



# Practice I. Download Climate Data and Apply Climpact

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# Introduction



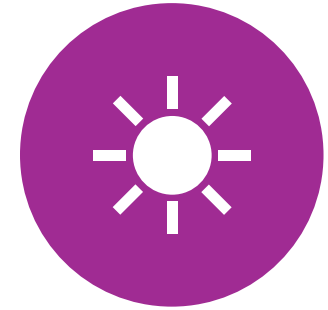
WE NEED DAILY CLIMATIC DATA:  
RAINFALL, MAXIMUM TEMPERATURE  
AND MINIMUM TEMPERATURE



FOR THE PURPOSE OF THIS LECTURE  
WE WILL USE ECA&D DATA  
[HTTPS://WWW.ECAD.EU/DAILYDATA/](https://www.ecad.eu/dailydata/)



THE DATA IT COMES FROM  
METEOROLOGICAL STATIONS ALONG  
UKRAINA





WE WILL COMPUTE CLIMATE INDICES  
WITH CLIMPACT

# First steps with Climpact

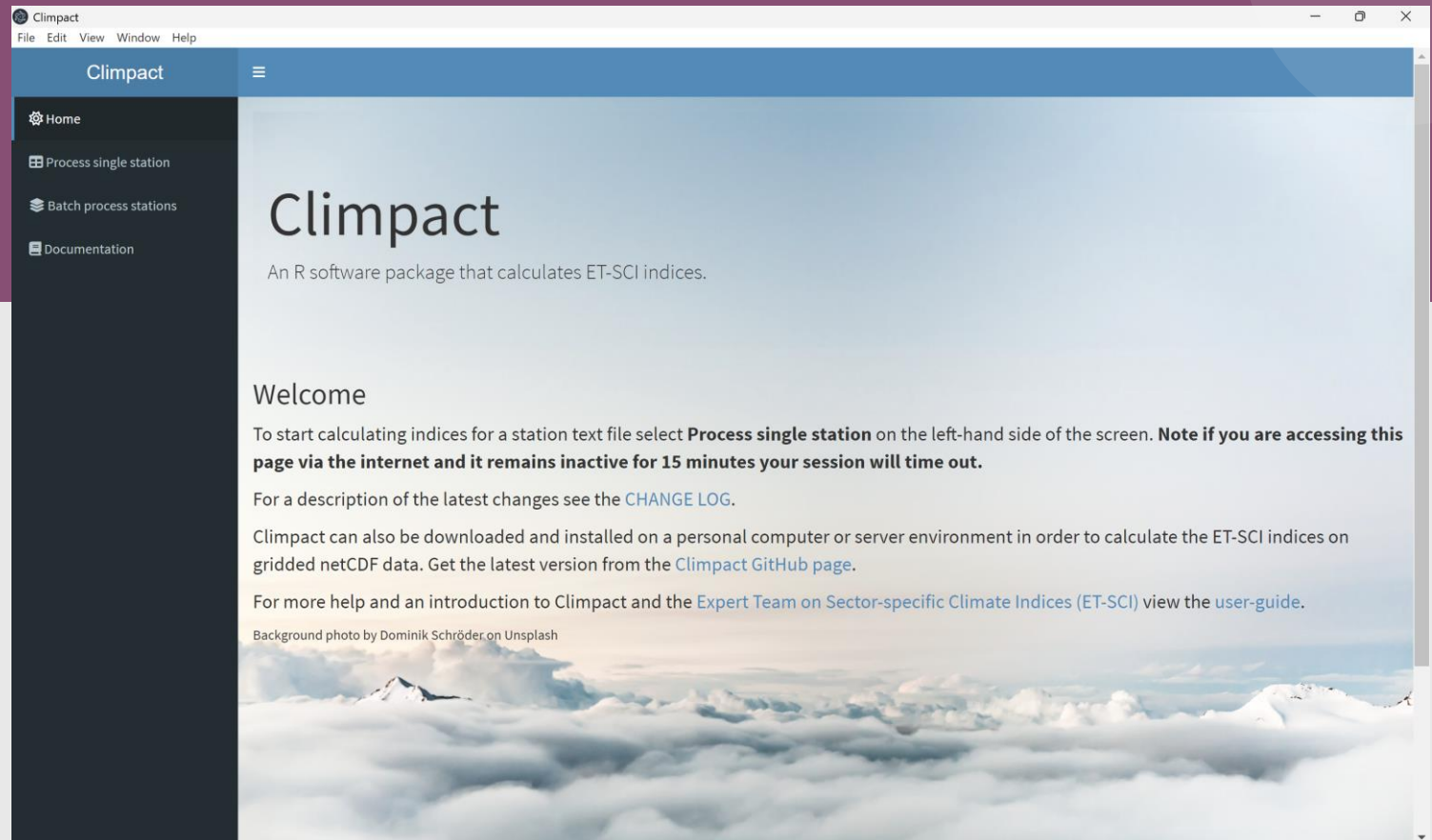
- You can use Climpact online or desktop version
- We will distribute you a Climpact desktop version
- [https://drive.google.com/drive/folders/1zad6UTbUwA6zlwxDuM\\_JUOtFfwaS0e4n?usp=sharing](https://drive.google.com/drive/folders/1zad6UTbUwA6zlwxDuM_JUOtFfwaS0e4n?usp=sharing)



