the top, there is a navigation bar with the ECMWF logo and the word "Charts". Below this is a search bar with the placeholder text "Search products...". To the left of the main content area is a filter sidebar with sections for "Range" (Medium (15 days), Extended (42 days), Long (Months)), "Type" (Forecasts, Verification), and "Component" (Surface, Atmosphere). The main content area displays two chart cards. The first card is titled "Mean sea level pressure and 850 hPa wind speed" and features a map of Europe with isobars and wind vectors. The second card is titled "500 hPa geopotential height and 850 hPa temperature" and features a map of Europe with geopotential height contours and a color-coded temperature field. Both cards include a "Latest forecast" label, a brief description, and a row of social sharing icons (Jupyter, GitHub, Launch, Binder, Open in Colab).



Open data usage – Open Charts

- In 2023 the products in Open Charts were viewed more than 42 million times.
- Most visualized products are the Medium Range products (84.9%), followed by the Extended Range products (10.8%)
- Since July 2023, experimental products for machine learning have been added:
 - Outputs from four external data-driven models (GraphCast, FourCastNet, Pangu-Weather and FuXi)
 - ECMWF's AIFS



Steps towards open data: Historical forecasts

All non-valid data in the Archive Catalogue under CC-by-4



Archive Catalogue

Hdate (20 values)	Time (1 values)	Step (185 values)	Number (10 values)
2003-01-02	00:00:00	0	1
2004-01-02		6	2
2005-01-02		12	3
2006-01-02		18	4
2007-01-02		24	5
2008-01-02		30	6
2009-01-02		36	7
2010-01-02		42	8
2011-01-02		48	9
2012-01-02		54	10

Parameter
(60 values)

10 metre wind direction
10 metre wind speed
Air density over the oceans



Further steps towards open data

- Provided the **NMHS Non-commercial licences** at Handling Charges only.
- Service charge for access to ecCharts has been waived for **WMO NMHS non-commercial users**
- Release of “**Atmospheric Composition Support**” dataset (model-level meteorological parameters from the CAMS ‘COMPO’ suite, removing the previous 6-day embargo).
- Release of “**S2S Support**” dataset consisting of the C3S seasonal forecasts available via the Climate Atmosphere Data Store (CADS).

Steps taken in 2024

- **ECMWF Open Data** released at **0.25 spatial resolution**
- **New parameters** added to ECMWF Open Data
- All ECMWF **AIFS** (machine learning-based) data open
- Extended-range data: ECMWF's contribution to **the S2S dataset**, is now available with a 48-hour delay (before it was a 3-week delay)
- **CAMS** (Copernicus Atmosphere Monitoring Service) data: the 6-day embargo has been removed and CAMS meteorological data are accessible in real-time.

Steps to be taken in 2024

All parameters (448) of the Real-Time Catalogue will be released as open data at 0.4 spatial resolution under CC-BY-4.0 licence

This means that users don't have to pay information cost for this data, but Service Charges still apply

Catalogue of ECMWF real-time products

The Catalogue outlines the real-time meteorological and oceanographic products available from the ECMWF forecasting system for **use by licence holders**.

Readers are expected to have a background knowledge of atmospheric or oceanographic sciences and are encouraged to consult the [ECMWF Forecast User Guide](#).

Other forms of meteorological and oceanographic services and products are available via the National Meteorological Services of ECMWF's Member States.

Group A: High resolution forecast

- [Set I: Atmospheric Model high resolution 10-day forecast \(HRES\)](#)

