



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

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1. Introducing lecturer

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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?



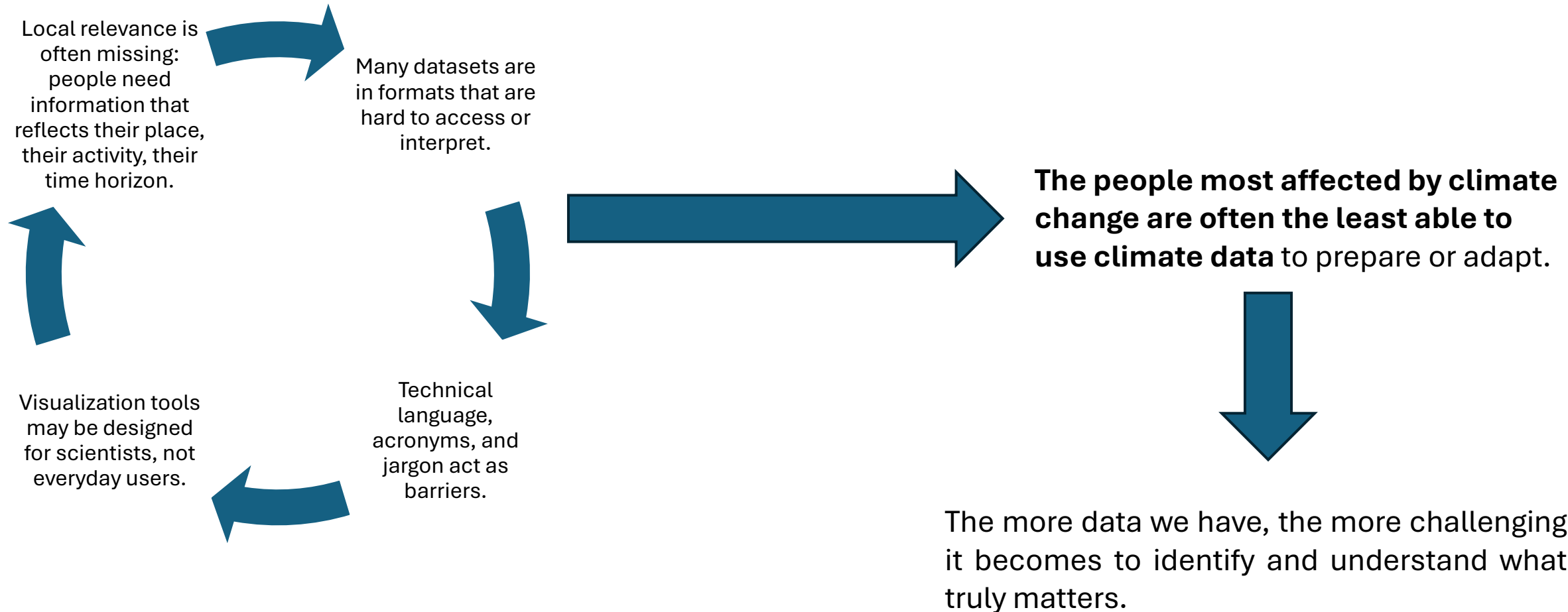
Is it safe to organize an outdoor event next weekend?

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.

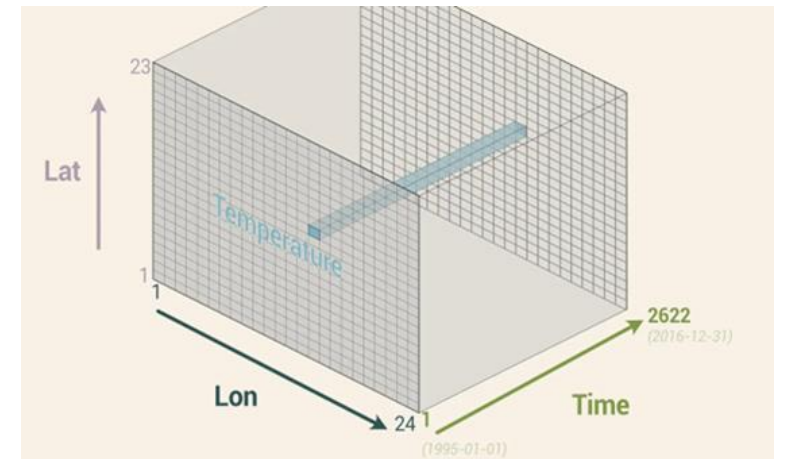
The paradox: Tons of data, but often not usable by those who need it most



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"?

