Food and Agriculture Organization of the United Nations

Crop Module 2
Creating Climate files

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Objective and data used in this session

Objective: how to create climate files on AquaCrop

We will create our own climatic files (using daily values) for Badin from 01-01-2010 until 31-12-2099.

- **GCM:** one model (bias-corrected using W5E5 dataset) under RCP 4.5.

- **Climatic variables:** maximum temperature (Tmax), minimum temperature (Tmin), and precipitation (pr).

All the climate data for Badin is available in Crop_Module_2 (link)

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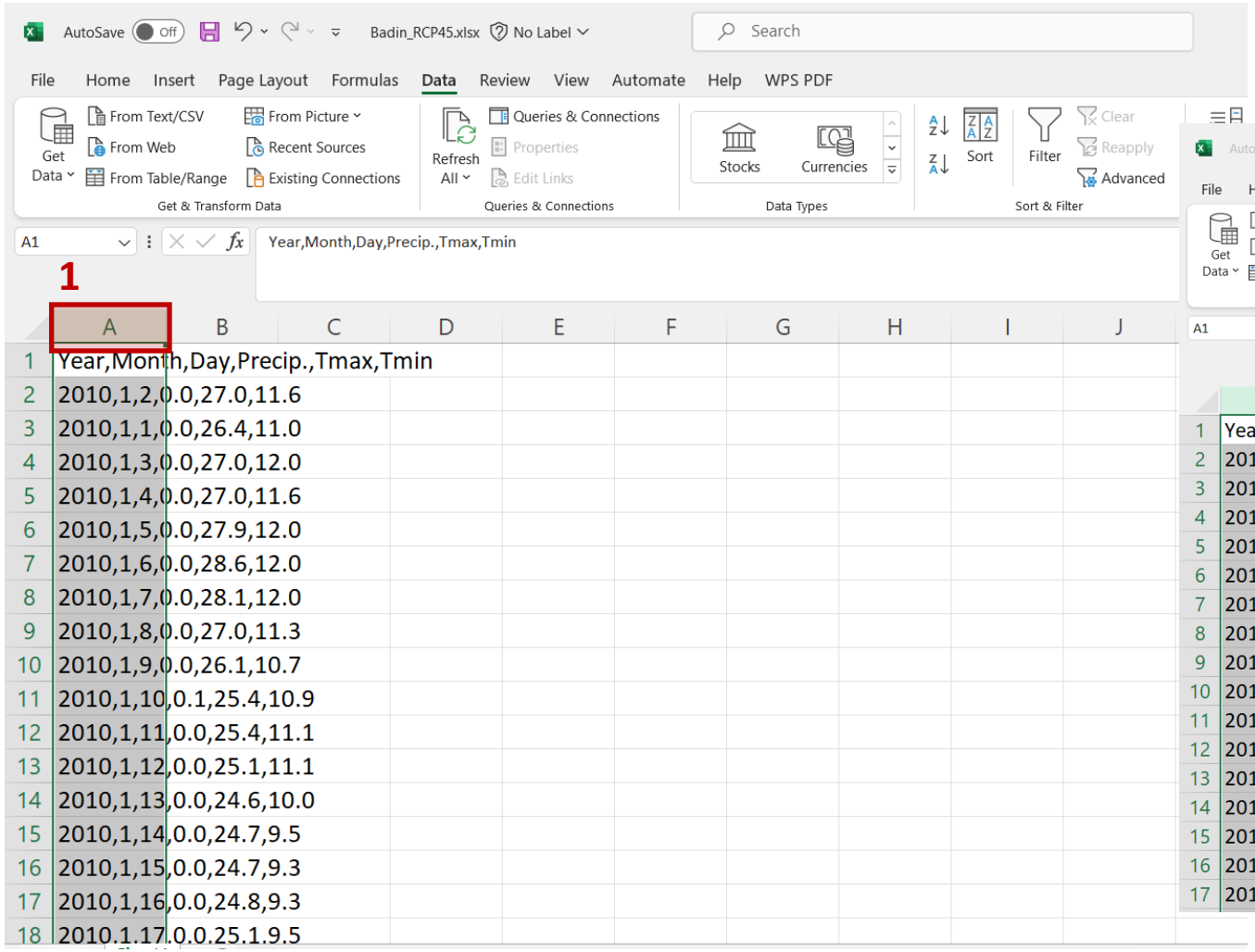
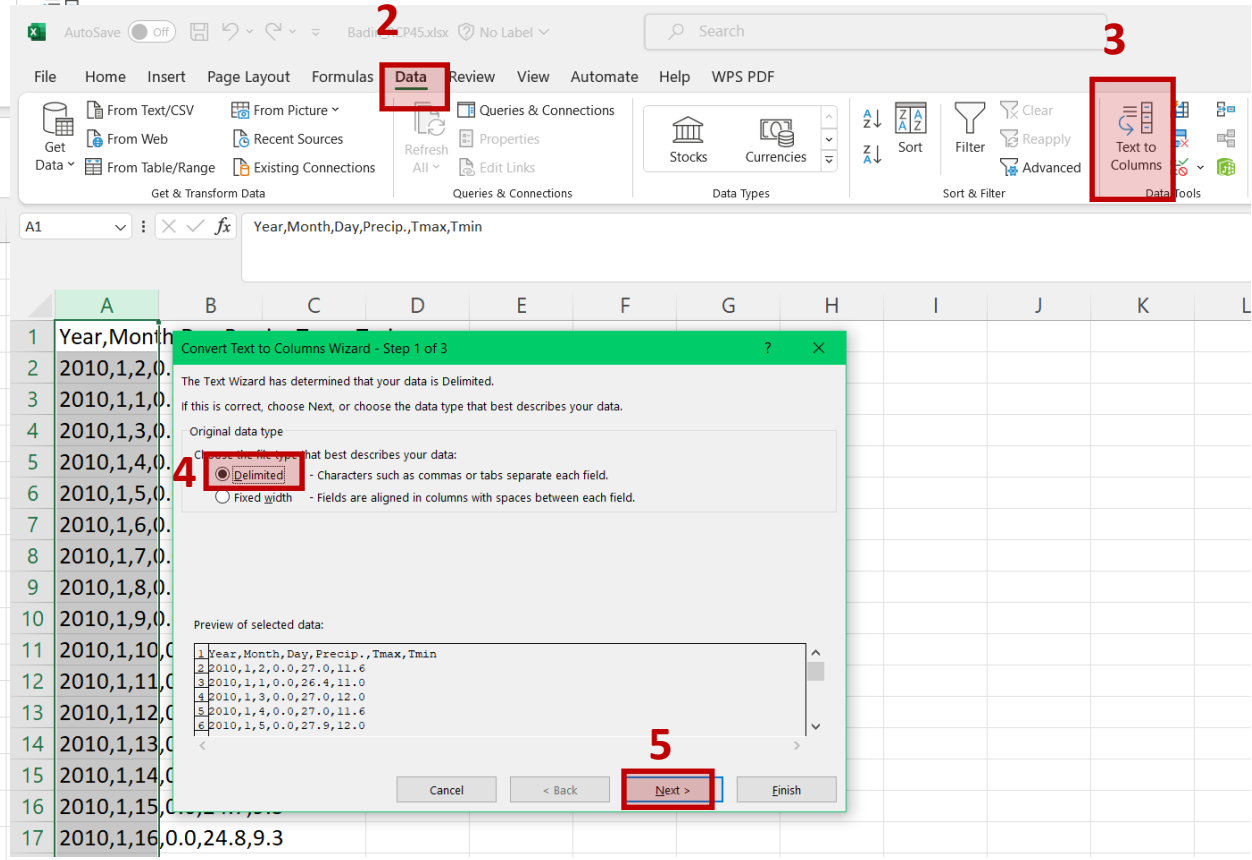
Preparing the CSV climatic files

Step 1: select column **A**



Steps 3-4: click the **Data tab** in the upper toolbar and, afterwards, click in **Text to Columns**

Steps 4-5: click on **Delimited** and then **Next**



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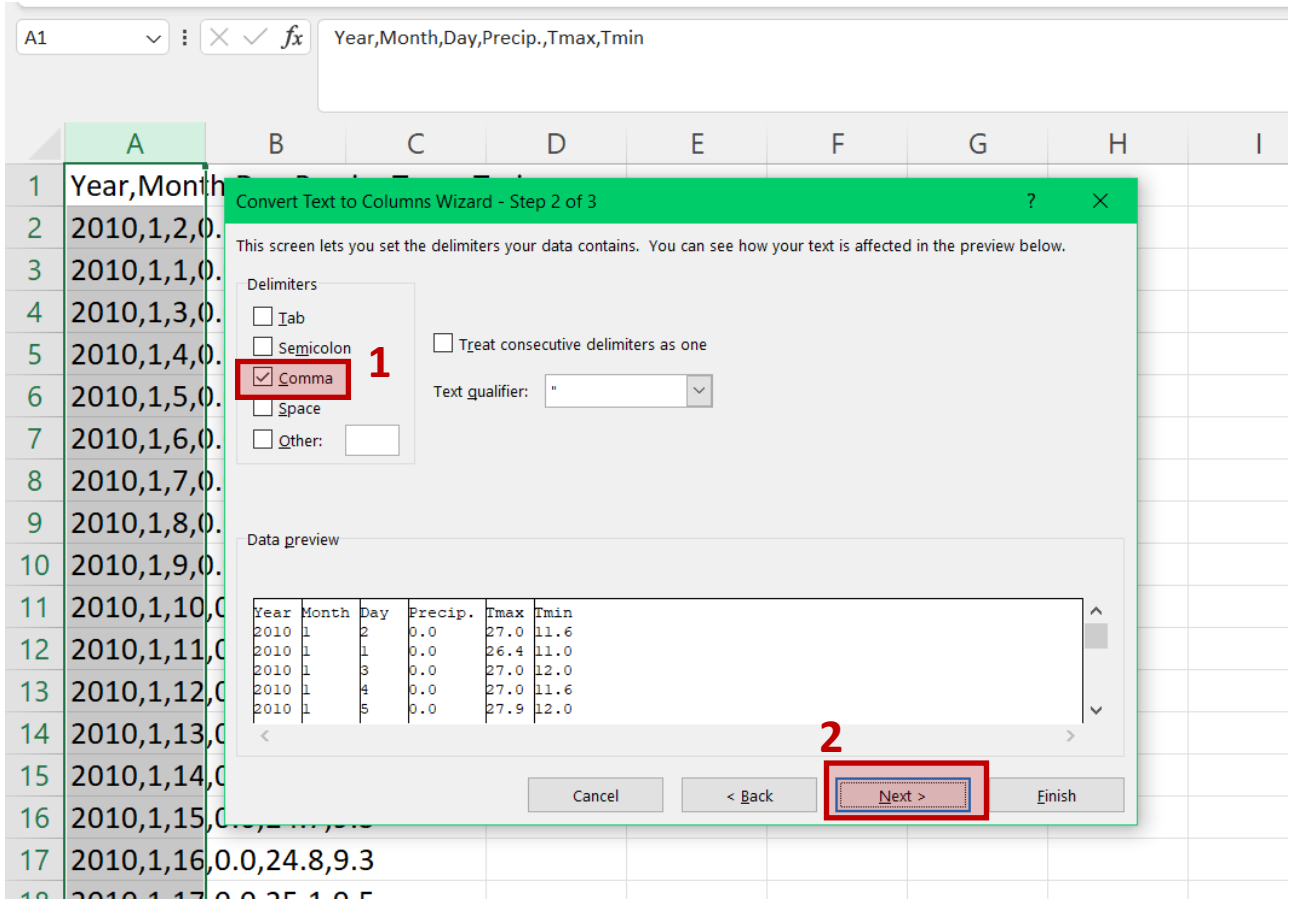
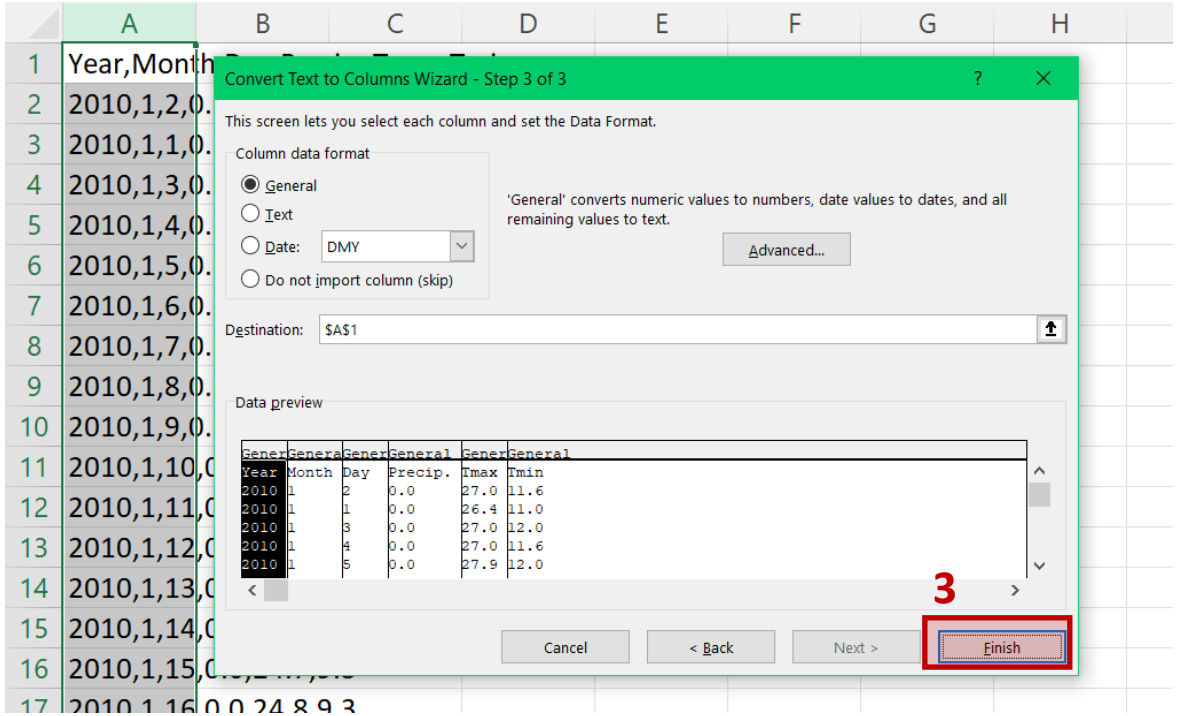
Preparing the CSV climatic files

