Lecture IV User Friendly Climate Data: Reliable Sources for Informed Action

Dr. Enric Aguilar

Dra. Anna Boqué

Dr. Jon Xavier Olano

1. Introducing lecturer

Jon Xavier Olano Pozo
jonxavier.olano@urv.cat
@jonolanopozo

Bs. Sociology (2011)

MsC. Territorial Planning (2014)

PhD. Tourism (2019)

Climate Services for Tourism (2020)

Climate Services and Capacity Building (2022)

Dinning room Manager (2009)

PreDoc Researcher (2016)

Post-Doc Researcher (2019)

Lecturer (2020)

Project Manager and Researcher (2020)

IU RESCAT
UNIVERSITAT ROVIRA i VIRGILI
Institut Universitari de Recerca en Sostenibilitat, Canvi Climàtic i Transició Energètica (IU-RESCAT)

Introduction – The Climate Data Challenge

- Climate data influences countless aspects of our daily decisions—sometimes without our even realizing it.

Should I water the crops this week or wait for rain?

Can we expect more heatwaves this summer that might affect vulnerable populations?

How should we plan urban infrastructure in a warming world?

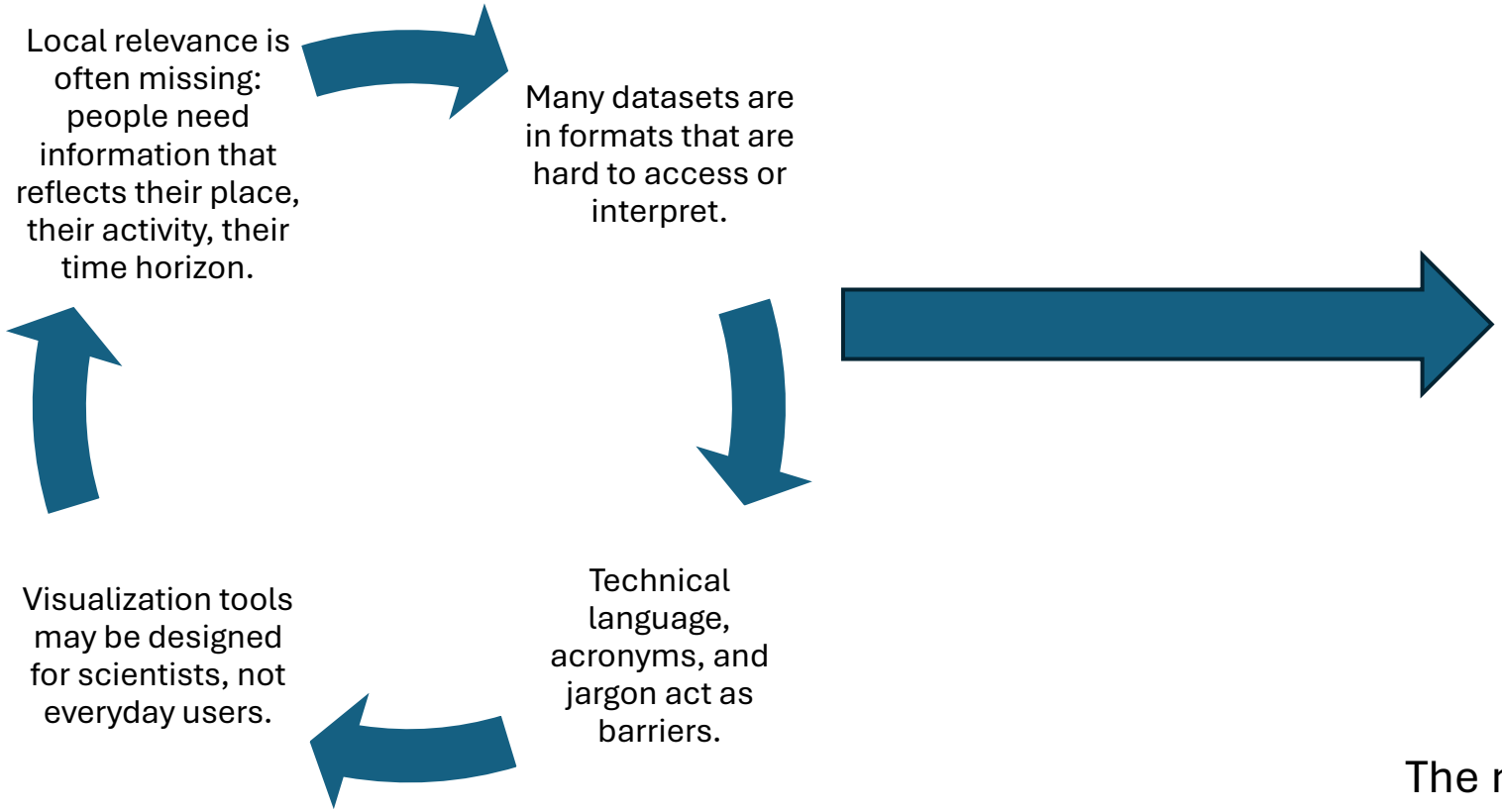
Is it safe to organize an outdoor event next weekend?

The paradox: Tons of data, but often not usable by those who need it most

- We live in an age of data abundance. Satellites, weather stations, climate models—we’re generating more climate data than ever before.

- But here's the problem: having data doesn’t mean having answers.

The paradox: Tons of data, but often not usable by those who need it most



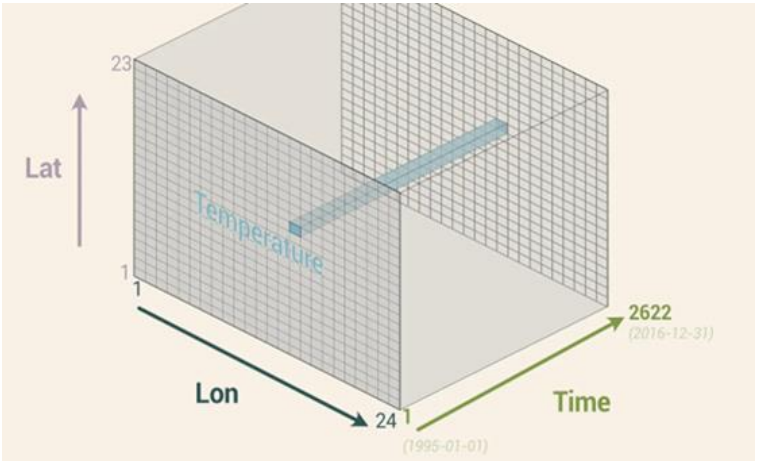
The people most affected by climate change are often the least able to use climate data to prepare or adapt.