  Climpact\_executable\_v099

# Options to use Climpact

- You can run single station data
- You can run multiple station data



# Running single station data



# Running single station data: upload data

Climpact  
File Edit View Window Help  
Home

Process single station  
Batch process stations  
Documentation

## Process Single Station

1. Load 2. Check 3. Calculate 4. Compare

### 1. Load station data and provide metadata

**Station data**  
The dataset **must** use the format described in [Appendix B of the Climpact User Guide](#).  
For a sample dataset look at [sydney\\_observatory\\_hill\\_1936-2015.txt](#)

Browse... No file selected

**Metadata**

**Station name (used in output file names):**

**Latitude (decimal degrees e.g. -40.992):**

**Longitude (decimal degrees e.g. 148.346):**

**Base period start year:**

**Base period end year:**

Next

**Instructions**

**Station data**  
Select a station text file. Climpact will calculate indices for this data.  
The dataset **must** use the format described in [Appendix B of the Climpact User Guide](#).  
For a sample dataset look at [sydney\\_observatory\\_hill\\_1936.txt](#)

**Metadata**  
Specify the station name. Climpact will attempt to determine this automatically for you based on the uploaded station data file name. This must be some text.  
Specify the station latitude and longitude in decimal degrees  
e.g. -40.992 or 148.346.  
Latitude must be between -90 and 90.  
Longitude must be between -180 and 180.  
Specify valid values for the base period start year and end year.  
These values must be within the limits of the dates in the station data provided.

**Next**  
Click the Next button or the tab labelled '2. Check' to proceed to the next step.

```
1900 01 01 1.8 -0.1 -2
1900 01 02 0.2 1.9 -0.3
1900 01 03 1.7 1.2 -1.1
1900 01 04 3.1 2.4 -1.1
1900 01 05 2.9 2.6 0.8
1900 01 06 1.1 2.4 -2.6
1900 01 07 0.1 -2.4 -10.7
1900 01 08 0 -10.6 -17.9
1900 01 09 0 -14.1 -19.8
1900 01 10 0 -11.3 -18
1900 01 11 0 -14.6 -19.7
1900 01 12 0 -11.1 -20.1
1900 01 13 0 -13.4 -18.5
1900 01 14 0 -8.4 -15.3
1900 01 15 0.4 -7.9 -10.6
1900 01 16 1.5 -6.4 -9
1900 01 17 3.2 -4.1 -7.2
1900 01 18 0.9 -3.8 -7
1900 01 19 9.6 -0.4 -4.1
1900 01 20 7.1 0.2 -5.8
1900 01 21 0 -2.7 -7.8
1900 01 22 0 -2.9 -5.9
1900 01 23 2.6 -2 -5.4
1900 01 24 0 3.7 -4
1900 01 25 0.3 1.7 -2.8
1900 01 26 3.8 2 -0.5
1900 01 27 2.2 1 -1.7
1900 01 28 7 0.4 -1.5
1900 01 29 3.2 0 -2.2
1900 01 30 6.3 0.7 -2.6
1900 01 31 1.7 3.4 0.7
1900 02 01 0 3.5 -0.3
1900 02 02 0 1.1 -1.8
1900 02 03 0 0.4 -1.6
1900 02 04 0.3 -0.6 -1.6
1900 02 05 0.5 -1 -2.2
1900 02 06 1 -0.7 -2.1
1900 02 07 0.8 0 -2.4
1900 02 08 6.5 -0.9 -2.9
1900 02 09 0 1 -4.8
1900 02 10 0 -3.6 -12
1900 02 11 0.2 -0.2 -9.8
1900 02 12 3.2 0.4 -2.2
1900 02 13 0 1 5 0 2
```