Steps 1-2: use the **comma** delimiter and click **next**



Step 3: click on **Finish**



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Preparing the CSV climatic files

	A	B	C	D	E	F	G	H	I
1	Year	Month	Day	Precip.	Tmax	Tmin			
2	2010	1	2	0.0	27.0	11.6			
3	2010	1	1	0.0	26.4	11.0			
4	2010	1	3	0.0	27.0	12.0			
5	2010	1	4	0.0	27.0	11.6			
6	2010	1	5	0.0	27.9	12.0			
7	2010	1	6	0.0	28.6	12.0			
8	2010	1	7	0.0	28.1	12.0			
9	2010	1	8	0.0	27.0	11.3			
10	2010	1	9	0.0	26.1	10.7			
11	2010	1	10	0.1	25.4	10.9			
12	2010	1	11	0.0	25.4	11.1			
13	2010	1	12	0.0	25.1	11.1			
14	2010	1	13	0.0	24.6	10.0			
15	2010	1	14	0.0	24.7	9.5			
16	2010	1	15	0.0	24.7	9.3			
17	2010	1	16	0.0	24.8	9.3			
18	2010	1	17	0.0	25.1	9.5			
19	2010	1	18	0.0	25.3	10.8			
20	2010	1	19	0.0	24.2	10.3			
21	2010	1	20	0.0	23.7	9.1			
22	2010	1	21	0.0	24.1	8.6			
23	2010	1	22	0.0	25.2	9.5			
24	2010	1	23	0.0	26.1	10.5			
25	2010	1	24	0.0	25.6	9.9			
26	2010	1	25	0.0	25.5	9.8			

Step 1: **delete** the first row (year) and the **date columns (A,B,C)** (AquaCrop cannot read text)

Remember that the columns respectively correspond to:

A) Precip: precipitation (mm/day)
B) Tmax: maximum temperatures (ºC)
C) Tmin: minimum temperatures (ºC)

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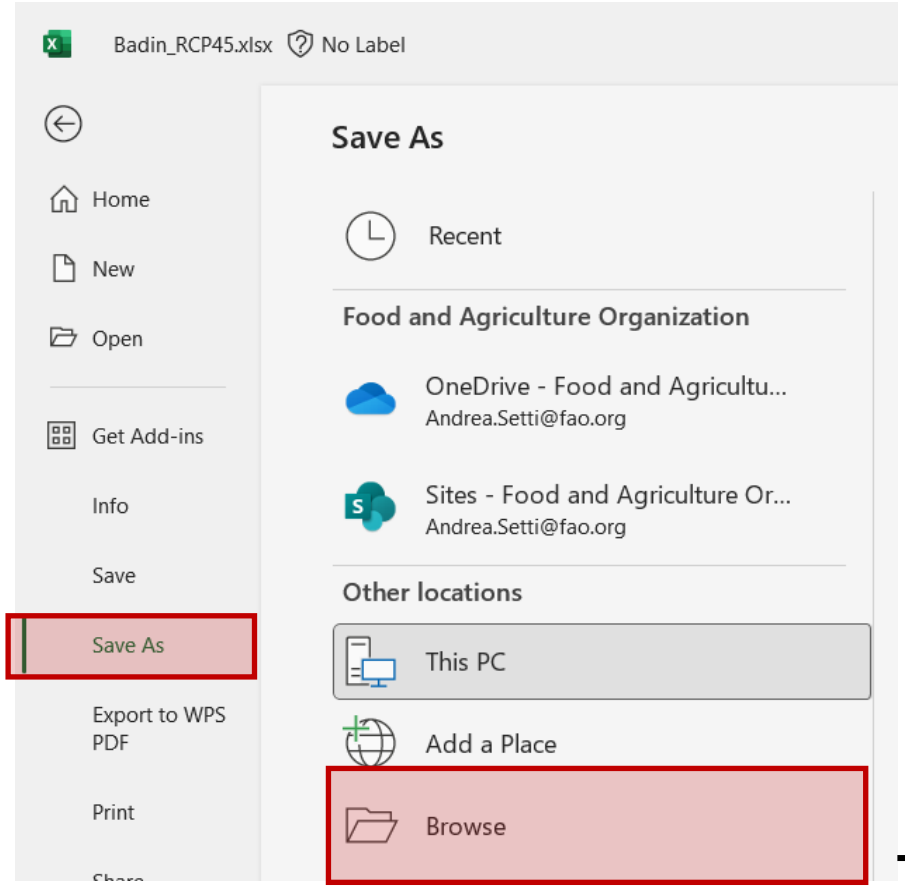
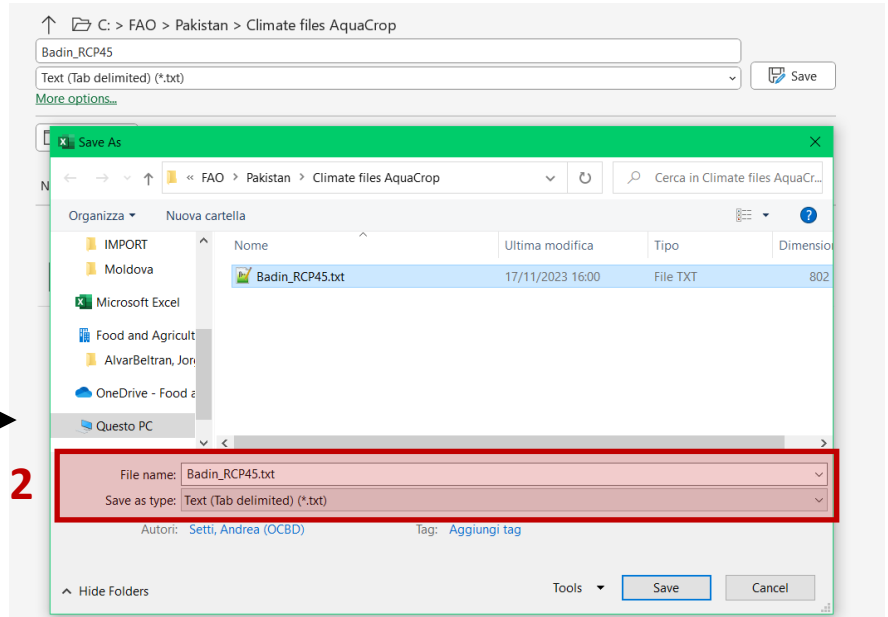
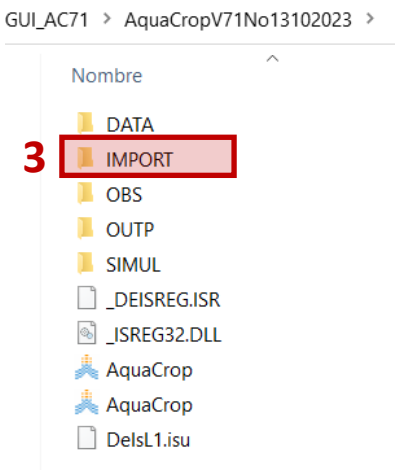
Saving the climatic files in the right format

Steps 1-2: save the CSV file as type "**Text (Tab delimited)**"





Step 3: save the file in the AquaCrop folder "**IMPORT**"



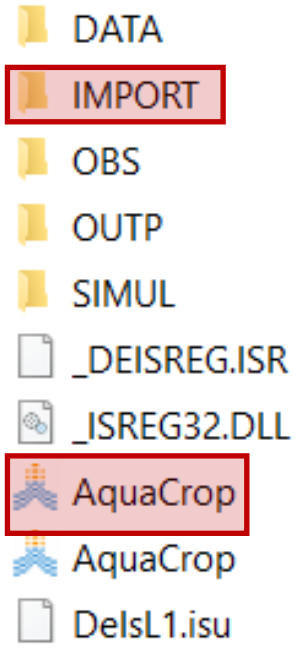
Create/import climatic files

Prec	Tmax	Tmin
0.0	27.0	11.6
0.0	26.4	11.0
0.0	27.0	12.0
0.0	27.0	11.6
0.0	27.9	12.0
0.0	28.6	12.0
0.0	28.1	12.0
0.0	27.0	11.3
0.0	26.1	10.7
0.1	25.4	10.9
0.0	25.4	11.1
0.0	25.1	11.1
0.0	24.6	10.0
0.0	24.7	9.5
0.0	24.7	9.3
0.0	24.8	9.3
0.0	25.1	9.5
0.0	25.3	10.8
0.0	24.2	10.3
0.0	23.7	9.1
0.0	24.1	8.6
0.0	25.2	9.5
0.0	26.1	10.5
0.0	25.6	9.9
0.0	25.5	9.8
0.5	25.9	10.6

- Daily values are introduced in AquaCrop as txt. format
- The more climatic variables you have, the better the results - as ETo estimations will be closer to the reality (observed values)…
- …and remember: AquaCrop calculates biomass production from crop transpiration.
- AquaCrop does not read blank cells nor text
- AquaCrop has default CO_2 files from 1900 until 2100
- If weather data necessary to compute ETo is missing, procedures to estimate missing climatic data are used – based on the methodologies outlined in the Irrigation and Drainage Paper No 56 (FAO, 1998).