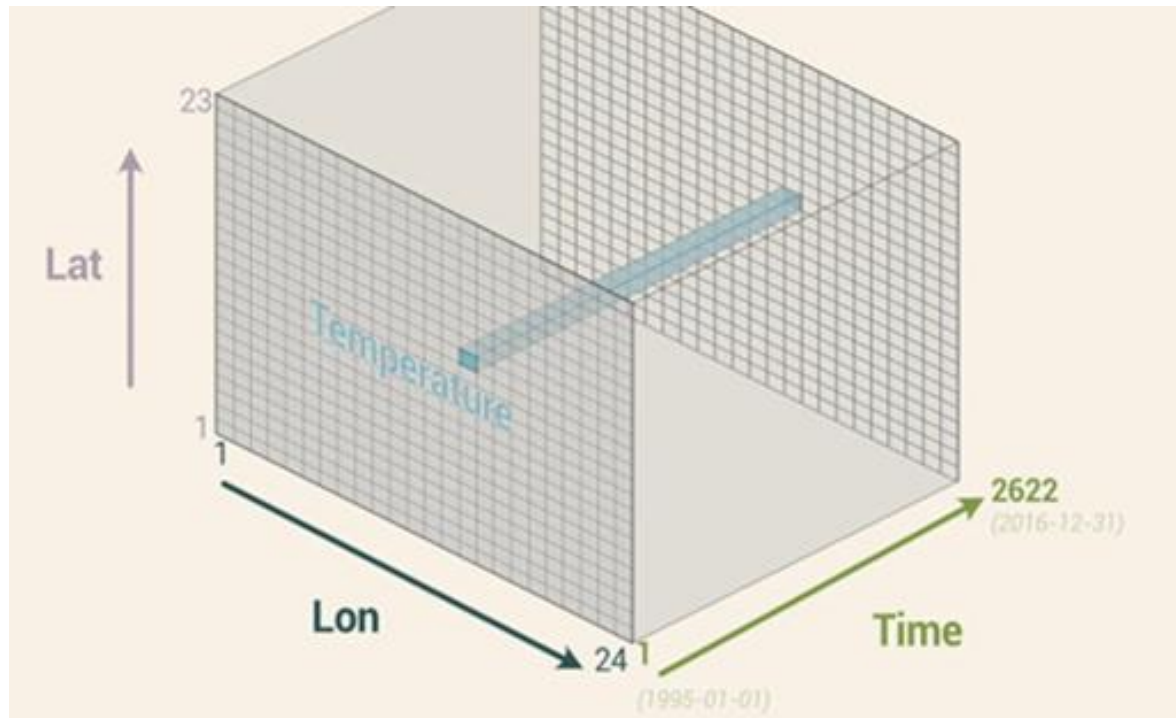
No need to code to use these platforms.

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



ERA5 hourly data on pressure levels from 1940 to present

Overview Download Documentation

Complete all required fields before submitting the request.

Product type [Select all](#) [Clear all](#)

Reanalysis Ensemble mean Ensemble members Ensemble spread

Variable [Select all](#)
At least one selection must be made

Divergence Fraction of cloud cover
 Geopotential Ozone mass mixing ratio
 Potential vorticity Relative humidity
 Specific cloud ice water content Specific cloud liquid water content
 Specific humidity Specific rain water content
 Specific snow water content Temperature
 U-component of wind V-component of wind
 Vertical velocity Vorticity (relative)

Year [Select all](#)
At least one selection must be made

References
[Citation and attribution](#)
DOI: [10.24381/44_b40915c6](#)

Licence
[Licence to use Copernicus Products](#)