The more data we have, the more challenging it becomes to identify and understand what truly matters.

What do we mean by "User-Friendly"?

- Climate data characteristics: technical language, large volumes, and various scales (temporal and spatial).
- To use this climate data in climate-dependent sectors such as agriculture, economics, culture, tourism or others….we need data
  - Accessible
  - Relevant
  - Clear
  - Interactive
  - Local

```
1900 01 01 0 0 -5.5
1900 01 02 1.4 5.1 -6.3
1900 01 03 1.3 5 1.9
1900 01 04 0.8 8.4 2.5
1900 01 05 0 9.8 6.1
1900 01 06 0.1 9.4 1.5
1900 01 07 0 8.3 -2.1
1900 01 08 0 -2 -7.7
1900 01 09 0 -7.3 -11.1
1900 01 10 0 -7.7 -13.7
1900 01 11 0 -6.6 -10.7
1900 01 12 0 -5.3 -10.2
1900 01 13 0 -1.1 -6.2
1900 01 14 0 4.4 -2.3
1900 01 15 0 4.4 -1.7
1900 01 16 0.1 7.4 0.5
1900 01 17 0 2.7 -0.6
1900 01 18 1.6 3.6 -0.2
1900 01 19 1.2 7.5 -0.1
1900 02 13 0 8.4 1.9
1900 02 14 0 8 4.8
1900 02 15 0 10.6 5.3
1900 02 16 0 13.2 4.6
1900 02 17 0 4.7 -4.9
1900 02 18 2.7 1.9 -3.9
1900 02 19 0 1.4 -4
```



What do we mean by "User-Friendly"?

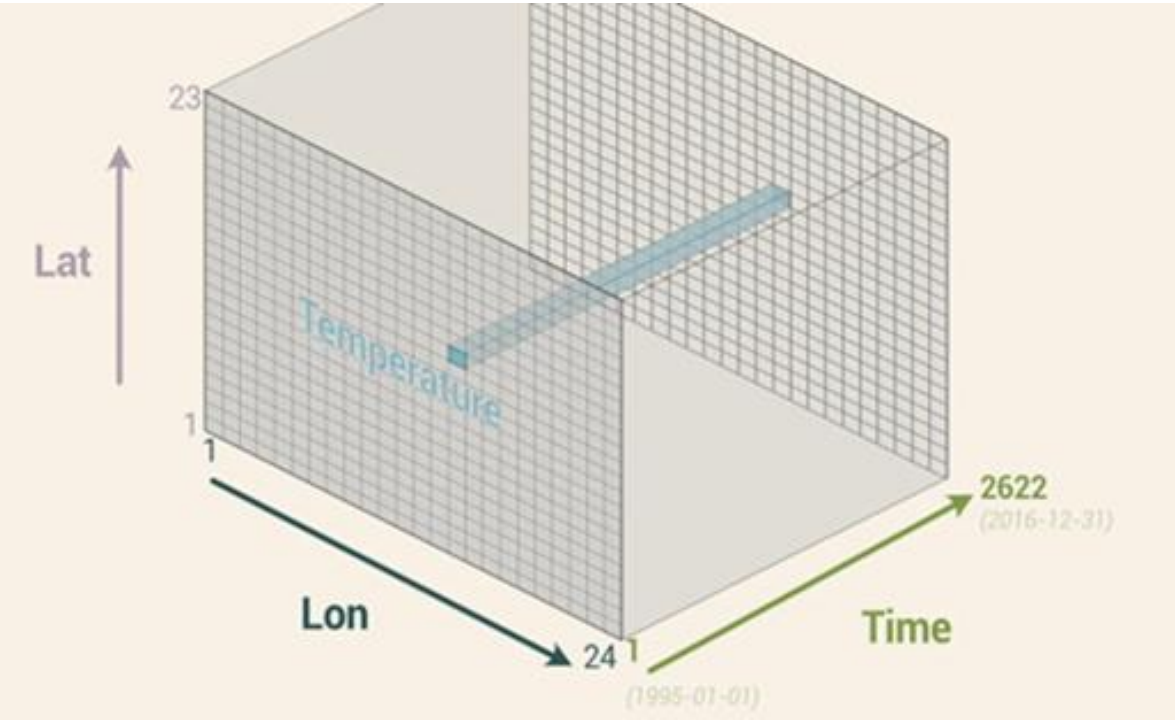
No need to code to use these platforms.