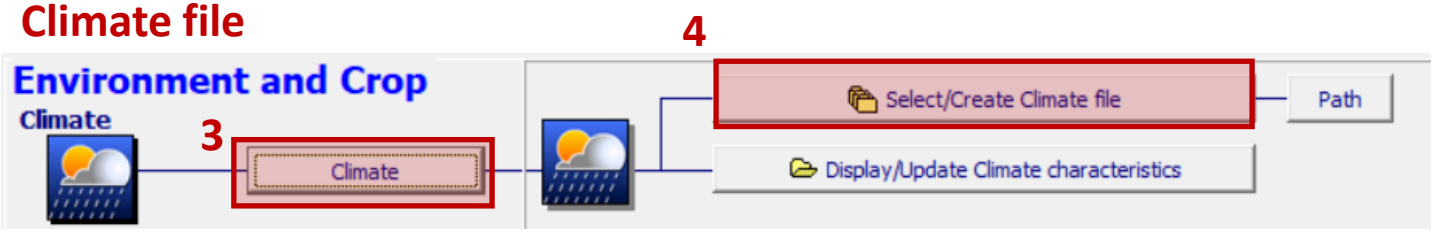
Open txt. file on AquaCrop

Step 1: copy paste the txt file into AquaCrop folder **IMPORT**



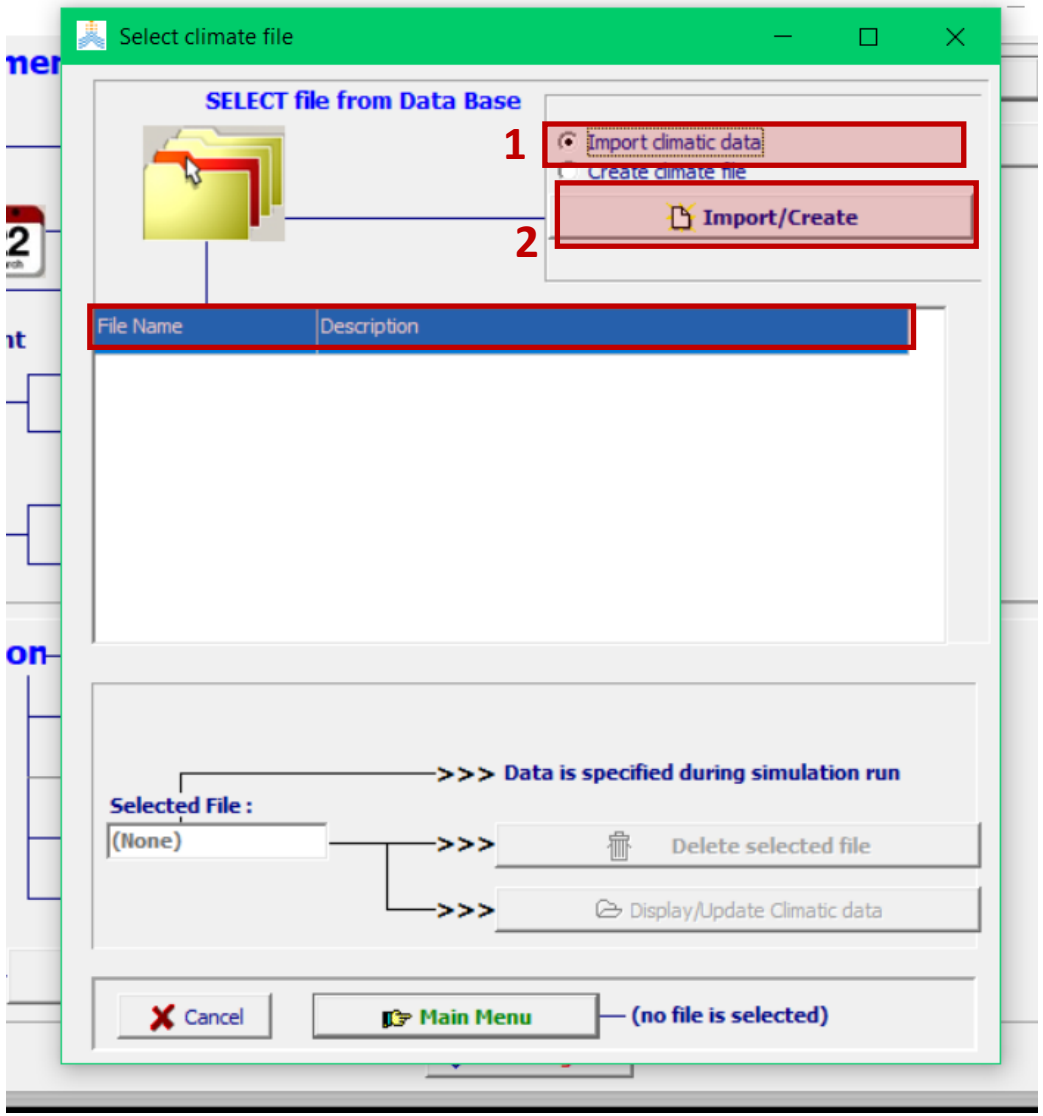
Step 2: open **AquaCrop** and click on **Start**

Step 3: open the **climate** module and click on **Select/Create Climate file**

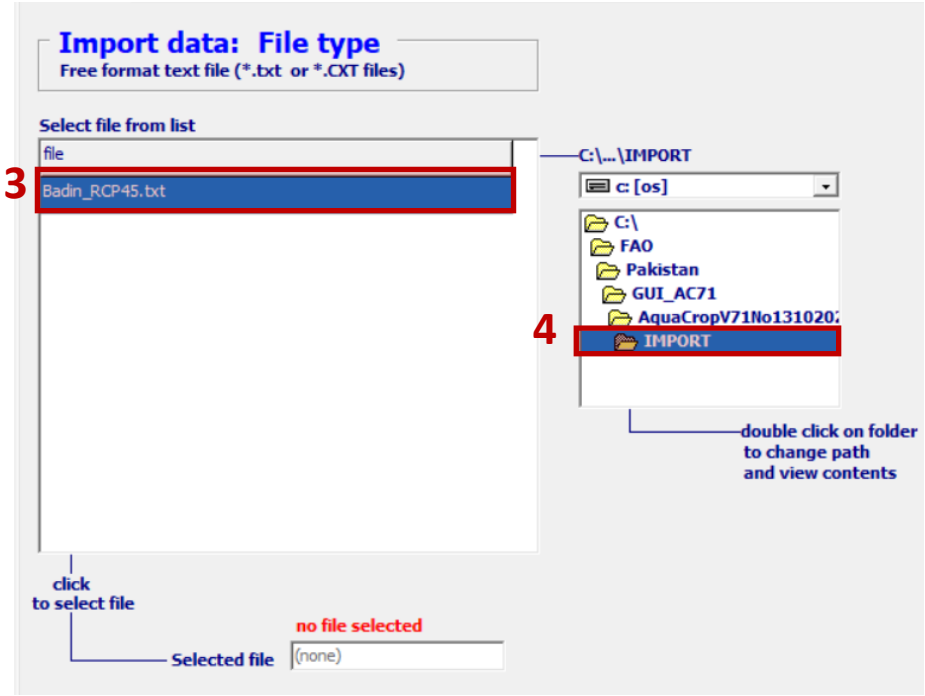


Create a climatic file

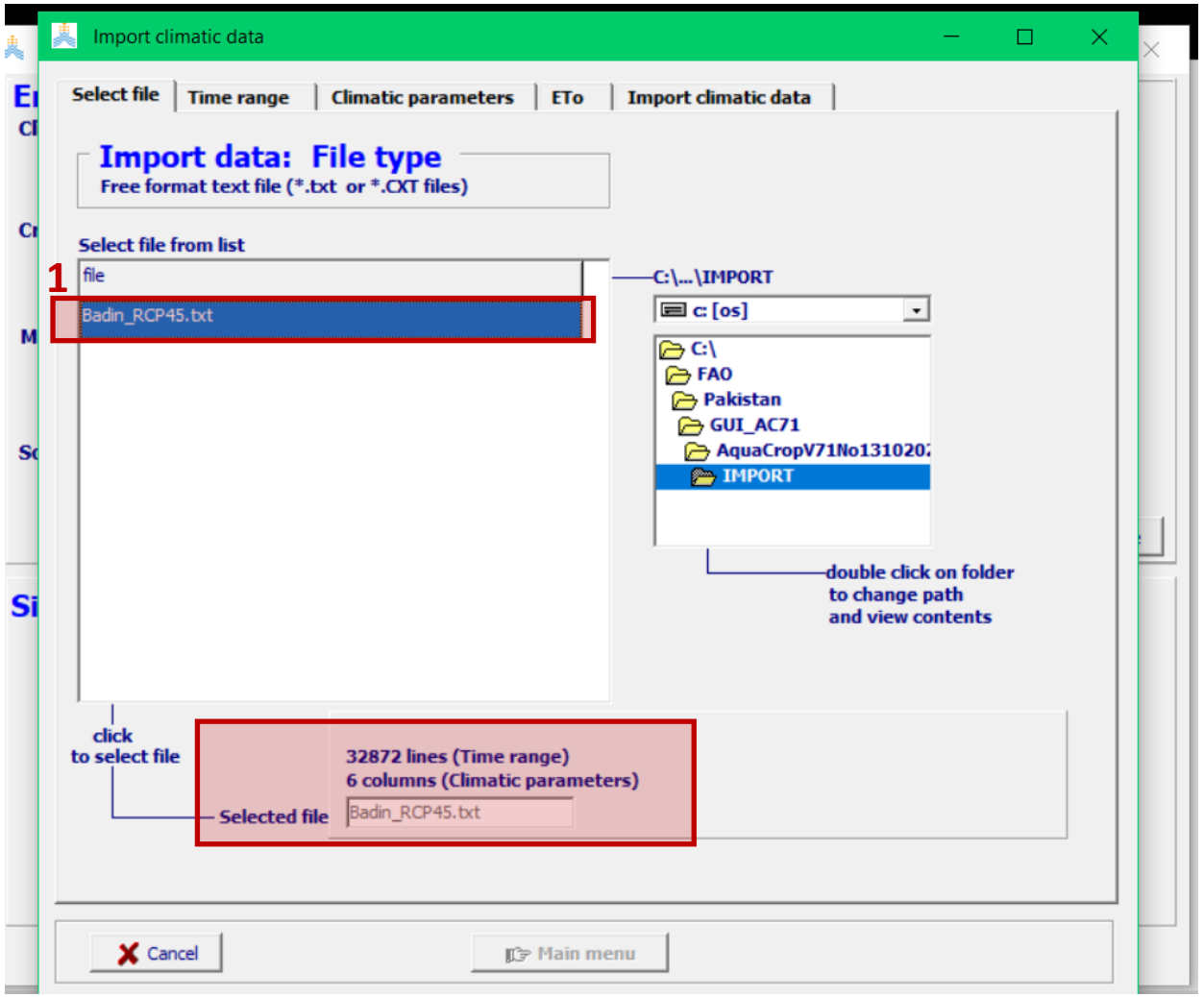
Steps 1-2: click on **Import/Create** climatic file



Steps 3-4: select **Badin_RCP45** and click on **Import/Create**



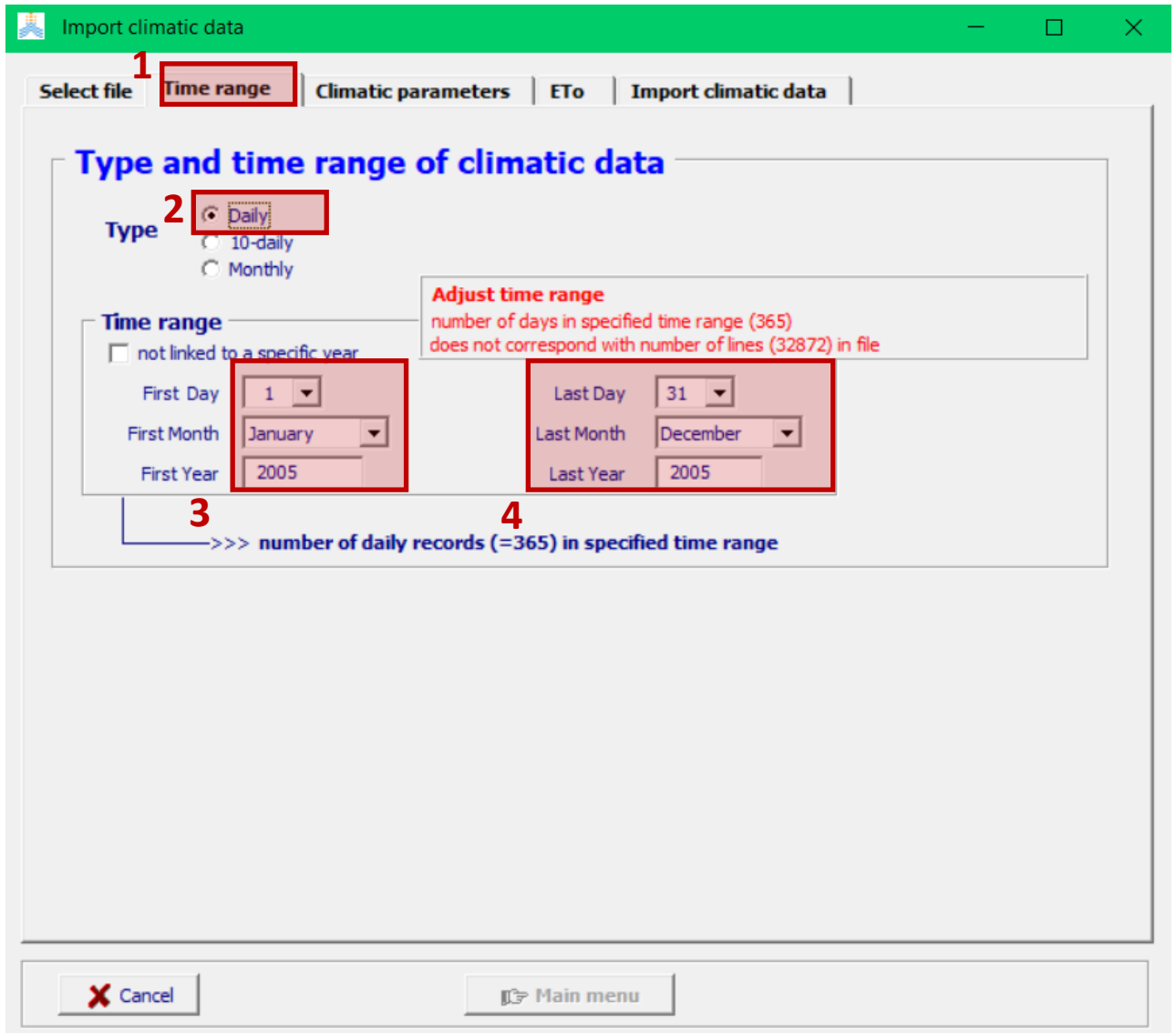
Create a climatic file



Step 1: double click on the file named **Badin_RCP45**

Double check that no errors appear in red (e.g., AquaCrop cannot read text, rows missing, blank cells etc.)