Publication date
2018-06-14

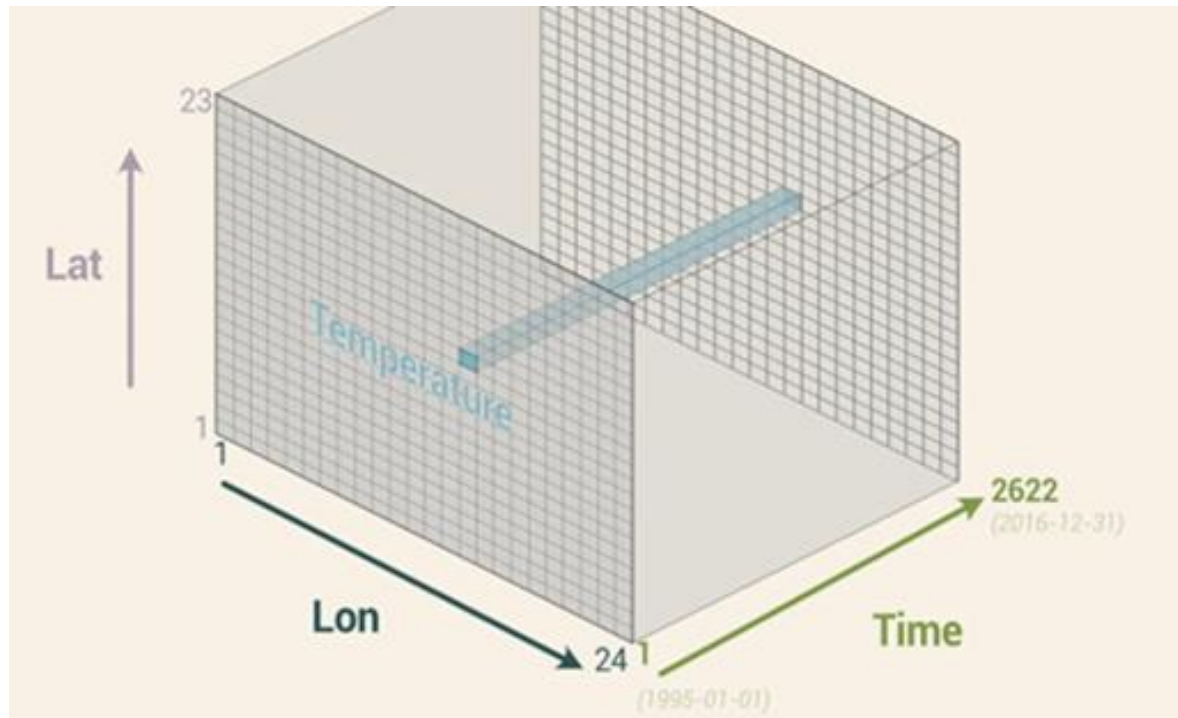
Update date
2025-03-25

Standard metadata
SIAC [↗](#)
CBW [↗](#)

Related datasets
[ERA5 monthly averaged data on single levels from 1940 to present](#)
[ERA5 east-eccoresced daily statistics on pressure levels from 1940 to present](#)
[Theoretical model output derived from ERA5 reanalysis](#)

Climate Scientist Level

CMIP6 and similars



Climate Data Store

Datasets Applications User guide Live Background

CMIP6 climate projections

Overview **Download** Quality Documentation

Complete all required fields before submitting the request.

Temporal resolution
At least one selection must be made

Monthly Daily Fixed (no temporal resolution)

Experiment
At least one selection must be made

Historical SSP1-1.9 SSP1-2.6 SSP4-3.4 SSP5-3.4OS SSP2-4.5
 SSP4-6.0 SSP3-7.0 SSP5-8.5

Variable
At least one selection must be made

Air temperature Capacity of soil to store water
 Daily maximum near-surface air temperature Daily minimum near-surface air temperature
 Eastward near-surface wind Eastward wind
 Evaporation including sublimation and transpiration Geopotential height
 Grid-cell area for atmospheric grid variables Grid-cell area for ocean variables
 Land ice area percentage Moisture in upper portion of soil column
 Near-surface air temperature Near-surface relative humidity

References
[Citation and attribution](#)
DOI: [10.24381/ods.866074c](#)

Licence
[CMIP6 - Data Access - Terms of Use](#)

Publication date
2021-03-23


Update date
2025-01-10

Standard metadata
[STAC](#) [CSW](#)

Related datasets
[Gridded dataset underpinning the Copernicus Interactive Climate Atlas](#)
[Gridded monthly climate reanalysis dataset underpinning the IPCC AR6 Interactive Atlas](#)

Scientist Level

- NMHSs data sets
- International repositories as



The screenshot shows the top part of the ECA&D website. It features a logo on the left and the title 'European Climate Assessment & Dataset' on the right. Below the title is a navigation menu with links for Home, FAQ, Daily data, Indices of extremes, and Project info. A secondary menu below that includes 'See also:' followed by links to KNMI Climate Explorer, ICA&D, and C3S2_311_Lot3.

