Progress on the implementation of the ECMWF open data

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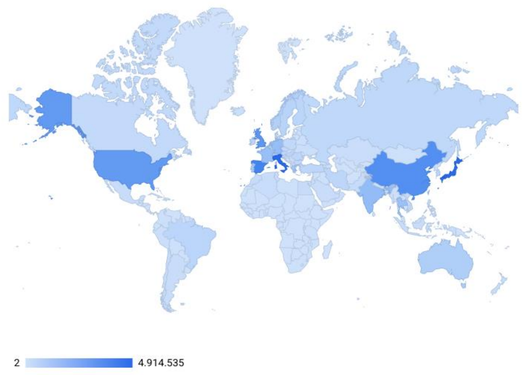
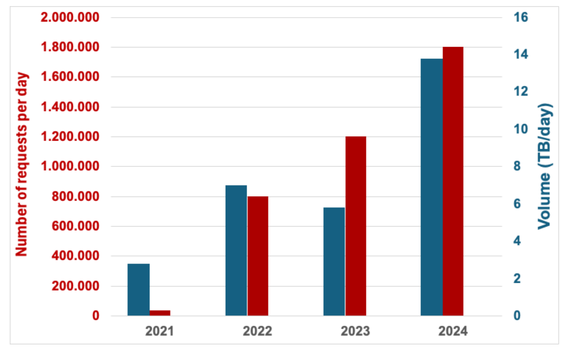
Current open data at ECMWF

Open data is an essential tool to maximise socio-economic benefits of investments in weather and climate data production and is a key part of ECMWF Strategy between now and 2030. Many steps have already been taken:

- Applied the Creative Commons CC BY 4.0 licence to all non-valid (historical) data in the Archive Catalogue
- Made free and applied the CC BY 4.0 licence to all static charts in the open charts catalogue.
- Reduced the information cost for data and maximum charge fee.
- Released a subset of the real-time catalogue with open data policy (resolution = 0.25 degrees).
- Released all parameters at resolution >= 0.4 degrees of the real-time catalogue with open data policy.
- Release of AIFS data from real-time catalogue with open data policy.



Distribution of Open Charts views in 2024



Open data usage since 2021

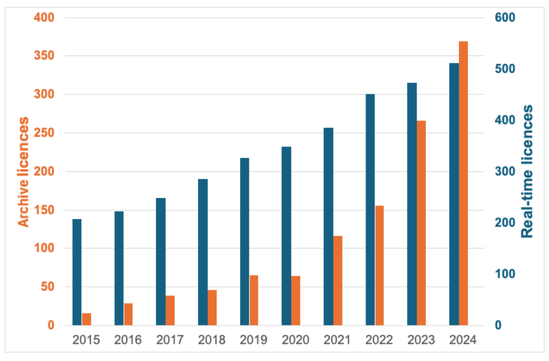
ECMWF WMO Additional and Essential Data Statistics 2024

	Number of requests/day	Volume downloaded/day
WMO Additional	~ 71,000	~ 9 GB/day
WMO Essential	~ 31,000	~ 2 GB/day

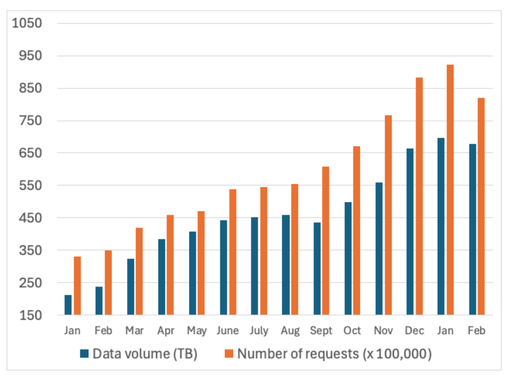
Challenges on the pathway to open data

- **Controlled Decrease of Revenue**: Even though steps towards open data have been taken, revenue from information cost continues to increase. ECMWF must balance this increase in revenue with commitments made to its Member and Co-Operating States.
- **Feedback and attribution**: If there is no registration required to access the data, ECMWF risks losing feedback, recognition and attribution.
- **Complex licensing / Data provision**: Users can have part of their data requirements as open and free data, while another part is still closed and subject to charges.
- **Increasing in number of users and data volume**: There is a significant growth in users and in volume of data downloaded.