Create a climatic file

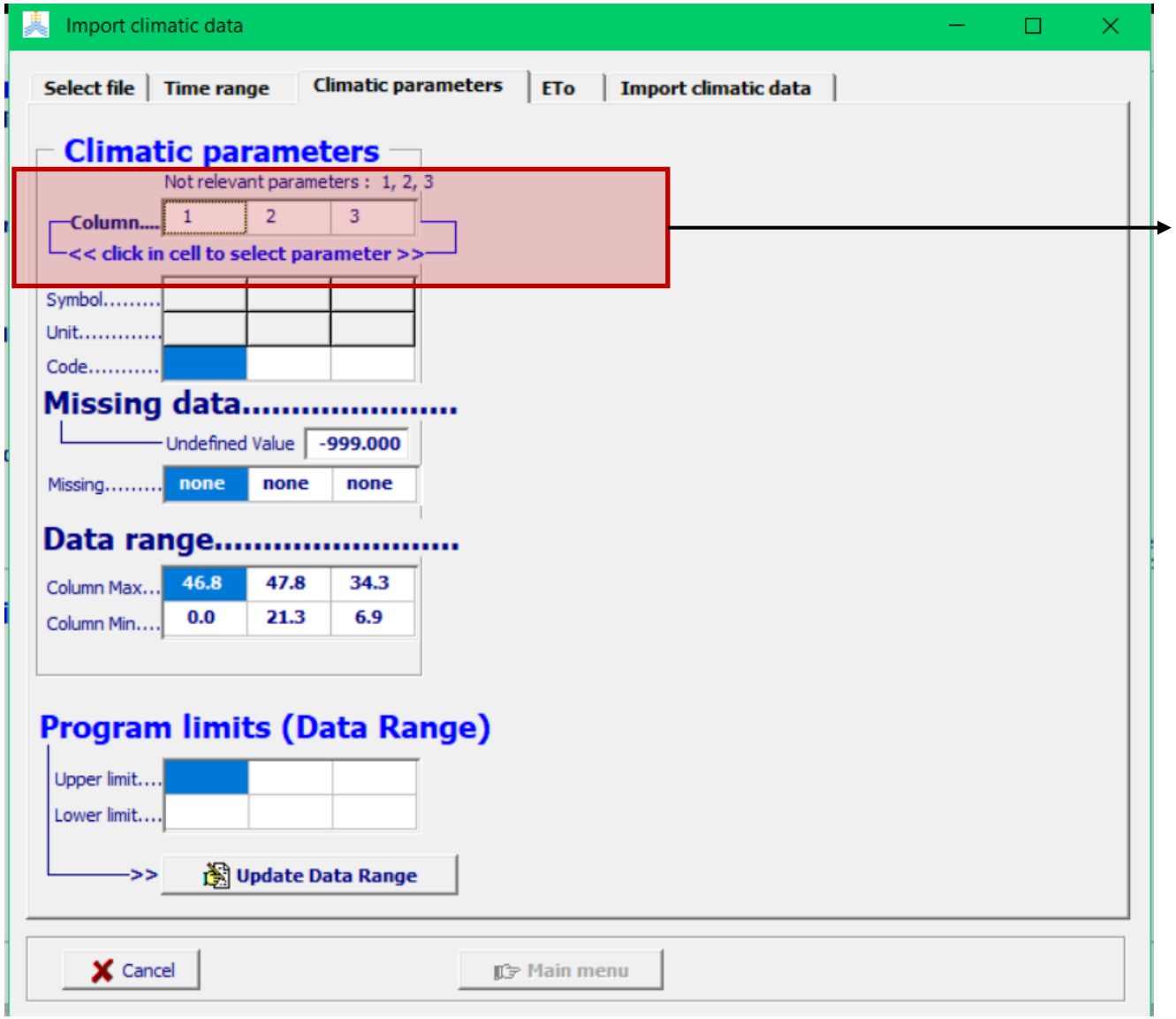


Steps 1-2: click on **Time range** and specify the frequency of climate observations/projections. In our case, **Daily**.

Steps 3-4: select the starting **(01/01/2010)** and end period **(31/12/2099)** of daily climatic information

AquaCrop can support daily, 10-day, and monthly climatic data

Create a climatic file



Remember that the new columns correspond to:

A) pr: precipitation (mm/day)
B) Tmax: maximum temperatures (ºC)
C) Tmin: minimum temperatures (ºC)

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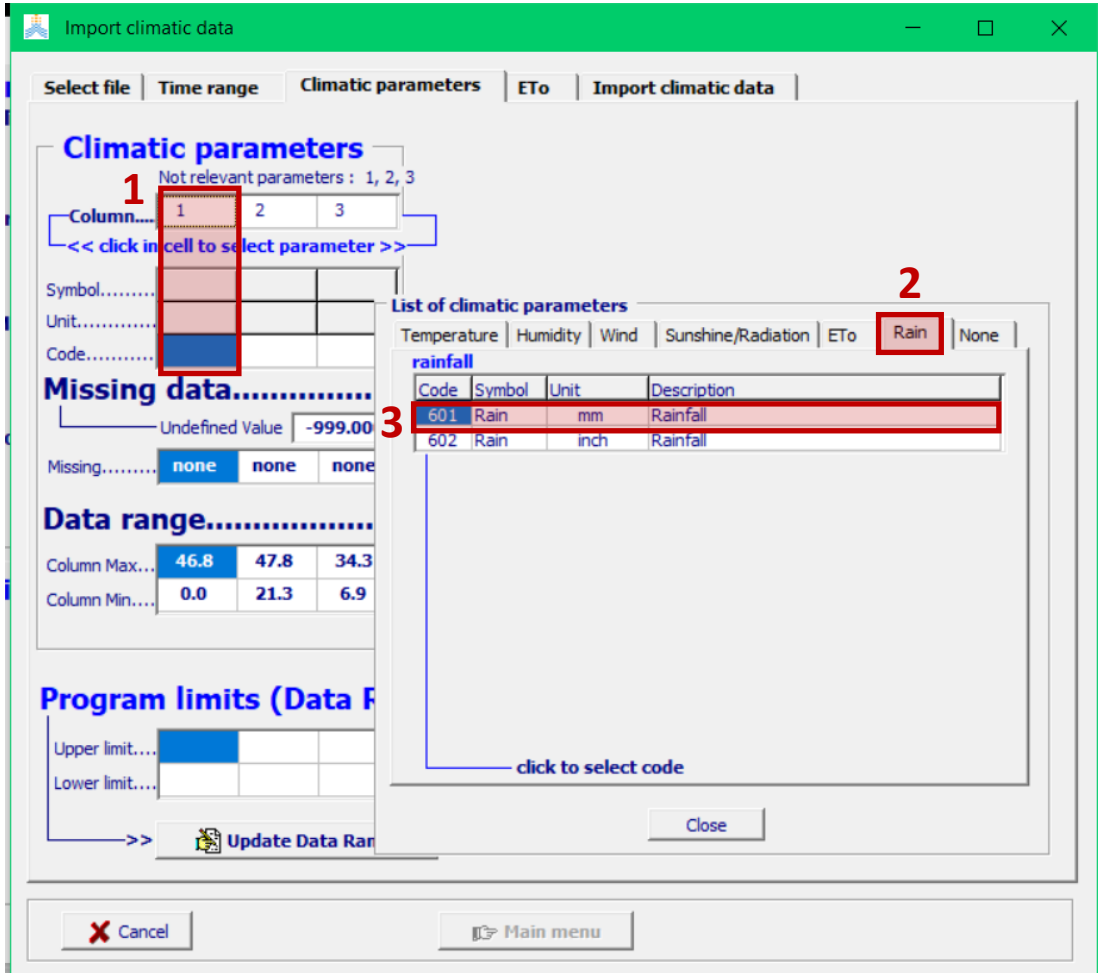
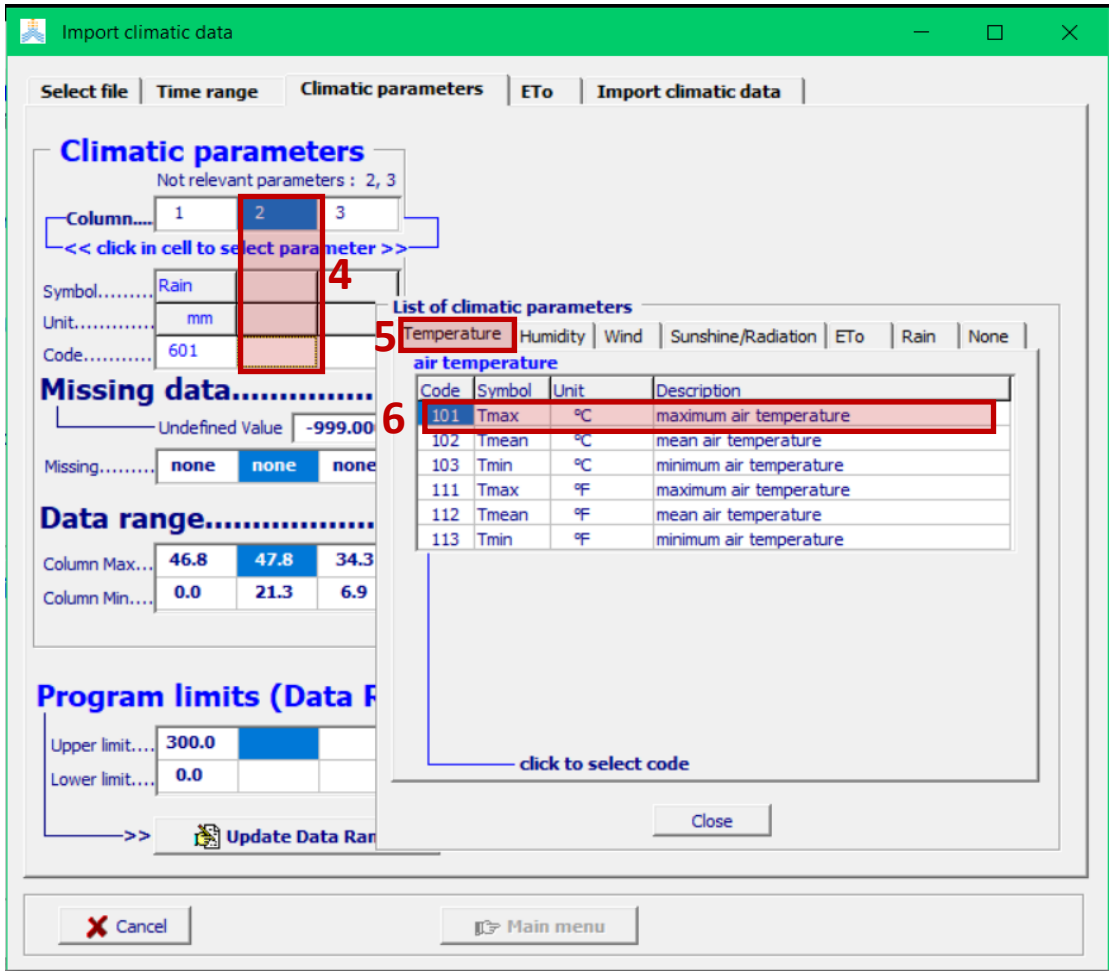
Create a climatic file (rain & Tmax)

Steps 1-3: click on the first column (**blank cell**), then select the **rain tab** and **rain (mm).**