Daily data

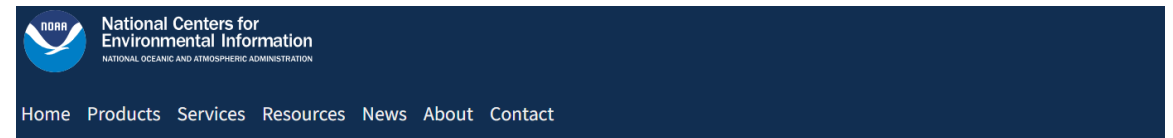
Daily data

The ECA dataset contains series of daily observations at meteorological stations throughout Europe and the Mediterranean. Part of the dataset is freely available for non-commercial research and education: see our [data policy](#) for more details. To download this part of the data select one of the options below. The non-downloadable series may be available from the data provider directly, as well as additional data. Please direct your inquiries to obtain these data to the [ECA&D Project Team](#). Note that a gridded version with daily temperature, precipitation and pressure fields is also available, as well as a predefined set of aggregated indices data.

For an overview of all available daily series and stations, see the [Data dictionary](#). More information about **non-blended**, **blended**, **downloadable** and **non-downloadable** data is given in the [specific FAQ](#) or in Project info > [ATRD](#).

For questions about these data and conditions for access to the full dataset, please contact the [ECA&D Project Team](#).

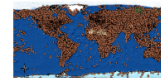
Custom query (ASCII)	updated until: Feb 28, 2025
Download predefined subsets (ASCII)	updated until: Feb 28, 2025
Download predefined sets of aggregated indices data (ASCII)	updated until: Feb 28, 2025
E-OBS gridded version of the ECA dataset (netCDF)	updated until: Jun 30, 2024
EOBS gridded observations interactive maps	



The screenshot shows the header of the NOAA National Centers for Environmental Information website. It includes the NOAA logo and the text 'National Centers for Environmental Information' and 'NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION'. Below this is a navigation menu with links for Home, Products, Services, Resources, News, About, and Contact.

Global Surface Summary of the Day - GSOD

Global Summary of the Day

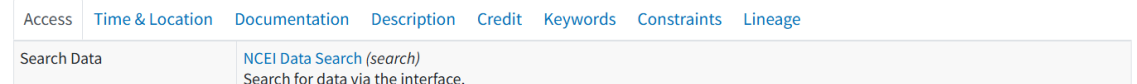


Global Surface
Summary of the Day GIS
map

Global Surface Summary of the Day is derived from The Integrated Surface Hourly (ISH) dataset. The ISH dataset includes global data obtained from the USAF Climatology Center, located in the Federal Climate Complex with NCDC. The latest daily summary data are normally available 1-2 days after the date-time of the observations used in the daily summaries. The online data files begin with 1929 and are at the time of this writing at the Version 8 software level. Over 9000 stations' data are typically available. The daily elements included in the dataset (as available from each station) are: Mean temperature (.1 Fahrenheit) Mean dew point (.1 Fahrenheit) Mean sea level pressure (.1 mb) Mean station pressure (.1 mb) Mean visibility (.1 miles) Mean wind speed (.1

[Show more...](#)

Dataset Citation
Dataset Identifiers
ISO 19115-2 Metadata



The screenshot shows a navigation bar with links for Access, Time & Location, Documentation, Description, Credit, Keywords, Constraints, and Lineage. Below this is a search box labeled 'Search Data' with the text 'NCEI Data Search (search)' and 'Search for data via the interface.'

Daily data > Custom query in ASCII

Custom query in ASCII

Select *country*, *location* and *element* to specify your query. Before that, choose whether you want your series to be **non-blended** or **blended**. Additional selection criteria are optional.

Currently, your selection contains about 9.698.780 observations. You can retrieve up to 3.000.000 observations per query.