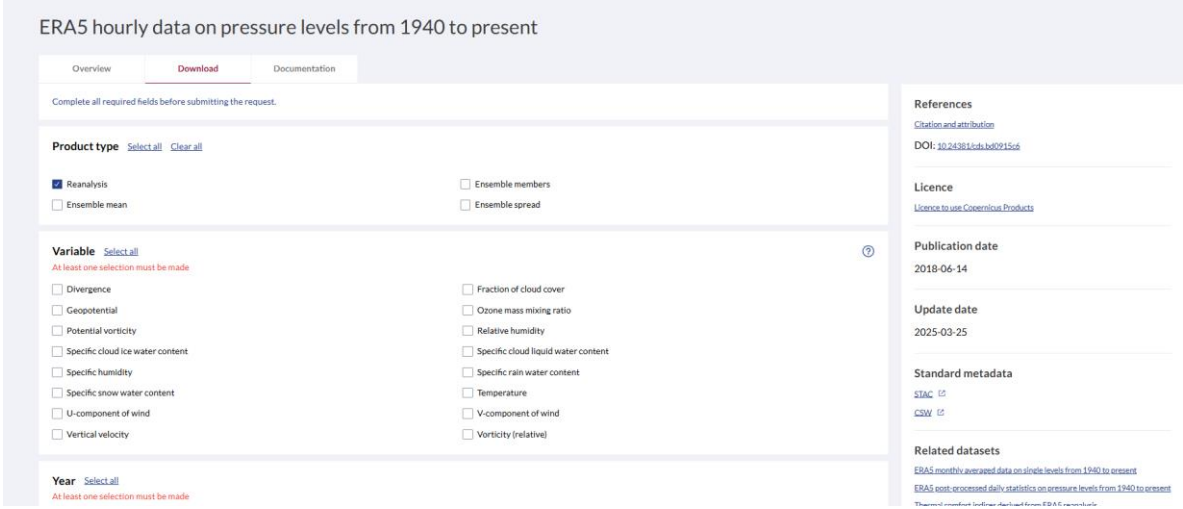
Characteristics

- Free and open access
- Visual, interactive tools
- Pre-processed and localized
- Focused on decisions and real-world applications