# Running single station data: check data quality

The screenshot shows the Climpact software interface. The window title is 'Climpact' and the menu bar includes 'File', 'Edit', 'View', 'Window', and 'Help'. On the left, a dark sidebar contains three items: 'Process single station' (selected), 'Batch process stations', and 'Documentation'. The main area has a progress bar with four steps: '1. Load', '2. Check' (active), '3. Calculate', and '4. Compare'. Below the progress bar is a large orange button with a play icon and the text 'Check Data Quality'. Underneath, there is a section titled 'Quality control parameters' with several input fields: 'Interquartile range (IQR) threshold for temperature outliers:' (value: 3), 'Interquartile range (IQR) threshold for precipitation outliers:' (value: 5), 'Maximum daily rainfall threshold (mm):' (value: 200), 'Maximum absolute temperature threshold (°C):' (value: 50), 'Threshold number of days of no temperature variability:' (value: 5), and 'Temperature change threshold (°C):' (value: 20). On the right, an 'Instructions' box contains the following text: 'Check Data Quality', 'Click 'Check Quality' button. Climpact will commence quality control checks.', 'Once processing is complete you can view quality control plots and you will be provided with a link to the quality control output that Climpact has produced.', and 'It is necessary for you to inspect the output to ensure no errors are present in your station data.' At the bottom right, there is a blue 'Next' button.

# Running single station data: check data quality

**Climpact**  
File Edit View Window Help

Process single station  
Batch process stations  
Documentation

Process Single Station

1. Load   2. Check   3. Calculate   4. Compare

### 2. Check data quality

Quality control plots are displayed below.  
Quality control directory: C:/Climpact\_executable/Climpact\_Executable/resources/app/www/output/000251/qc

**Outliers per calendar month**

**NON ZERO PREC** (mm)

**TX** (°C)

**TN** (°C)

**DTR** (°C)

Instructions

#### Check Data Quality

Click 'Check Quality' button. Climpact will commence quality control checks.

Once processing is complete you can view quality control plots and you will be provided with a link to the quality control output that Climpact has produced.

It is necessary for you to inspect the output to ensure no errors are present in your station data.

**Evaluate Data Quality**  
Please view the quality control output described below and carefully evaluate before continuing.  
Refer to [section 6 of the Climpact User Guide](#) for help.  
Quality control directory:  
C:/Climpact\_executable/Climpact\_Executable/resources/a



# Running single station data: calculate climate indices

The screenshot displays the Climpact software interface for processing single station data. The main window is titled "Process Single Station" and shows a progress bar with four steps: 1. Load, 2. Check, 3. Calculate (active), and 4. Compare. The current step is "3. Calculate and plot indices".

**Settings**

**Plot title:**  
000251 [0°N, 0°E]

**User Parameters**  
The following fields change user-definable parameters in several Climpact indices. Leave as default unless you are interested in these indices. See [Section 4.4 of the Climpact User Guide](#) for guidance.

<b>d for WSDId (1 &lt;= d &lt;= 10):</b> <input type="text" value="1"/>	<b>Base temperature for HDDheat (°C):</b> <input type="text" value="18"/>
<b>d for CSDId (1 &lt;= d &lt;= 10):</b> <input type="text" value="1"/>	<b>Base temperature for CDDcold (°C):</b> <input type="text" value="18"/>
<b>d for Rxd day (d &gt;= 1):</b> <input type="text" value="3"/>	<b>Base temperature for GDDgrow (°C):</b> <input type="text" value="10"/>
<b>d for TXdTNd and TXbdTNbd (d &gt;= 1):</b> <input type="text" value="2"/>	<b>Number of days precip &gt;= nn (Rnnmm; nn &gt;= 0):</b> <input type="text" value="30"/>
	<b>SPEI/SPI custom monthly time scale (must be a positive</b>

**Instructions**

**Plot title**  
Enter a plot title. This will be included on all plots generated. Climpact will generate a title for you automatically based on the station name and coordinates provided when loading data, but you can override this here.