[Reset all](#)

Type of series	blend	note that synop data are included; see help
Country	UKRAINE	1 countries selected
Location	pick a station, or skip...	273 stations selected
Element	pick an element, or skip...	10 elements selected

Additional selection criteria

Home FAQ Daily data Indices of extremes Project info

See also: [KNMI Climate Explorer](#) [ICARD](#) [C352_311_Lot3](#)

Daily data

The ECA dataset contains series of daily observations at meteorological stations throughout Europe and the Mediterranean. Part of the dataset is freely available for non-commercial research and education: see our [data policy](#) for more details. To download this part of the data select one of the options below. The non-downloadable series may be available from the data provider directly, as well as additional data. Please direct your inquiries to obtain these data to the [ECA&D Project Team](#). Note that a gridded version with daily temperature, precipitation and pressure fields is also available, as well as a predefined set of aggregated indices data.

For an overview of all available daily series and stations, see the [Data dictionary](#). More information about **non-blended**, **blended**, **downloadable** and **non-downloadable** data is given in the [specific FAQ](#) or in [Project info](#) > [ATBD](#).

For questions about these data and conditions for access to the full dataset, please contact the [ECA&D Project Team](#).

Custom query (ASCII)	updated until: Feb 28, 2025
Download predefined subsets (ASCII)	updated until: Feb 28, 2025
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E-OBS gridded version of the ECA dataset (netCDF)	updated until: Jun 30, 2024
E-OBS gridded observations interactive maps	

Home FAQ Daily data Indices of extremes Project info

See also: [KNMI Climate Explorer](#) [ICARD](#) [C352_311_Lot3](#)

Daily data > Custom query in ASCII > Summary of selection

Summary of selection

This page summarizes your query from the ECA dataset. Click the button to download the data. *More details* gives access to details about the series in your selection.

The exact source of each observation in the **blended** series can be traced back from the first figure of the source ID (SOUID). A source ID starting with 9 indicates synoptical data, whereas 1 indicates participant data.

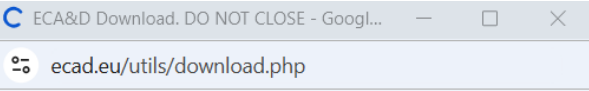
No changes have been made to the source data from the participants. Only quality codes have been added. More details on the source data are available upon request from [ECA&D Project Team](#).

Country	UKRAINE
Station	All available stations
Element	Maximum temperature
Period	All available years
Blending	yes

Estimated filesize: 25 Mb

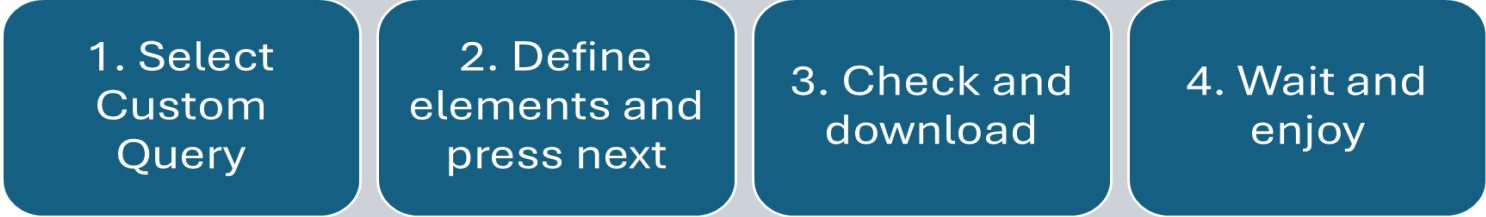
[Download](#)

More details about the series in your selection



Download

Your data file is now being created. This may take a minute; please wait until it is ready. When ready, a link for downloading your file will appear. **Do NOT close this window while your file is being created!**

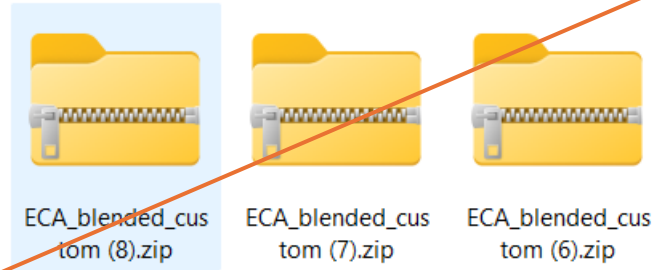


Scientist Level

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

Scientist Level

- How looks downloaded data from ECA&D



```

-----
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>
    
```