Climate Scientist Level

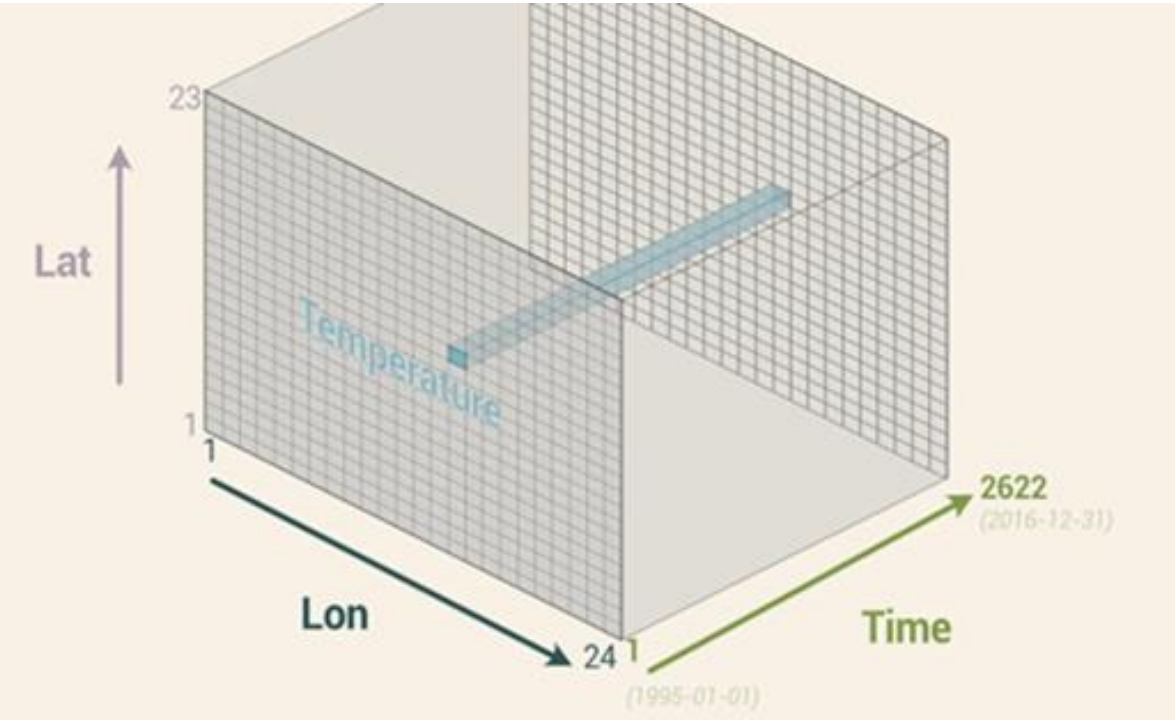
ERA 5 and similars

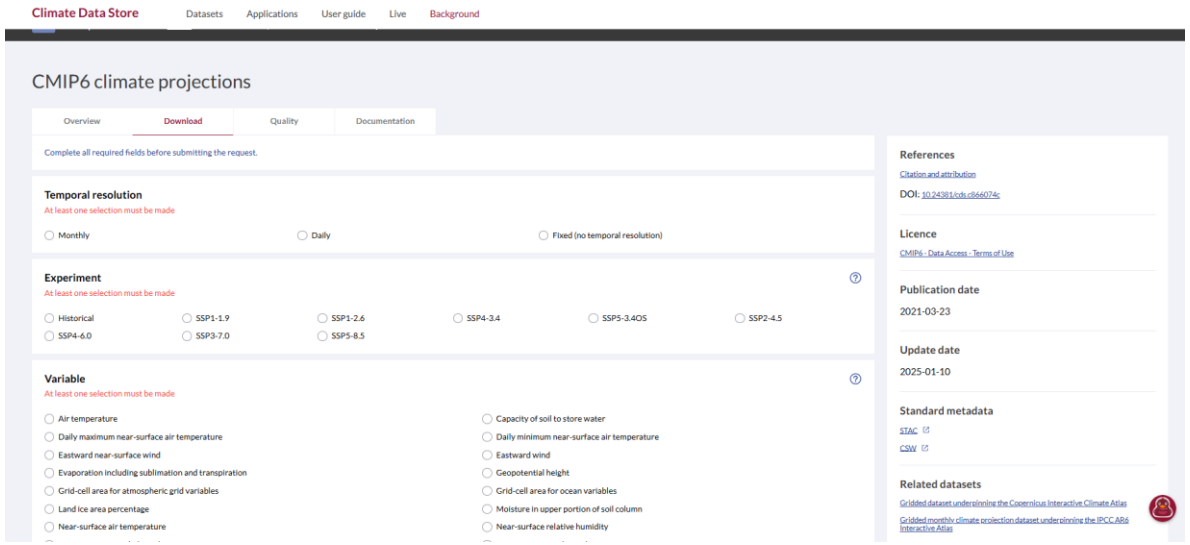




Climate Scientist Level

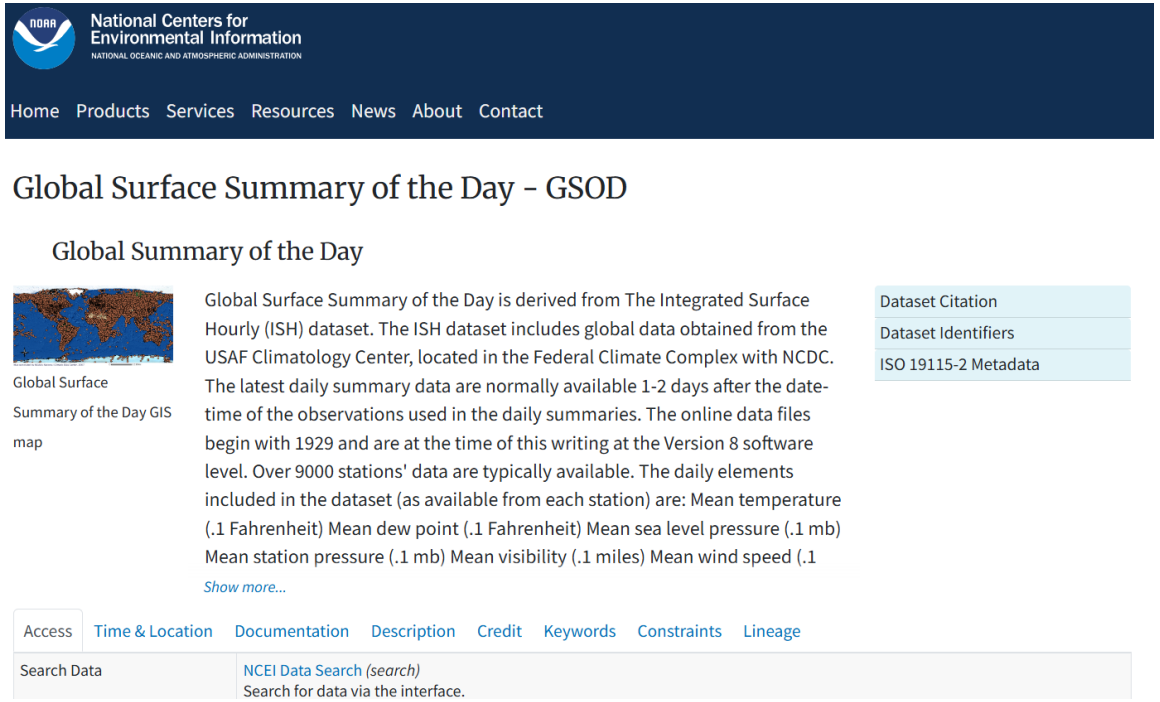
CMIP6 and similars

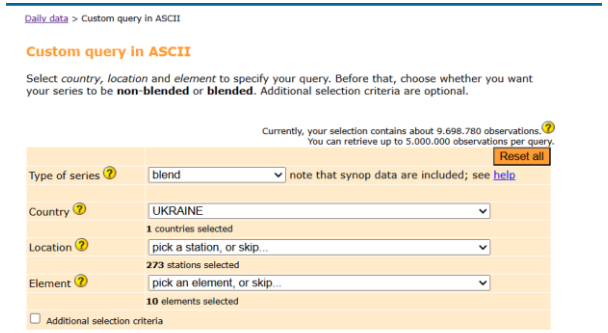


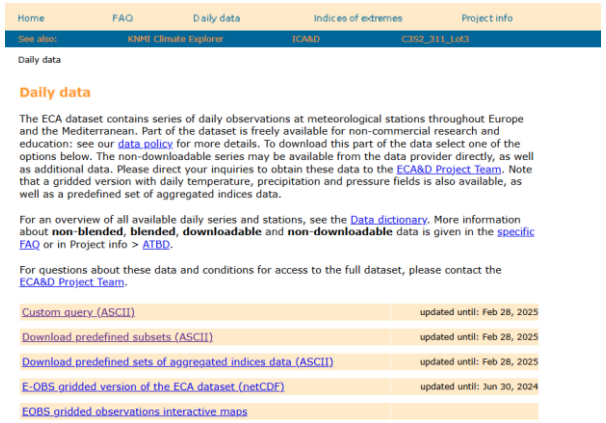


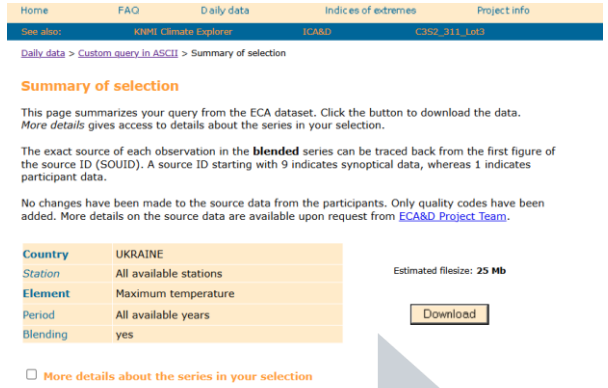
Scientist Level

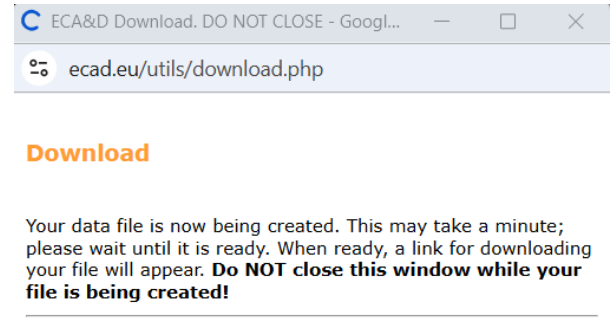
- NMHSs data sets
- International repositories as











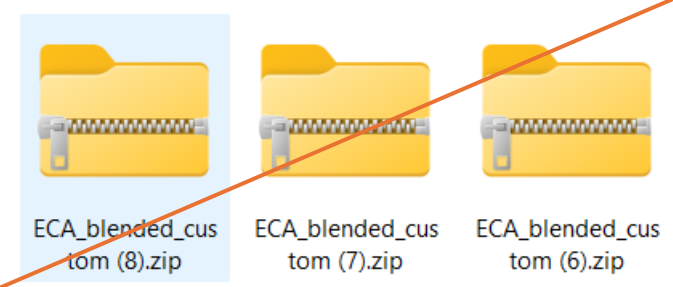
1. Select Custom Query
2. Define elements and press next
3. Check and download
4. Wait and enjoy