Increase of number of chargeable licenses from 2015



Open data usage in 2024



Fully open data status in 2025

ECMWF will move to fully open data status from 1 October 2025:

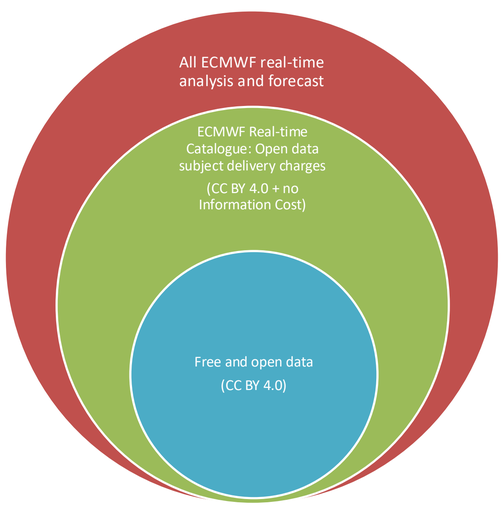
- The entire ECMWF Real-time Catalogue will be under a CC-BY-4.0 licence.
- There will be no more information cost associated with the data however service charges remain.

ECMWF will also expand support to WMO Members:

- Removing all data and service charges for UN initiatives.
- Improving data access for all WMO Members.

Current status

From 01/10/2025



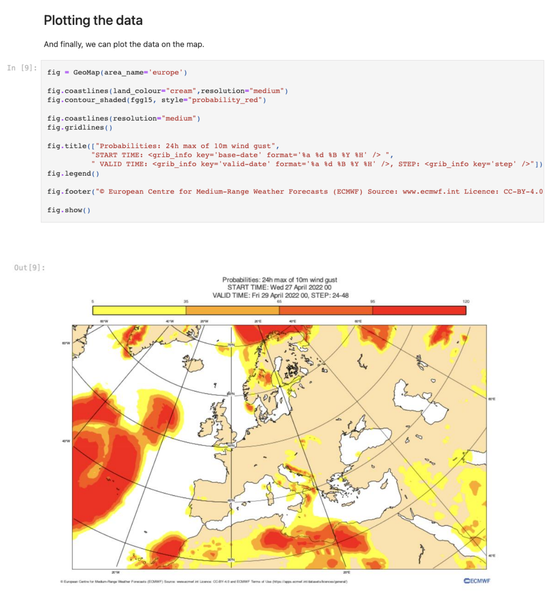
Open data delivered by cloud providers

- Delivery via Microsoft Azure in 2024: 34.80 GB/day
- Delivery via Amazon in 2024: 18134 GB/day
- Delivery via Google in 2024: 581 GB/day

FAIR Data Access

Compliance to “FAIR” = Findable, Accessible, Interoperable and Reusable: Jupyter Notebooks for open charts

- Design of an API to easily download the data
- Development of open-source Python libraries to process and visualise the data
- Development of Jupyter notebooks that showcase the use of libraries and the data
- Updated and maintained user documentation to support increasing number of active users



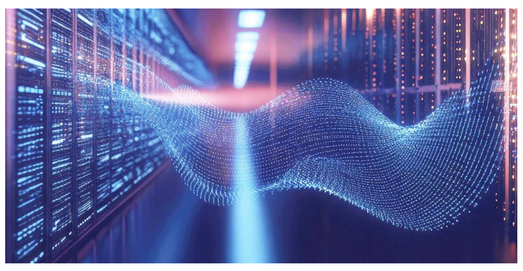
Open data vs free data

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

Example: ECMWF archive data (CC by 4.0)

Free data
Data that can be accessed without charge but may be subject to certain restrictions on its use, modification, or sharing.

Example: Data available for free but only for personal, non-commercial use.



Free and open data
Data that can be used, modified, and shared by anyone for any purpose but may be subject to delivery or service charges.

Examples: ECMWF open data (CC by 4.0), Open Charts (CC by 4.0)

List of currently available open data

- Real-time open data (https://www.ecmwf.int/en/forecasts/datasets/open-data)
- Open Charts (https://charts.ecmwf.int/)
- Archive data (licence required) (https://apps.ecmwf.int/archive-catalogue/)
- TIGGE Dataset (https://apps.ecmwf.int/datasets/data/tigge)
- CAMS and C3S including CAMS global air quality analysis, forecast, and C3S seasonal forecast and reanalysis:
  - Atmosphere Data Store (https://ads.atmosphere.copernicus.eu)
  - Climate Data Store (https://cds.climate.copernicus.eu/)