**User parameters**  
You may also change the following default parameters that relate to several indices (see [Appendix A](#) for index definitions):

- **WSDId Days** sets the number of days which need to occur consecutively with a TX > 90th percentile to be counted in the WSDId index.
- **CSDId Days** sets the number of days which need to occur consecutively with a TN < 10th percentile to be counted in the CSDId index.
- **Rxd day Days** sets the monthly maximum consecutive d-day precipitation to be recorded by the Rxd day index.
- **d for TXdTNd and TXbdTNbd** sets the number of consecutive days required to be counted as a run of hot or cold day and nights for the TXdTNd and TXbdTNbd indices.
- **Base temperature for HDDheat, CDDcold and GDDgrow** set the temperatures to be used in calculating

**Create a custom threshold index**  
Create an index that counts the number of days above or below a given threshold (e.g. number of days where TX > 40, named TXgt40)

**Variable:**  
TN

**Operation:**  
>

**Threshold:**  
0

# Running single station data: calculate climate indices

The screenshot displays the Climpact web application interface. The top navigation bar includes 'File', 'Edit', 'View', 'Window', and 'Help'. The main content area is titled 'Process Single Station' and features a progress indicator with four steps: 1. Load, 2. Check, 3. Calculate (active), and 4. Compare. Below the progress indicator, the text '3. Calculate and plot indices' is displayed. A 'Settings' input field is present. A large orange button with a play icon and the text 'Calculate Indices' is centered on the screen. To the right, an 'Instructions' panel provides details on plot titles and user parameters. Below the instructions, a plot titled 'Station: 000251 [0°N, 0°E]' is shown, with a subtitle 'Index: spei 12 month. Measure of 'drought' using the Standardised Precipitation Evapotranspiration Index on time scales of 3, 6'. The plot shows a time series of values, with a red shaded area at the bottom and a blue line representing the data. The y-axis is labeled 'ISS' and ranges from 0 to 2.

Climpact

File Edit View Window Help

Climpact

Home

Process single station

Batch process stations

Documentation

Process Single Station

1. Load 2. Check 3. Calculate 4. Compare

3. Calculate and plot indices

Settings

Calculate Indices

Instructions

Plot title

Enter a plot title. This will be included on all plots generated. Climpact will generate a title for you automatically based on the station name and coordinates provided when loading data, but you can override this here.

User parameters

You may also change the following default parameters that relate to several indices (see [Appendix A](#) for index definitions):

- **WSDId Days** sets the number of days which need to occur consecutively with a TX > 90th percentile to be counted in the WSDId index.
- **CSDId Days** sets the number of days which need to occur consecutively with a TN < 10th percentile to be counted in the CSDId index.
- **Rxdday Days** sets the monthly maximum consecutive d-day precipitation to be recorded by the Rxdday index.
- **d for TXdTNd and TXbdTNbd** sets the number of consecutive days required to be counted as a run of hot or cold day and nights for the TXdTNd and TXbdTNbd indices.

Plots of calculated indices

Please view the output in the following directory:  
C:/Climpact\_executable/Climpact\_Executable/resources/app/www/output/000251

Plots are displayed below and available for download on this page using the link in the blue info box under Instructions.

Station: 000251 [0°N, 0°E]

Index: spei 12 month. Measure of 'drought' using the Standardised Precipitation Evapotranspiration Index on time scales of 3, 6

ISS

# Running single station data: compare with sectoral data (we do not use it)

The screenshot displays the Climpact software interface. The window title is 'Climpact' and the menu bar includes 'File', 'Edit', 'View', 'Window', and 'Help'. The sidebar on the left contains navigation options: 'Home', 'Process single station', 'Batch process stations', and 'Documentation'. The main content area is titled 'Process Single Station' and shows a progress bar with four steps: 1. Load, 2. Check, 3. Calculate, and 4. Compare. The current step is '4. Calculate and plot sector correlations'. Below the progress bar, there are sections for 'Settings', 'Sector data', and 'Plot attributes'. The 'Sector data' section includes a 'Browse...' button and a 'No file selected' message. The 'Plot attributes' section has a 'Title:' field with the value '000251', a 'Label for y axis:' field, and a checked 'Detrend data' checkbox. To the right of the main content area is an 'Instructions' panel with the following text:

**Instructions**

**Sector data**

Climpact can calculate and plot correlations between annual sector data the user has and the indices it has calculated. Currently, Climpact only calculates correlations for annual sector data.