Scientist Level

Download station data from ECA&D: https://www.ecad.eu/dailydata/index.php

Scientist Level

- How looks downloaded data from ECA&D



Nombre	Tipo	Tamaño comprimido	Protegido ...	Tamaño	Relación	Fecha de modificación
elements.txt	Documento de texto	1 KB	No	5 KB	80%	25/03/2025 8:08
metadata.txt	Documento de texto	9 KB	No	88 KB	91%	25/03/2025 8:08
RR_STAID026485.txt	Documento de texto	102 KB	No	820 KB	88%	25/03/2025 8:08
sources.txt	Documento de texto	9 KB	No	53 KB	85%	25/03/2025 8:08
stations.txt	Documento de texto	5 KB	No	17 KB	72%	25/03/2025 8:08
RR_STAID001498.txt	Documento de texto	88 KB	No	924 KB	91%	25/03/2025 8:08
RR_STAID001523.txt	Documento de texto	101 KB	No	820 KB	88%	25/03/2025 8:08
RR_STAID026490.txt	Documento de texto	100 KB	No	820 KB	88%	25/03/2025 8:08
RR_STAID001473.txt	Documento de texto	85 KB	No	903 KB	91%	25/03/2025 8:07
RR_STAID001587.txt	Documento de texto	154 KB	No	1.492 KB	90%	25/03/2025 8:07
RR_STAID002279.txt	Documento de texto	86 KB	No	924 KB	91%	25/03/2025 8:07
RR_STAID001549.txt	Documento de texto	87 KB	No	924 KB	91%	25/03/2025 8:07
RR_STAID001621.txt	Documento de texto	113 KB	No	924 KB	88%	25/03/2025 8:07
RR_STAID023063.txt	Documento de texto	112 KB	No	924 KB	88%	25/03/2025 8:07
RR_STAID001500.txt	Documento de texto	112 KB	No	924 KB	88%	25/03/2025 8:07
RR_STAID001513.txt	Documento de texto	117 KB	No	924 KB	88%	25/03/2025 8:07
RR_STAID026487.txt	Documento de texto	117 KB	No	924 KB	88%	25/03/2025 8:07
RR_STAID001503.txt	Documento de texto	106 KB	No	820 KB	88%	25/03/2025 8:07
RR_STAID001519.txt	Documento de texto	176 KB	No	1.444 KB	88%	25/03/2025 8:07