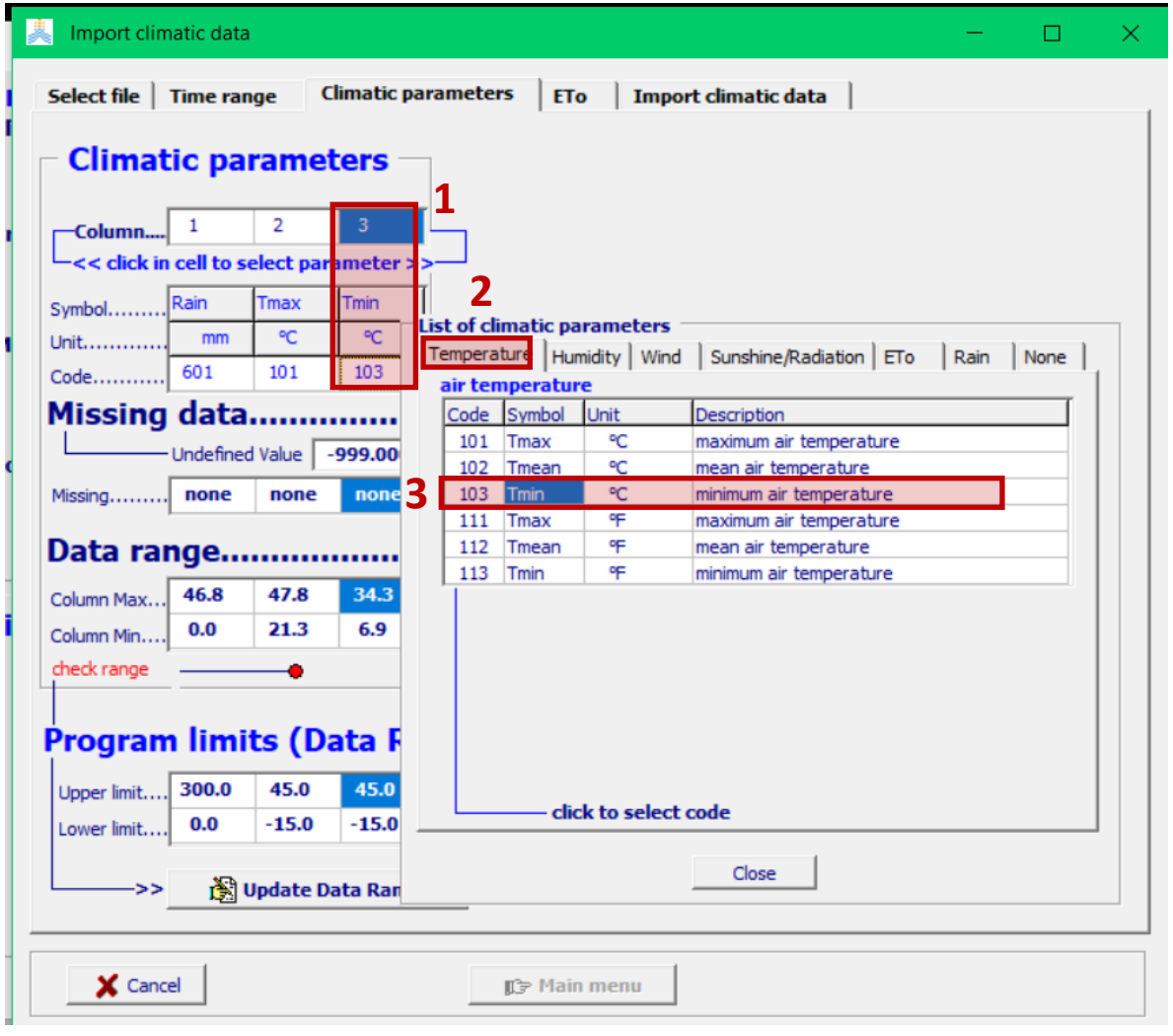


Step 4-6: click on the second column (**blank cell**), then select the **temperature tab** and **Tmax (ºC).**



Create a climatic file (Tmin & RH)

Steps 1-3: click on the third column (**blank cell**), then select the **temperature tab** and **Tmin (ºC)**.



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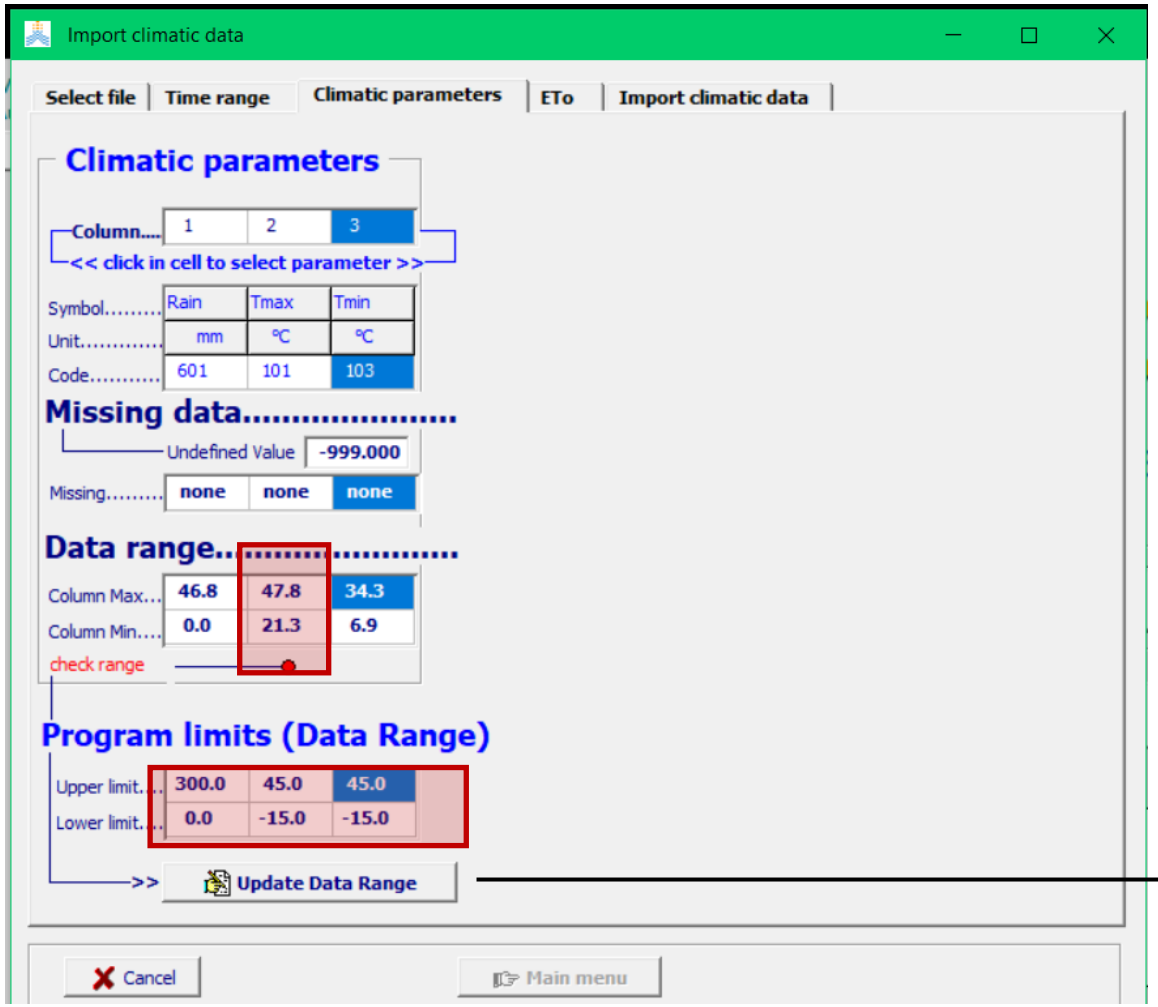
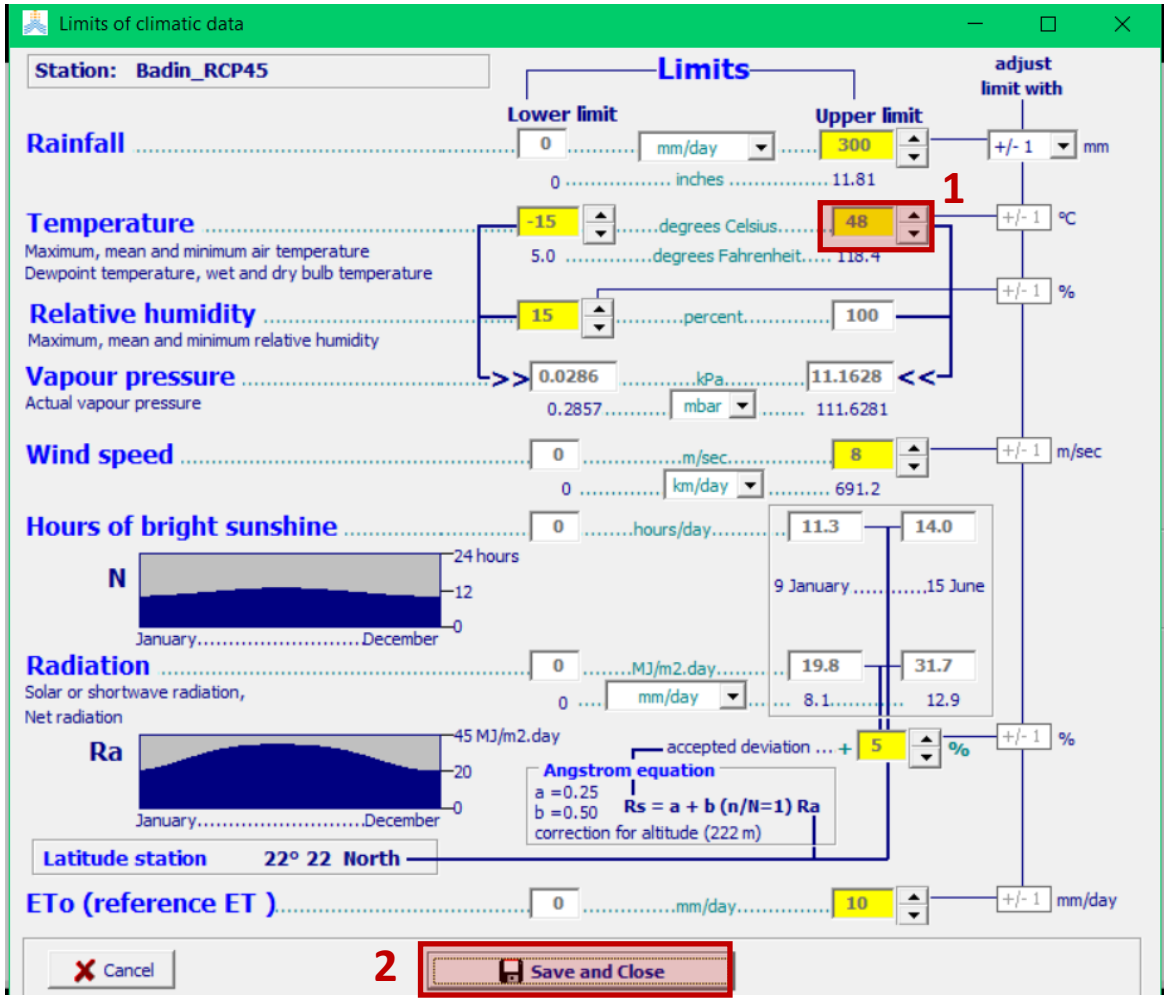
Update data ranges exceeding limits

Now you can visualize all the imported parameters as well as the data ranges for each of these variables!

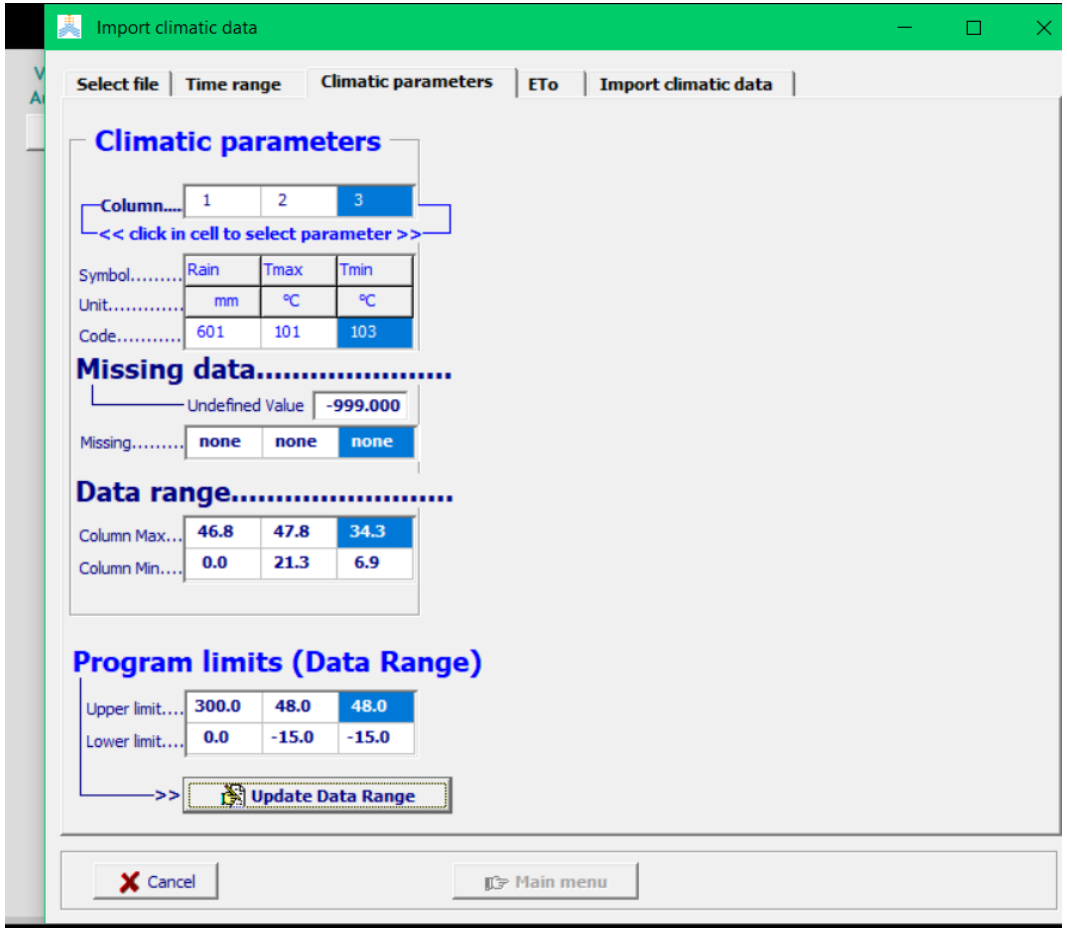


Steps 1-2: change the upper limit of **Tmax** to **48ºC** Finally, click on **Save and Close**