Note that the indices must have been calculated in the current session of Climpact. So, if you have closed Climpact and wish to calculate correlations with sector data, you must repeat the process from the beginning.

**Plot attributes**

Select sector data file for correlating with indices. See [Appendix B](#) for guidance on formatting this file.

Climpact will attempt to automatically determine a title and label for the y axis of the plots from the file name loaded.

You can override these values by entering your preferred values in the relevant boxes.

Leave the 'Detrend data' checkbox checked if you would like the sector and index data to be detrended prior to calculating the correlations.

**Calculate Correlations**

At the bottom of the main content area, there is a large orange button with a play icon and the text 'Calculate Correlations'.

# Running multiple station data



# Running multiple station data: batch process stations

The screenshot shows the Climpact web application interface. The main heading is "Process multiple stations". Below this, there is a section titled "Load station data and provide metadata" with the following text: "This page allows you to calculate the indices for multiple station text files. Any errors will be reported after processing. This process can take a long time (~1 minute per file)."

The interface is divided into three main sections:

- Metadata:** A "Browse..." button is present, with the text "No file selected" next to it.
- Station data:** A "Browse..." button is present, with the text "Select or drop multiple station files" next to it.
- Parameters:** This section contains three input fields:
  - Base period start year:** A text input field containing the value "1970".
  - Base period end year:** A text input field containing the value "2010".
  - Number of cores to use (your computer has 16 cores):** A text input field containing the value "1".

On the right side of the interface, there is an "Instructions" panel with the following content:

- Metadata:** A text file must be created with information describing each station that you will provide as input data. Refer to section 5.3 of the user guide and use this file as a template. Upload a file with information for each station. Each file of input data uploaded at step 2 must be included in this file.
- Station data:** Select all the Climpact formatted station text files that you would like to process from the dialog window that opens when you click Browse... These must be formatted according to Appendix B of the user guide.
- Parameters:** Specify valid values for base period.
- Calculate Indices:** The 'Calculate Indices' button will be enabled when you have specified all required inputs, including: metadata, station data and parameters.

At the bottom center of the interface, there is a large orange button with a play icon and the text "Calculate Indices".

# Running multiple station data: needed files

- Climate data station by station
- Stations file containing all the metadata
- All with Climpact format
- If you use the desktop version you will find the outputs in this directory  
*C:\Climpact\_executable\Climpact\_Executable\resources\app\www\output\climpactstations*

# Running multiple station data: needed files

✓ hoy

 000251	04/04/2025 9:16	Documento de texto	904 KB
 000252	04/04/2025 9:16	Documento de texto	951 KB
 000253	04/04/2025 9:16	Documento de texto	884 KB
 000254	04/04/2025 9:16	Documento de texto	854 KB
 000255	04/04/2025 9:16	Documento de texto	928 KB
 climactstations	04/04/2025 9:16	Documento de texto	1 KB

- Climate data station by station: *000251, 000252, 000253*
- Stations file containing all the metadata: *climact stations*