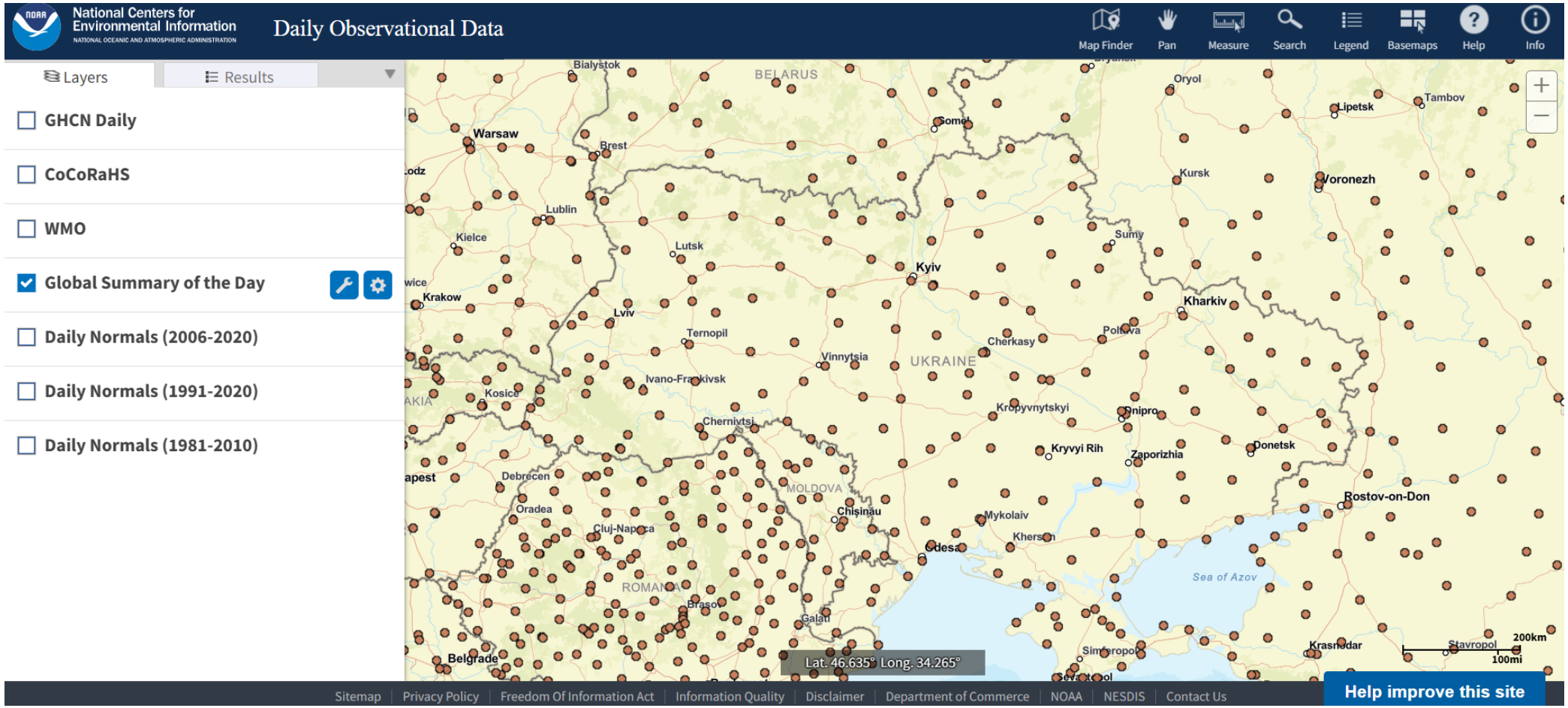
```
----------------------------------------------------------------------------------
252,KIEV,UKRAINE,+50:24:00,+030:32:00,166 m
----------------------------------------------------------------------------------
* Land use:
Territory of big city. District hilly. Station is located on top of the hill. Multi-story buildings, river Dnipro at 3km distance. Lot of trees, parks,
woods alternate with low crops or plant cover.
* Soil type:
Loam
* Surface coverage:
Grass
* History:
Precipitation: <br>
Until 1934: 24 h sum of accumulated values recorded at 07.00, 13.00 and 19.00 LST (Local Solar Time = UT + 2) <br>
1935-1965: 24 h sum of accumulated values recorded at 01.00, 07.00, 13.00, 19.00 LST <br>
1966-1992: 24 h sum of accumulated values recorded at 00, 03, 06, 09, 12, 15, 18, 21 Moscow Decret Time (M
DT = UT + 3h) <br>
1993-present: 24h sum of accumulated values recorded at 21, 00, 03, 06, 09, 12, 15, 18 UT <br>
Daily mean temperature, Humidity and Pressure: <br>
Until 1934: mean of values recorded at 07.00, 13.00 and 19.00 LST <br>
1935-1965: mean of values recorded at 01.00, 07.00, 13.00, 19.00 LST <br>
1966-1992: mean of values recorded at 00, 03, 06, 09, 12, 15, 18, 21 MDT <br>
1993-present: mean of values recorded at 21, 00, 03, 06, 09, 12, 15, 18 UT <br>
Daily minimum (maximum) temperature: <br>
Until 1934: minimum (maximum) over 21-21 LST <br>
1935-1965: minimum (maximum) over 19-19 LST <br>
1966-1992: minimum (maximum) over 21-21 MDT <br>
1993-present: minimum (maximum) over 18-18 UT <br>
Snow depth:
Until 1965: one observation at 07.00 LST<br>
```

```
EUROPEAN CLIMATE ASSESSMENT & DATASET (ECA&D), file created on 25-03-2025
THESE DATA CAN BE USED FREELY PROVIDED THAT THE FOLLOWING SOURCE IS ACKNOWLEDGED:

Klein Tank, A.M.G. and Coauthors, 2002. Daily dataset of 20th-century surface
air temperature and precipitation series for the European Climate Assessment.
Int. J. of Climatol., 22, 1441-1453.
Data and metadata available at http://www.ecad.eu

FILE FORMAT (MISSING VALUE CODE IS -9999):

 01- 05 STAID  : Station identifier
 07- 46 STANAME: Station name
 48- 49 CN     : Country code (ISO3116 country codes)
 51- 59 LAT    : Latitude in degrees:minutes:seconds (+: North, -: South)
 61- 70 LON    : Longitude in degrees:minutes:seconds (+: East, -: West)
 72- 75 HGTH   : Station elevation in meters

STAID,STANAME                                 ,CN,      LAT,       LON,HGHT

  251,FEODOSIIA                               ,UA,+45:02:00,+035:23:00,  22
  252,KIEV                                    ,UA,+50:24:00,+030:32:00, 166
  253,LUGANSK                                 ,UA,+48:34:00,+039:15:00,  59
  254,NIKOLAEV                                ,UA,+46:58:00,+031:59:00,  49
  255,POLTAVA                                 ,UA,+49:36:00,+034:33:00, 160
 1440,SEMENOVKA                               ,UA,+52:12:00,+032:36:00, 160
 1441,MIHAYLOVSKIY_HUTOR                      ,UA,+52:06:00,+033:54:00, 190
 1445,CHERNIGIV_AMSC                          ,UA,+51:24:24,+031:09:13, 140
```

```
EUROPEAN CLIMATE ASSESSMENT & DATASET (ECA&D), file created on 25-03-2025
THESE DATA CAN BE USED FREELY PROVIDED THAT THE FOLLOWING SOURCE IS ACKNOWLEDGED:

Klein Tank, A.M.G. and Coauthors, 2002. Daily dataset of 20th-century surface
air temperature and precipitation series for the European Climate Assessment.
Int. J. of Climatol., 22, 1441-1453.
Data and metadata available at http://www.ecad.eu

FILE FORMAT (MISSING VALUE CODE IS -9999):

01-06 SOUID: Source identifier
08-15 DATE : Date YYYYMMDD
17-21 RR   : precipitation amount in 0.1 mm
23-27 Q_RR : Quality code for RR (0='valid'; 1='suspect'; 9='missing')

This is the blended series of station UKRAINE, ZOLOTONOSHA (STAID: 1498).
Blended and updated with sources: 103563
See file sources.txt and stations.txt for more info.

 SOUID,    DATE,   RR, Q_RR
103563,19360101,    2,    0
103563,19360102,    0,    0
103563,19360103,    0,    0
103563,19360104,    0,    0
103563,19360105,    0,    0
103563,19360106,   20,    0
103563,19360107,    2,    0
103563,19360108,    1,    0
103563,19360109,   98,    0
```