Configure and order real-time data >

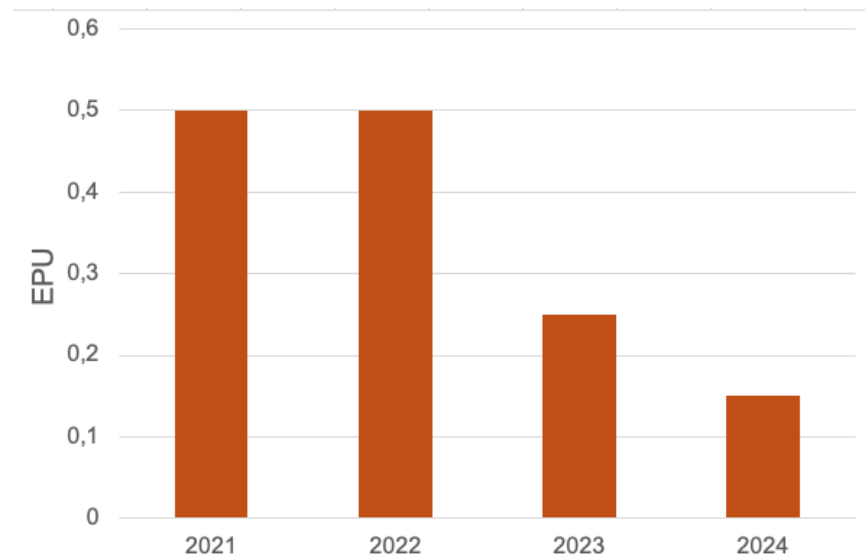
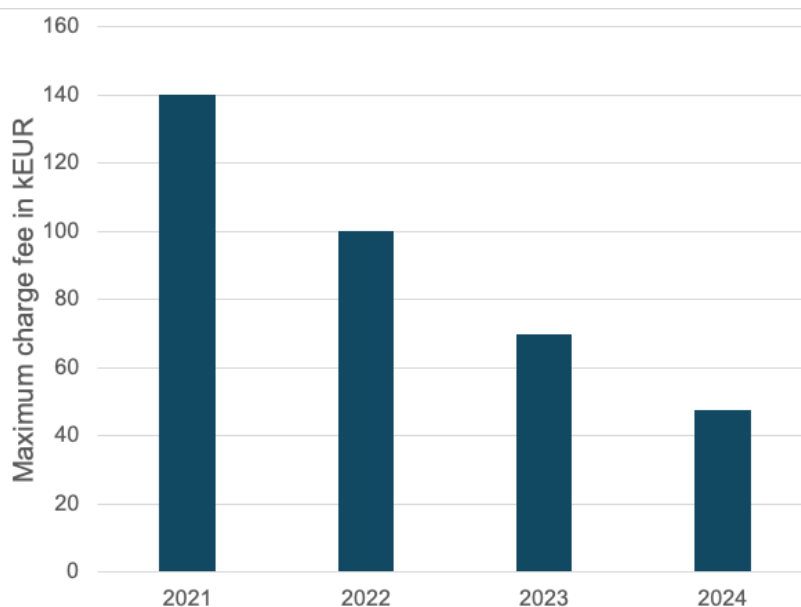
Other real-time data:

- [Open data](#)
- [WMO Essential](#)
- [WMO Additional](#)

Steps to be taken in 2024

From 1 July 2024, decrease in price real-time licence:

- **Decrease of Maximum Charge fee** from 70,000 EUR to 47,500 EUR
- **Decrease of EPU (ECOMET Product Unit)** from 0.25 EUR to 0.15 EUR



New prices – new licence?

As a current licensee, you can:

- Leave your licence as it is
- Terminate your licence and sign a new licence (the 3 month notification period will be waived)
- Terminate your licence



You will be able to declare your intent



Declaration of intent

Organisation name	*	<input type="text"/>
Licensor	*	<input type="text" value="▼"/>
Current Licence ID	*	<input type="text"/>
Contact Name	*	<input type="text"/>
Contact Email	*	<input type="text"/>
Do you wish to terminate with or without a new licence?		<input type="radio"/> Termination without a new licence
	*	<input type="radio"/> Termination with a new licence (from 01 July 2024)

Future steps towards open data

- Further decrease of the Information Cost
- WMO Essential (for public under CC-by-4) and WMO additional (for NMHS of WMO members) will be renamed and updated with new parameters



Conclusions

- Open data is a key part of ECMWF Strategy
- Many steps towards Open Data have already been taken
- Some important steps are coming up very soon
- Further steps will be taken