# Running multiple station data: needed files

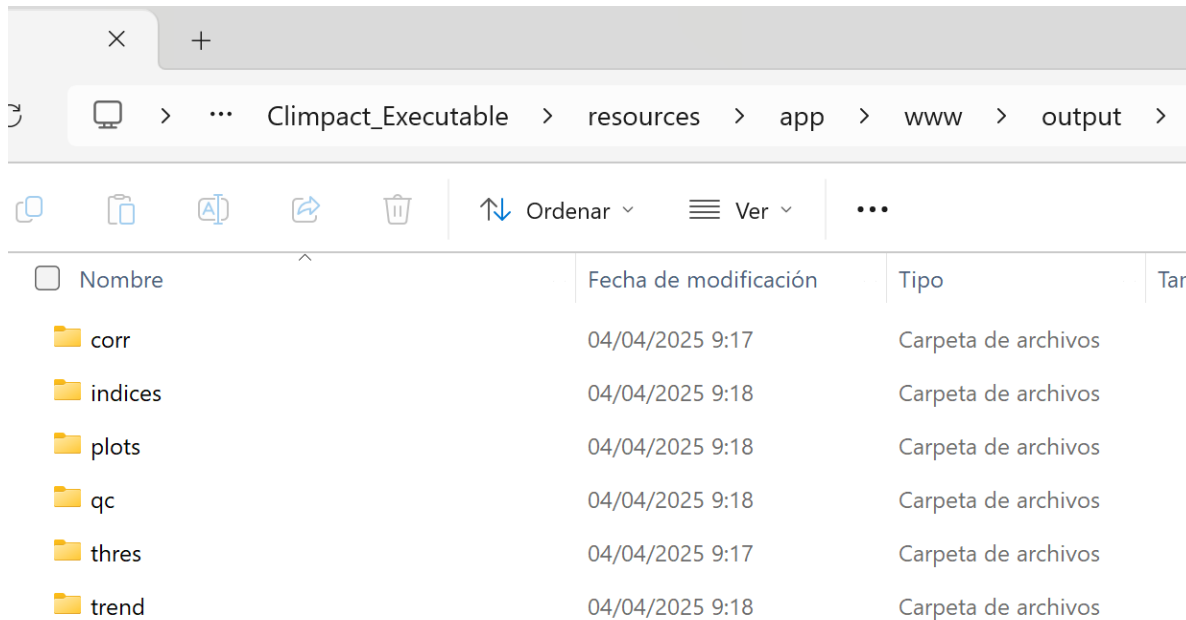
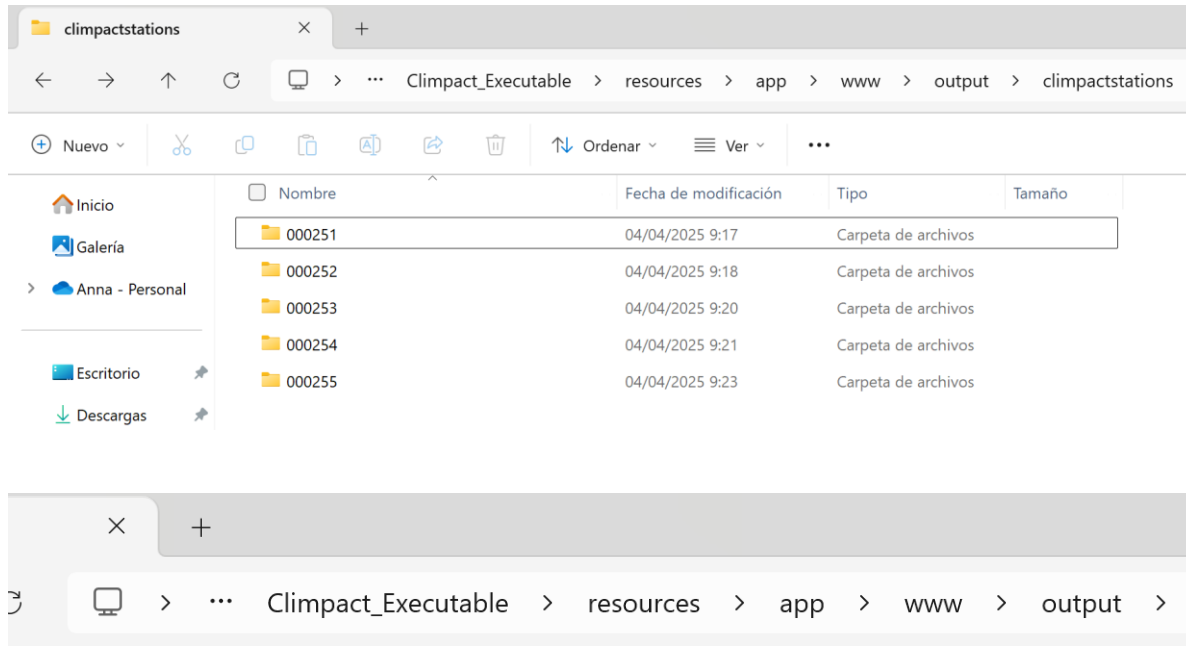
- Climate data station by station: *000251, 000252, 000253*
- Stations file containing all the metadata: *climpack stations*