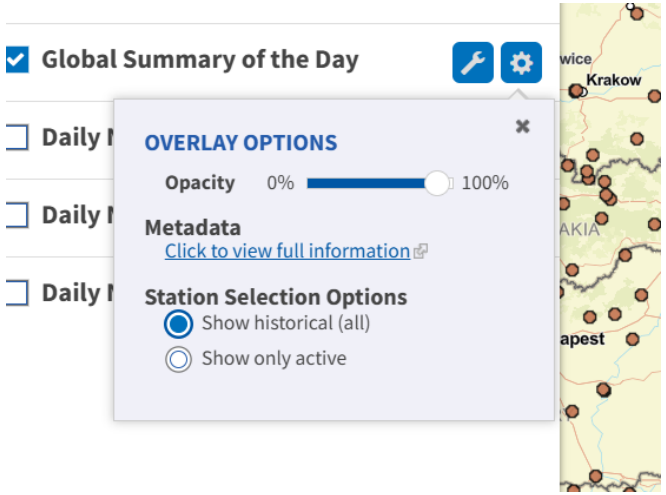
Scientist Level

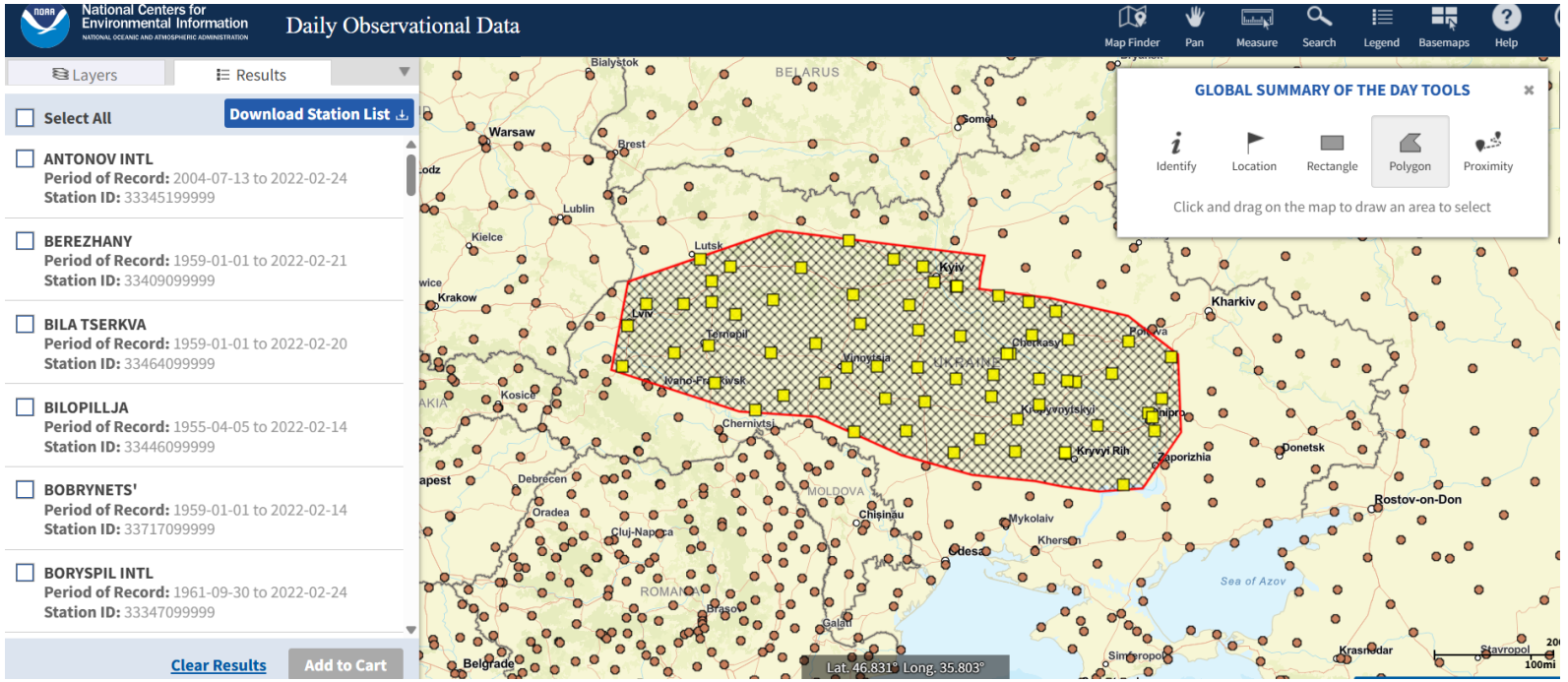
Download station data from GSOD (https://www.ncei.noaa.gov/maps/daily/?layers=0001)



Scientist Level

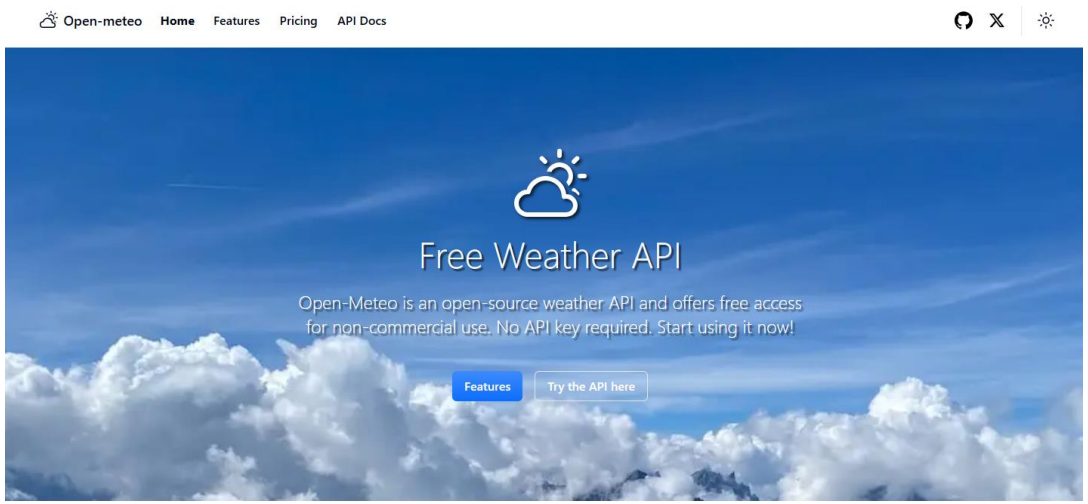
Download station data from GSOD (https://www.ncei.noaa.gov/maps/daily/?layers=0001)





User Level

Download station data from Open meteo: a shortcout to ERA5 and CMIP6



Accurate Weather Forecasts for Any Location

Weather APIs

- Weather Forecast API
- Historical Weather API
- ECMWF API
- GFS & HRRR Forecast API
- Météo-France API
- DWD ICON API
- GEM API
- JMA API
- Met Norway API

Other APIs

- Ensemble API
- Climate Change API
- Marine Weather API
- Air Quality API
- Geocoding API
- Elevation API
- Flood API