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

```

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 HGHT : 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,SEMOVKA ,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 SQUID : 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.

SQUID 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>)

National Centers for Environmental Information
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Daily Observational Data

Map Finder Pan Measure Search Legend Basemaps Help Info

Layers Results

- GHCN Daily
- CoCoRaHS
- WMO
- Global Summary of the Day
- Daily Normals (2006-2020)
- Daily Normals (1991-2020)
- Daily Normals (1981-2010)



Lat. 46.635° Long. 34.265°

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Scientist Level

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


Global Summary of the Day  

Daily I

Daily I

Daily I

OVERLAY OPTIONS

Opacity 0%  100%

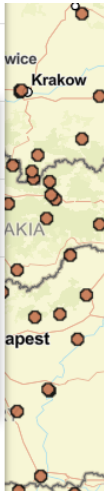
Metadata

[Click to view full information](#)

Station Selection Options

Show historical (all)

Show only active



National Centers for Environmental Information
National Oceanic and Atmospheric Administration

Daily Observational Data

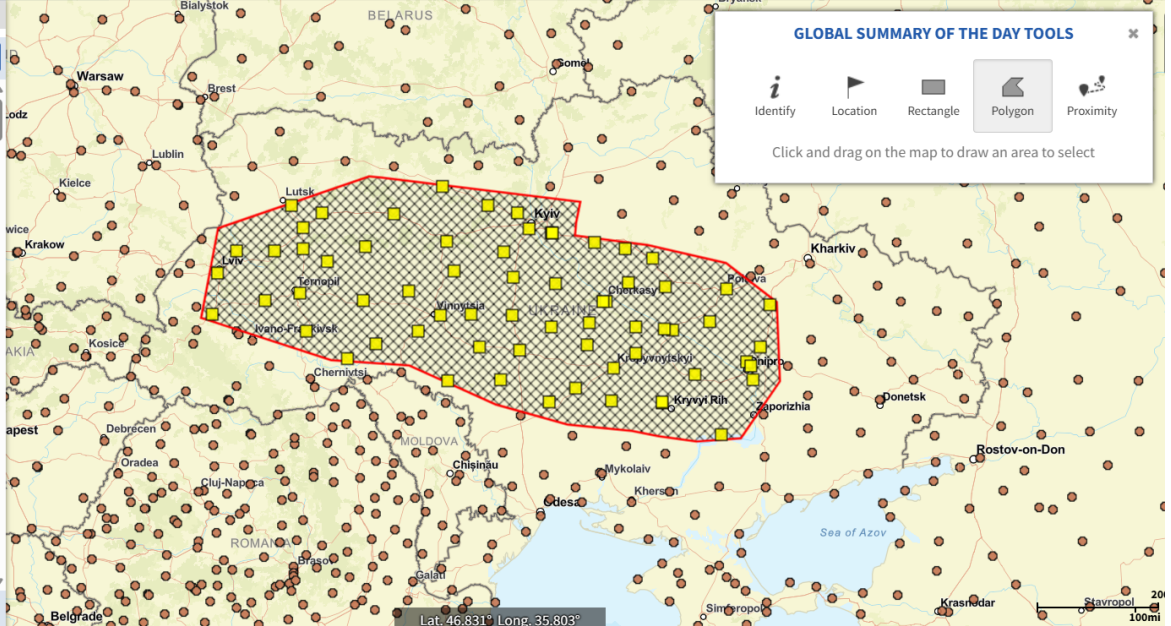
Map Finder Pan Measure Search Legend Basemaps Help

Layers Results

Select All [Download Station List](#)

- ANTONOV INTL
Period of Record: 2004-07-13 to 2022-02-24
Station ID: 33345199999
- BEREZHANY
Period of Record: 1959-01-01 to 2022-02-21