<u>station_file</u>	<u>latitude</u>	<u>longitude</u>	<u>wsdin</u>	<u>csdin</u>	<u>Tb_HDD</u>	<u>Tb_CDD</u>	<u>Tb_GDD</u>	<u>rxnday</u>	<u>rnmm</u>	<u>txtn</u>	SPEI
000251.txt	45	35.23	3	3	18	18	10	5	10	30	12
000252.txt	50.24	30.32	3	3	18	18	10	5	10	30	12
000253.txt	48.34	39.15	3	3	18	18	10	5	10	30	12
000254.txt	46.58	31.59	3	3	18	18	10	5	10	30	12
000255.txt	49.36	34.33	3	3	18	18	10	5	10	30	12

```
1900 01 01 1.8 -0.1 -2
1900 01 02 0.2 1.9 -0.3
1900 01 03 1.7 1.2 -1.1
1900 01 04 3.1 2.4 -1.1
1900 01 05 2.9 2.6 0.8
1900 01 06 1.1 2.4 -2.6
1900 01 07 0.1 -2.4 -10.7
1900 01 08 0 -10.6 -17.9
1900 01 09 0 -14.1 -19.8
1900 01 10 0 -11.3 -18
1900 01 11 0 -14.6 -19.7
1900 01 12 0 -11.1 -20.1
1900 01 13 0 -13.4 -18.5
1900 01 14 0 -8.4 -15.3
1900 01 15 0.4 -7.9 -10.6
1900 01 16 1.5 -6.4 -9
1900 01 17 3.2 -4.1 -7.2
1900 01 18 0.9 -3.8 -7
1900 01 19 9.6 -0.4 -4.1
1900 01 20 7.1 0.2 -5.8
1900 01 21 0 -2.7 -7.8
1900 01 22 0 -2.9 -5.9
1900 01 23 2.6 -2 -5.4
1900 01 24 0 3.7 -4
1900 01 25 0.3 1.7 -2.8
1900 01 26 3.8 2 -0.5
1900 01 27 2.2 1 -1.7
1900 01 28 7 0.4 -1.5
1900 01 29 3.2 0 -2.2
1900 01 30 6.3 0.7 -2.6
1900 01 31 1.7 3.4 0.7
1900 02 01 0 3.5 -0.3
1900 02 02 0 1.1 -1.8
1900 02 03 0 0.4 -1.6
1900 02 04 0.3 -0.6 -1.6
1900 02 05 0.5 -1 -2.2
1900 02 06 1 -0.7 -2.1
1900 02 07 0.8 0 -2.4
1900 02 08 6.5 -0.9 -2.9
1900 02 09 0 1 -4.8
1900 02 10 0 -3.6 -12
1900 02 11 0.2 -0.2 -9.8
1900 02 12 3.2 0.4 -2.2
1900 02 13 0.1 5.0 2
```