© 2022-2025 Copyright: Open-Meteo.com

User Level

1. Select Location(s) and time scale

Location and Time

Location: Coordinates | List

Latitude: 50,4547

Longitude: 30,5238

Timezone: Not set (GMT+0)

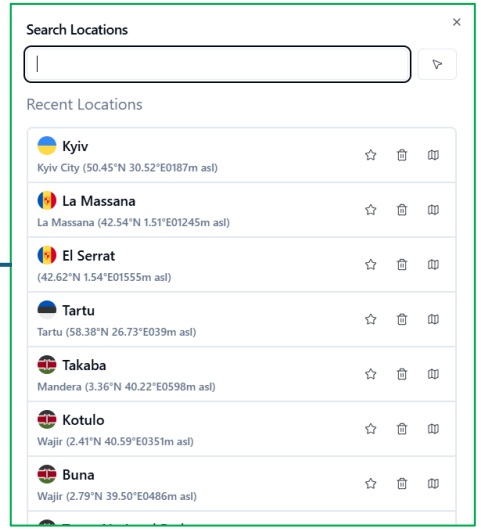
Search | +

Start date: 2025-03-09

End date: 2025-03-23

You can access past weather data dating back to 1940. However, there is a 5-day delay in the data. If you want information for the most recent days, you can use the forecast API and adjust the Past Days setting.

Quick: 2000-2009 | 2010-2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025



2. Select Variables and models

Hourly Weather Variables

- Temperature (2 m)
- Relative Humidity (2 m)
- Dewpoint (2 m)
- Apparent Temperature
- Precipitation (rain + snow)
- Rain
- Snowfall
- Snow depth
- Weather code
- Sealevel Pressure
- Surface Pressure
- Cloud cover Total
- Cloud cover Low
- Cloud cover Mid
- Cloud cover High
- Reference Evapotranspiration (ET_0)
- Vapour Pressure Deficit
- Wind Speed (10 m)
- Wind Speed (100 m)
- Wind Direction (10 m)
- Wind Direction (100 m)
- Wind Gusts (10 m)
- Soil Temperature (0-7 cm)
- Soil Temperature (7-28 cm)
- Soil Temperature (28-100 cm)
- Soil Temperature (100-255 cm)
- Soil Moisture (0-7 cm)
- Soil Moisture (7-28 cm)
- Soil Moisture (28-100 cm)
- Soil Moisture (100-255 cm)

Additional Variables And Options

Solar Radiation Variables

ERA5-Ensemble Spread Variables

Reanalysis models

Daily Weather Variables

- Weather code
- Mean Temperature (2 m)
- Maximum Temperature (2 m)
- Minimum Temperature (2 m)
- Mean Apparent Temperature (2 m)
- Maximum Apparent Temperature (2 m)
- Minimum Apparent Temperature (2 m)
- Sunrise
- Sunset
- Daylight Duration
- Sunshine Duration
- Precipitation Sum
- Rain Sum
- Snowfall Sum
- Precipitation Hours
- Maximum Wind Speed (10 m)
- Maximum Wind Gusts (10 m)
- Dominant Wind Direction (10 m)
- Shortwave Radiation Sum
- Reference Evapotranspiration (ET_0)

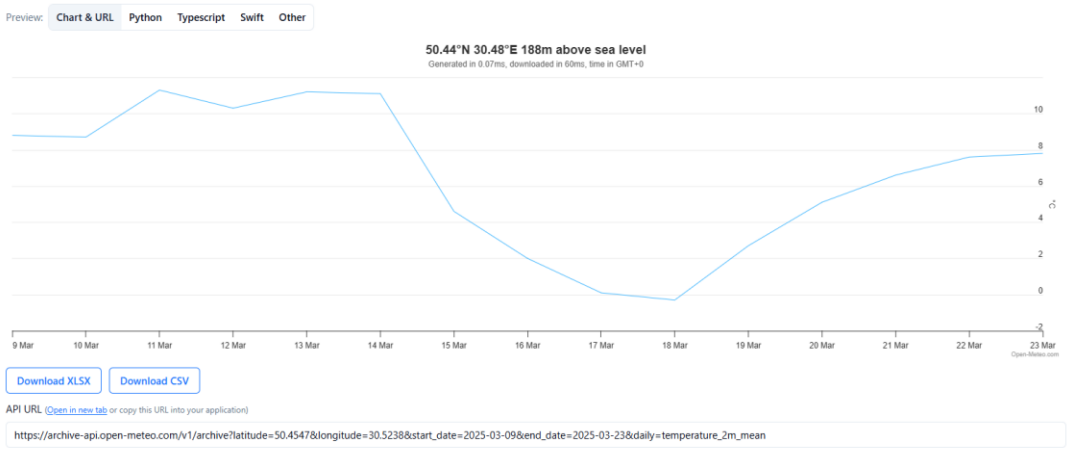
Reanalysis models

- Best match
- ECMWF IFS
- ECMWF IFS Analysis Long-Window
- ERA5-Seamless
- ERA5
- ERA5-Land
- ERA5-Ensemble
- CERRA

Note: The default Best Match combines ERA5 and ERA5-Land seamlessly. The CERRA model will also be included in Best Match once real-time updates become available.

User Level

3. Check and download



4. How the data looks

1	latitude	longitude	elevation	utc_offset_se	timezone	timezone_abbreviation	
2	50,4394	30,4762	188	0	GMT	GMT	
3							
4	time	temperature_2m_mean (°C)					
5	2025-03-09T00:00	8,8					
6	2025-03-10T00:00	8,7					
7	2025-03-11T00:00	11,3					
8	2025-03-12T00:00	10,3					
9	2025-03-13T00:00	11,2					
10	2025-03-14T00:00	11,1					
11	2025-03-15T00:00	4,6					
12	2025-03-16T00:00	2					
13	2025-03-17T00:00	0,1					
14	2025-03-18T00:00	-0,3					
15	2025-03-19T00:00	2,7					
16	2025-03-20T00:00	5,1					
17	2025-03-21T00:00	6,6					
18	2025-03-22T00:00	7,6					