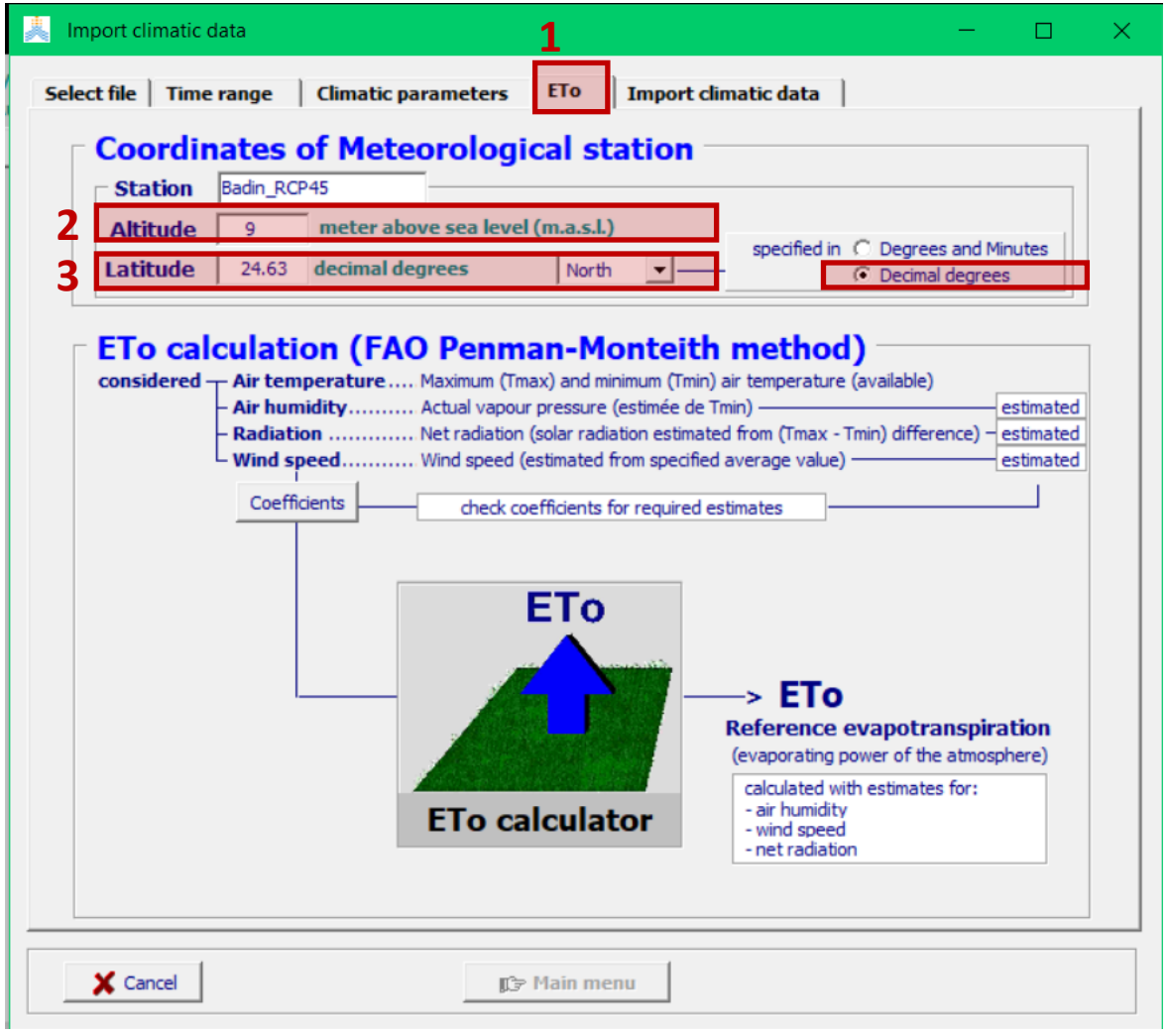


Introduce coordinates

All the imported parameters have been succesfully uploaded!



Step 1: since we are preparing the climatic file for **Badin**, change the **altitude** to **9 masl** and the **latitude** to **24.63 decimal degrees**.



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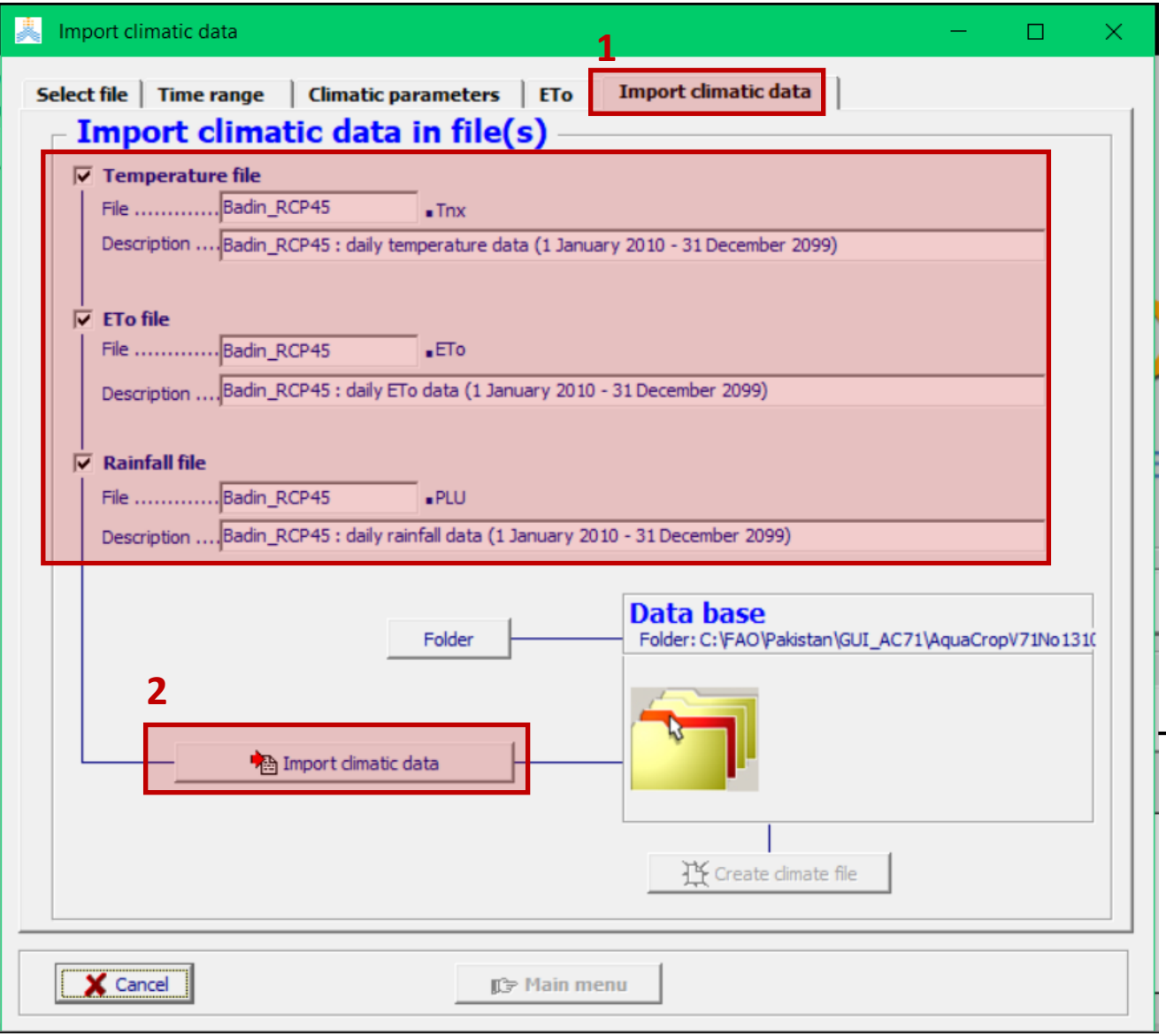
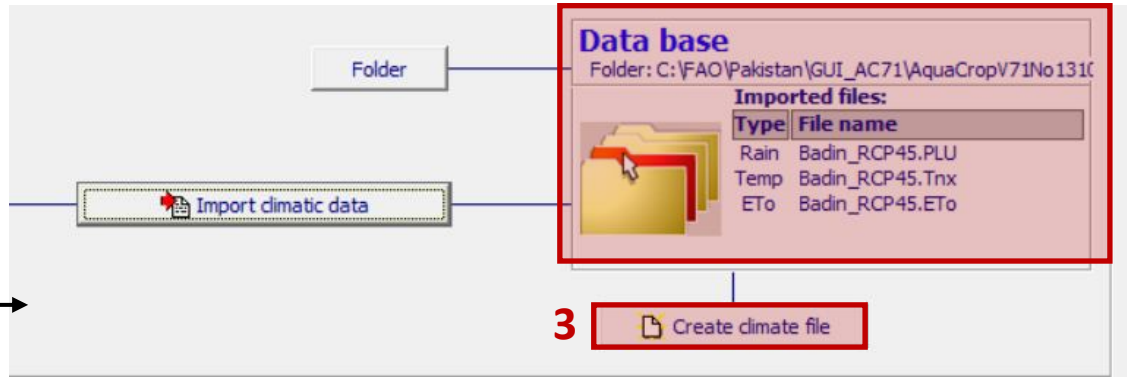
Import climatic data into AquaCrop



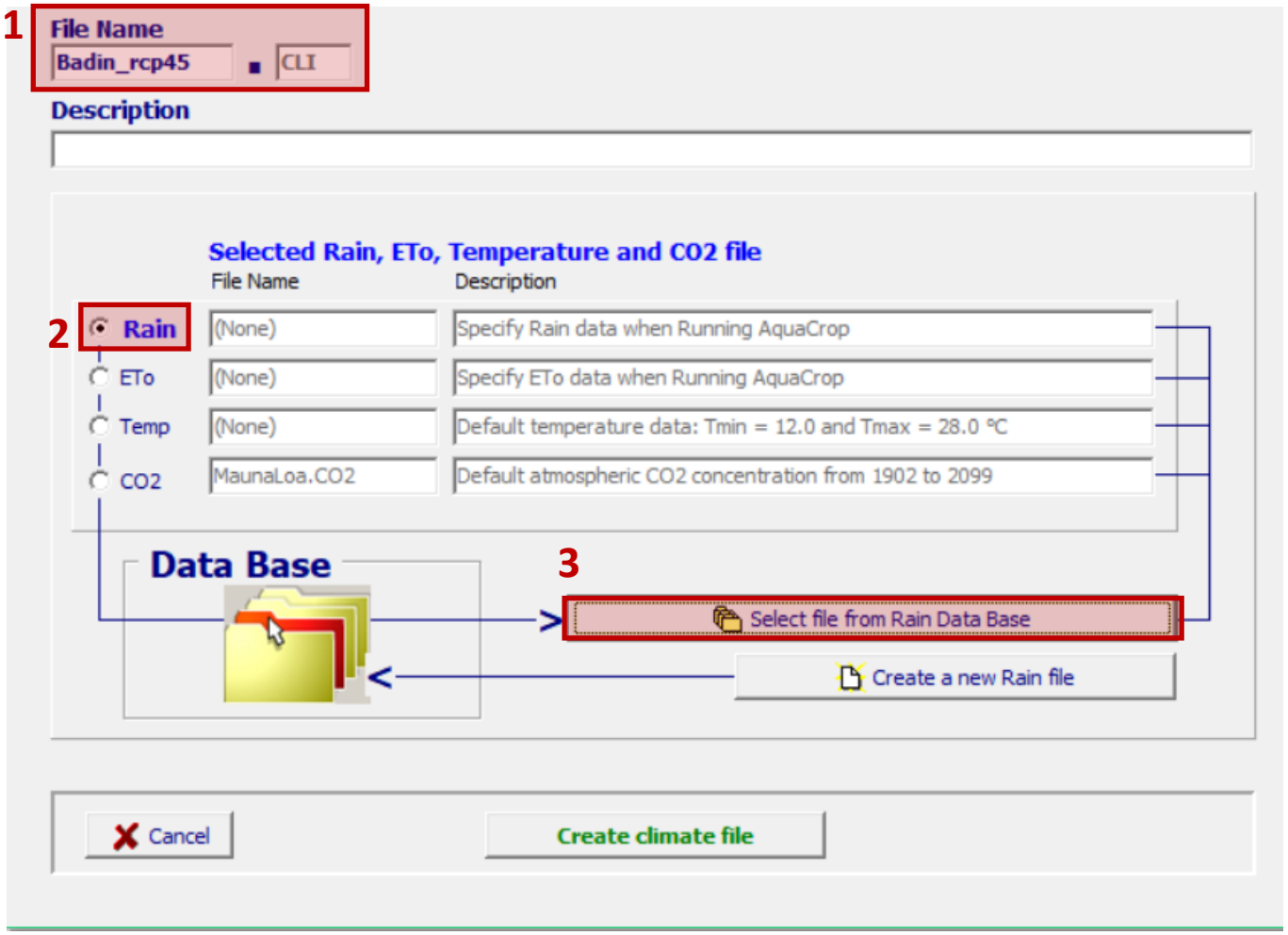
Step 1: click on **Import climatic data** and double check that the temperature, ETo and rainfall files are selected/ticked