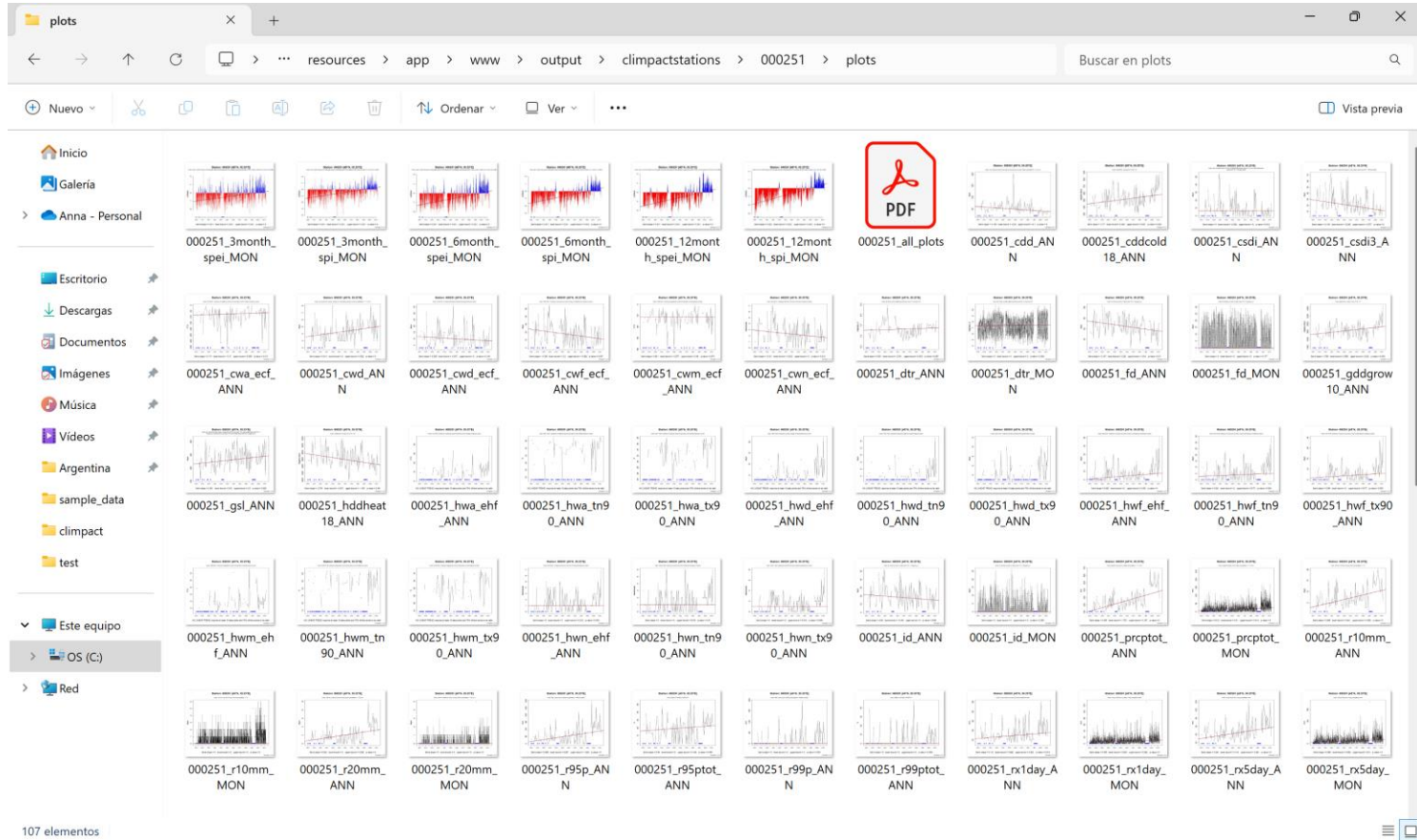


# Running multiple station data: output



- A folder with subfolders for each station is created
- Each station contains different folder for each of the different processes
- Plots of indices can be found in **indices**
- Values of indices can be found in **indices**

# Running multiple station data: output



- A folder with subfolders for each station is created
- Each station contains different folder for each of the different processes
- **Plots of indices can be found in *indices***
- Values of indices can be found in *indices*

# Running multiple station data: output

NAME	DATE TIME	TYPE	SIZE
000251_3month_spei_MON	04/04/2025 9:18	Archivo de valores se...	38 KB
000251_3month_spi_MON	04/04/2025 9:18	Archivo de valores se...	38 KB
000251_6month_spei_MON	04/04/2025 9:18	Archivo de valores se...	38 KB
000251_6month_spi_MON	04/04/2025 9:18	Archivo de valores se...	38 KB
000251_12month_spei_MON	04/04/2025 9:18	Archivo de valores se...	37 KB
000251_12month_spi_MON	04/04/2025 9:18	Archivo de valores se...	37 KB
000251_cdd_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_cddcold18_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_csdi_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_csdi3_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_cwd_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_dtr_ANN	04/04/2025 9:18	Archivo de valores se...	5 KB
000251_dtr_MON	04/04/2025 9:18	Archivo de valores se...	57 KB
000251_ecf_heatwave_ANN	04/04/2025 9:18	Archivo de valores se...	6 KB
000251_ehf_heatwave_ANN	04/04/2025 9:18	Archivo de valores se...	6 KB
000251_fd_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_fd_MON	04/04/2025 9:18	Archivo de valores se...	42 KB
000251_gddgrow10_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_gsl_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_hddheat18_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_id_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_id_MON	04/04/2025 9:18	Archivo de valores se...	42 KB
000251_prcptot_ANN	04/04/2025 9:18	Archivo de valores se...	4 KB
000251_prcptot_MON	04/04/2025 9:18	Archivo de valores se...	44 KB

- A folder with subfolders for each station is created
- Each station contains different folder for each of the different processes
- Plots of indices can be found in *indices*
- Values of indices can be found in *indices*