Station ID: 33409099999
- BILA TSERKVA
Period of Record: 1959-01-01 to 2022-02-20
Station ID: 33464099999
- BILOPILLJA
Period of Record: 1955-04-05 to 2022-02-14
Station ID: 33446099999
- BOBRYNETS'
Period of Record: 1959-01-01 to 2022-02-14
Station ID: 33717099999
- BORYSPIL INTL
Period of Record: 1961-09-30 to 2022-02-24
Station ID: 33347099999

[Clear Results](#) [Add to Cart](#)



GLOBAL SUMMARY OF THE DAY TOOLS

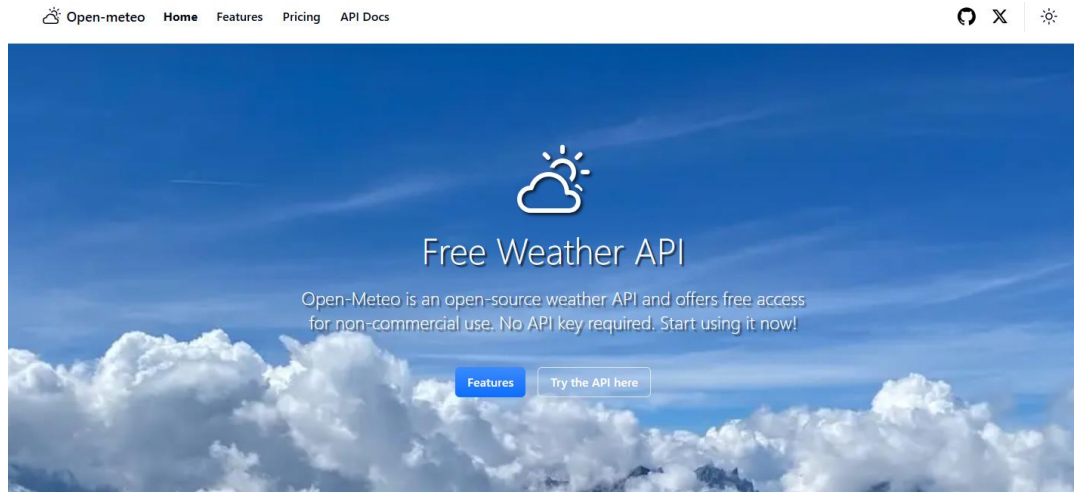
Identify Location Rectangle Polygon Proximity

Click and drag on the map to draw an area to select

Lat: 46.831° Long: 35.803°

User Level

Download station data from
Open meteo: a shortcut 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

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)

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:

Search Locations

Recent Locations

- Kyiv**
Kyiv City (50.45°N 30.52°E0187m asl) ☆ 🗑️ 📄
- La Massana**
La Massana (42.54°N 1.51°E01245m asl) ☆ 🗑️ 📄
- El Serrat**
(42.62°N 1.54°E01555m asl) ☆ 🗑️ 📄
- Tartu**
Tartu (58.38°N 26.73°E039m asl) ☆ 🗑️ 📄
- Takaba**
Mandera (3.36°N 40.22°E0598m asl) ☆ 🗑️ 📄
- Kotulo**
Wajir (2.41°N 40.59°E0351m asl) ☆ 🗑️ 📄
- Buna**
Wajir (2.79°N 39.50°E0486m asl) ☆ 🗑️ 📄

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_a)
- 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

ERAS-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_a)

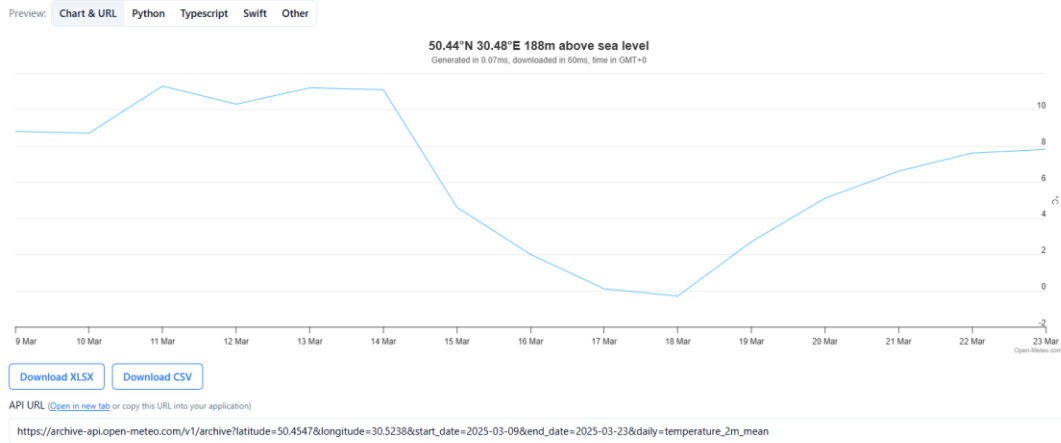
Reanalysis models

- 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				