Steps 2-3: click on **import climatic data** and then on **create climate file**.

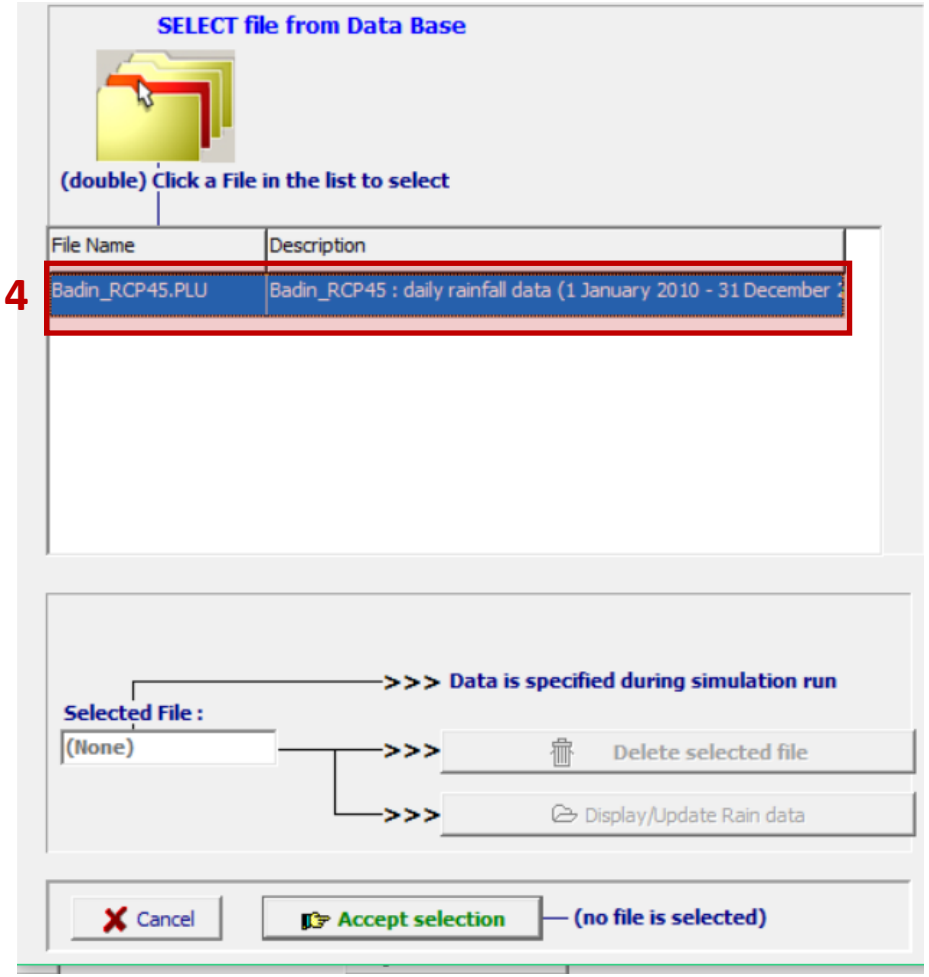


Select the rain file

Step 1: Name the climatic file as **Badin_rcp45**
Steps 2-3: Click on **Rain** and **Select File from Rain Database**



Step 4: Select the correct rain file named: **Cahul_MOHC-HadGEM2-ES_rcp26: daily rainfall**



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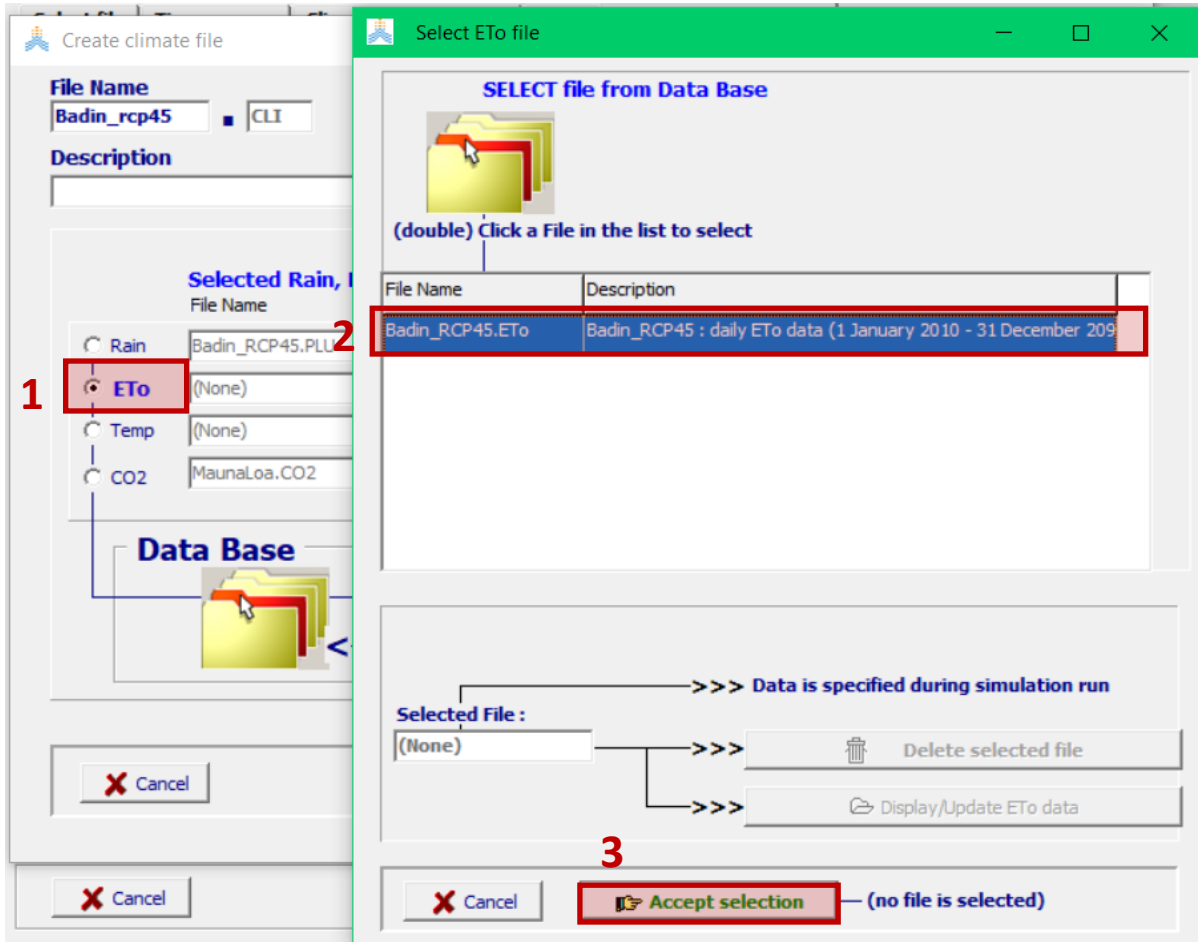
Select the ETo and Temp files

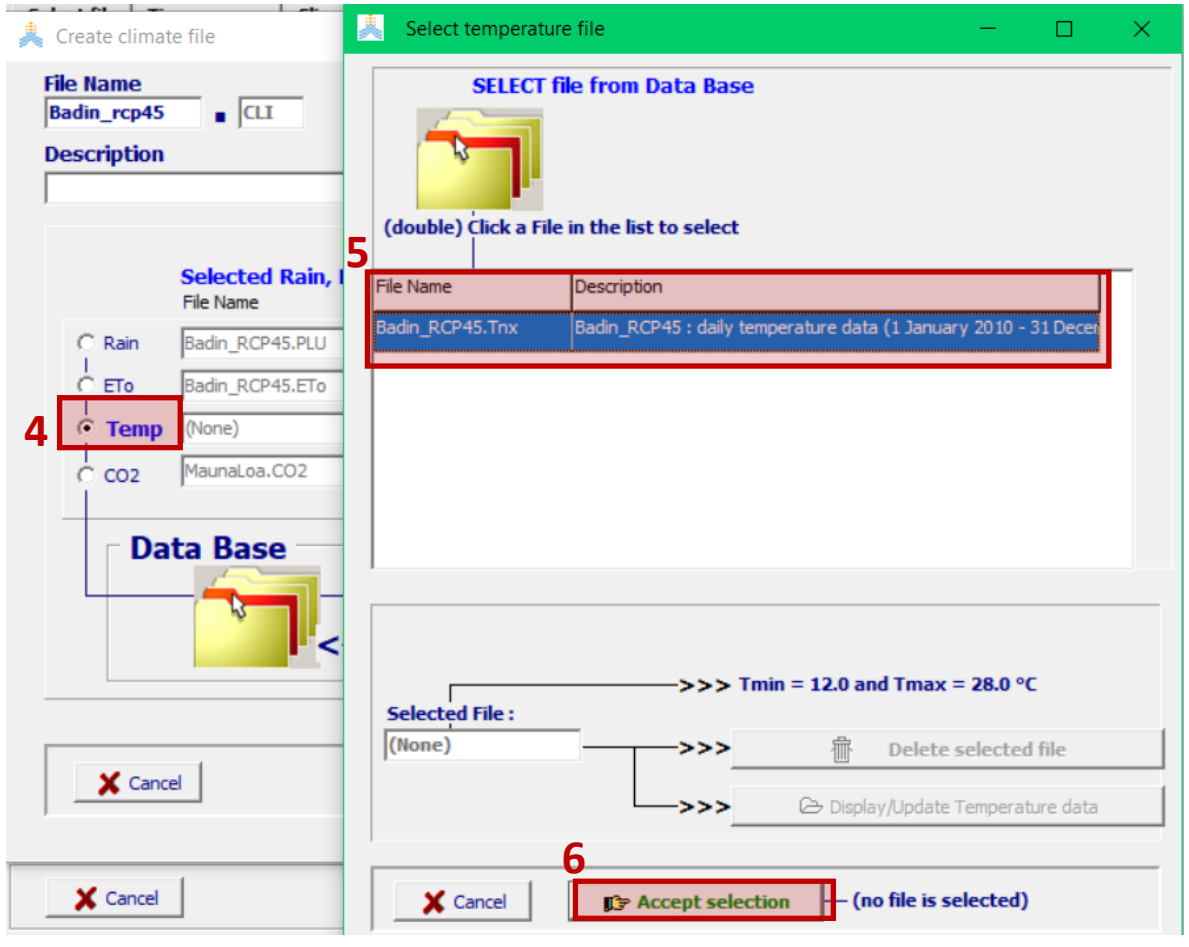
Steps 1-3. Click on **ETo**, select file from **ETo Database** and **accept selection**

Remember that the file is named: ***Badin_RCP45: daily ETo data***



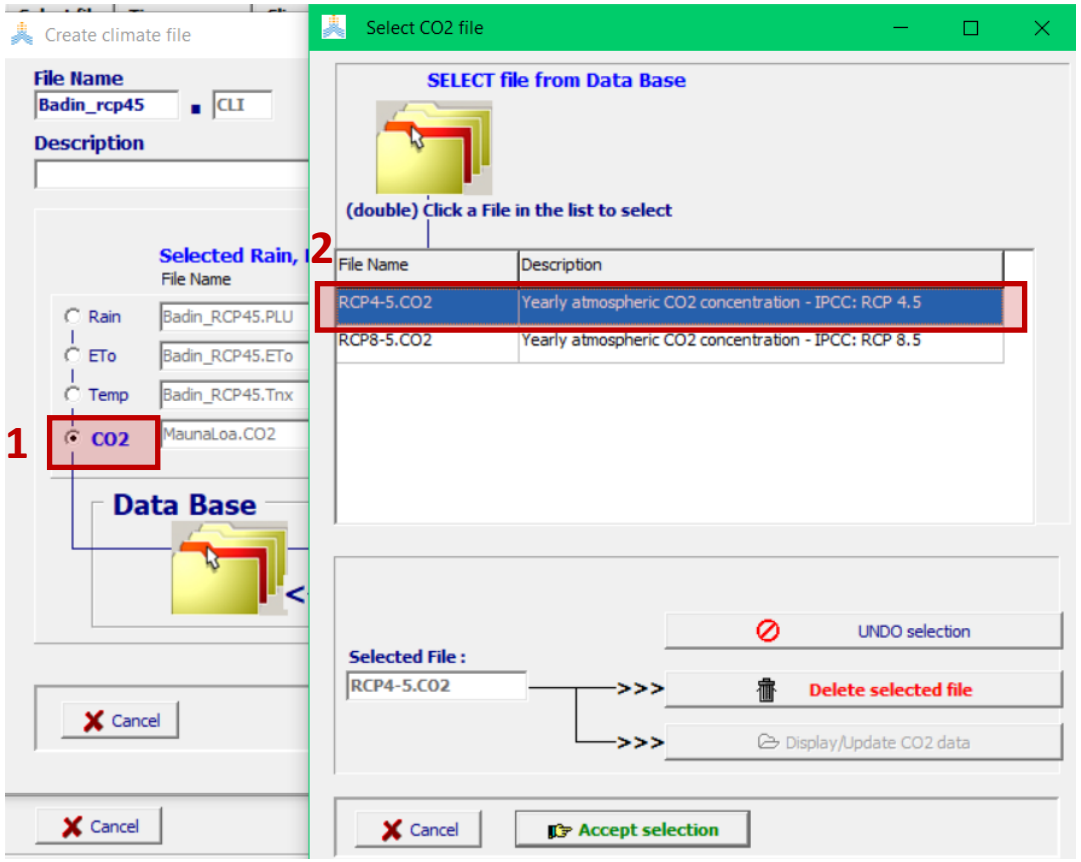
Steps 4-6. Click on **Temp**, select file from **Temp Database** and **accept selection**

Remember that the file is named: ***Badin_RCP45: daily temperature data***

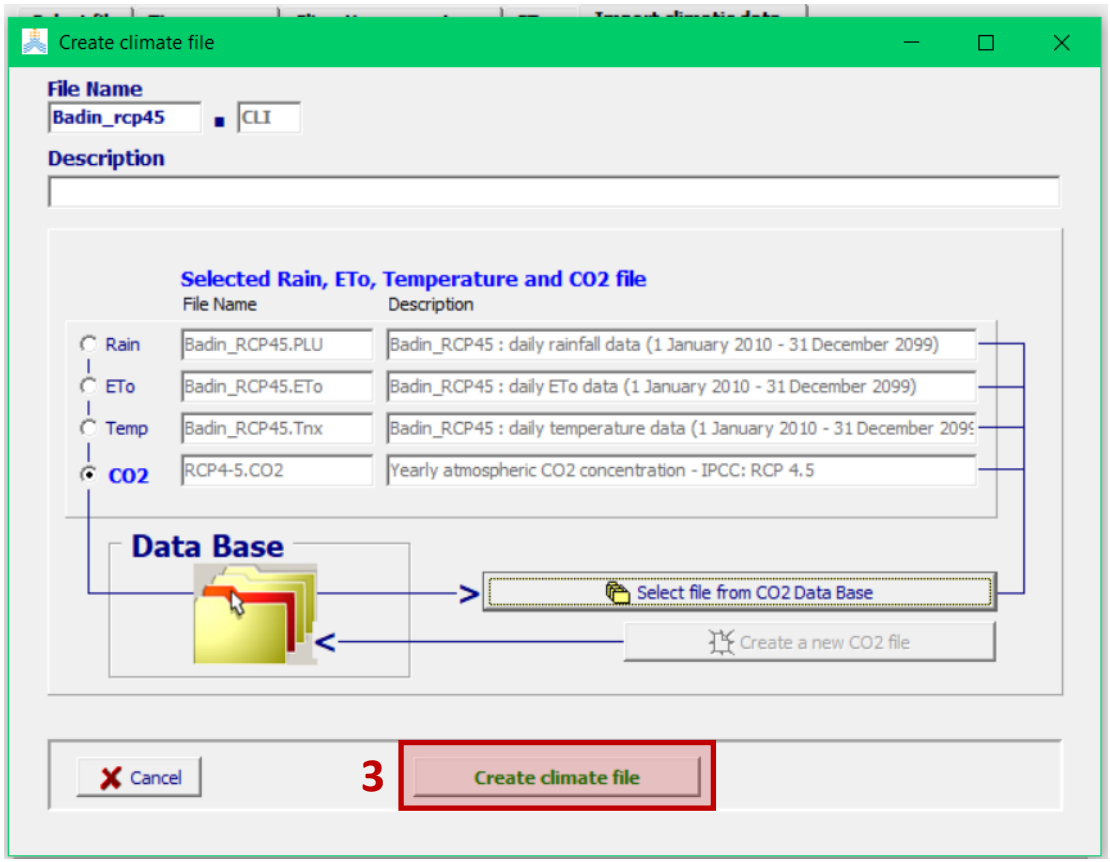


Select the CO_2 file and create climate file

Steps 1-2. Click on **CO_2** and select **RCP 4.5-CO_2** from database



Step 3. Click on **Create climate file**



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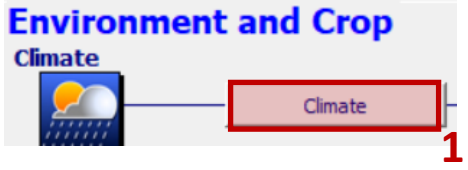
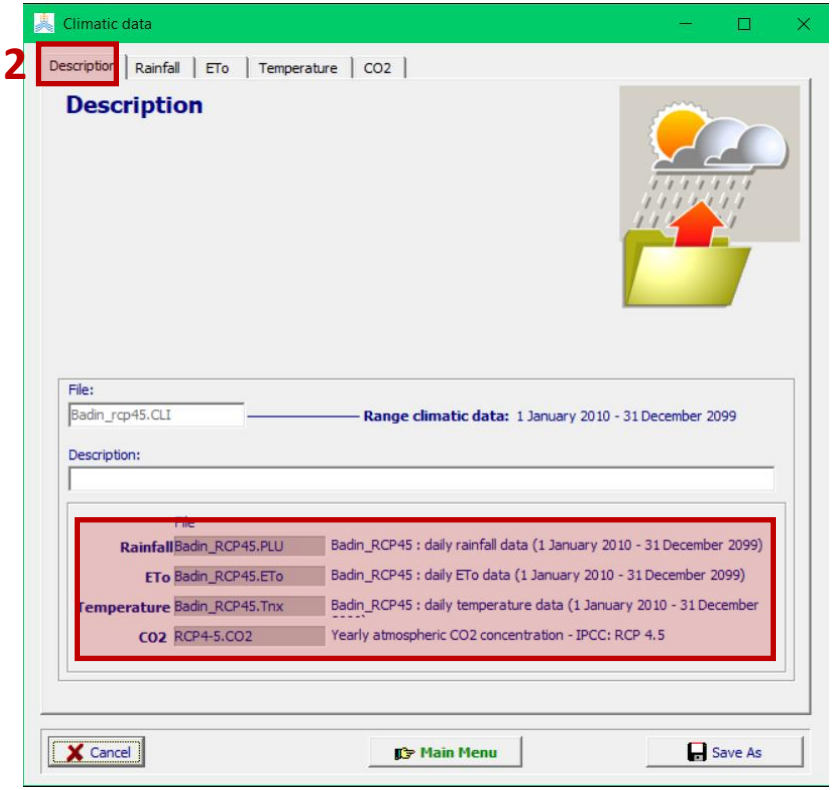
Visualize the climatic results for Badin

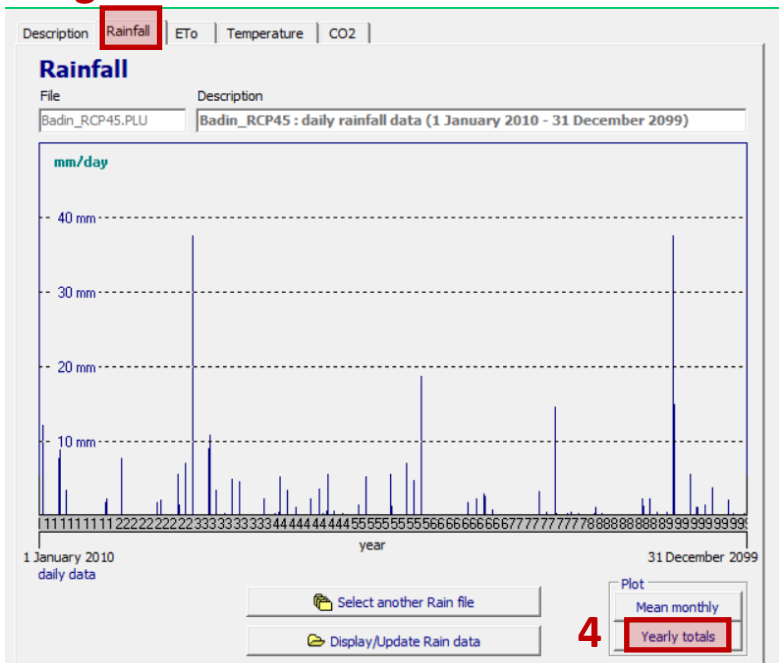


Step 1: Click on the **climate module** and **select Badin_rcp45**

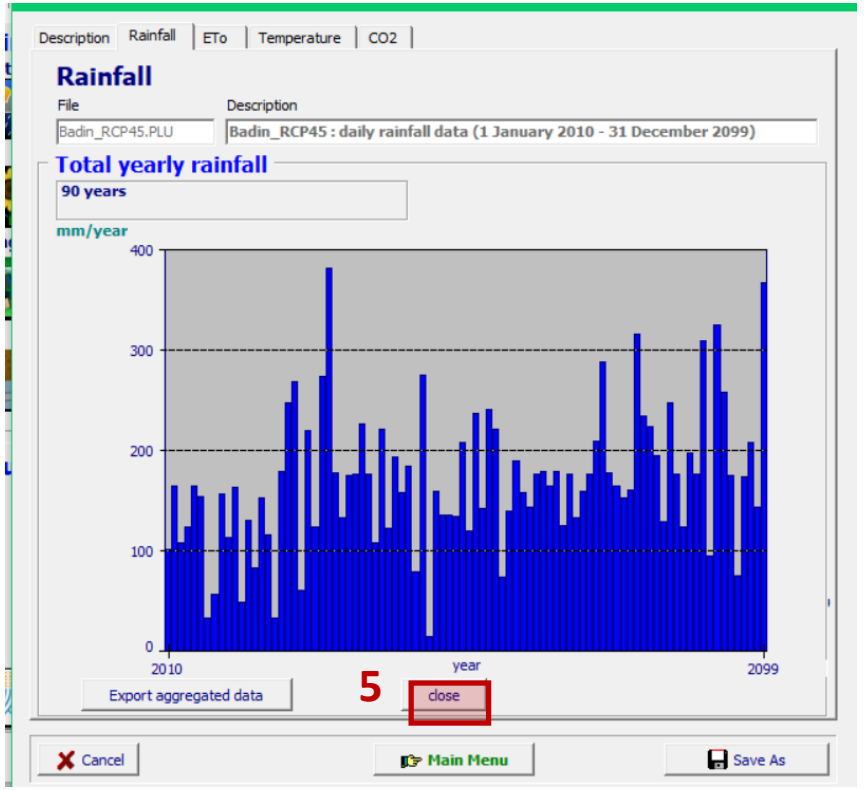
Step 2: In **description**, verify that the climate files are the right ones



Steps 3-4: Click on the **rainfall tab** and on **yearly totals**



Step 5: Visualize the rainfall data and then click on **close**



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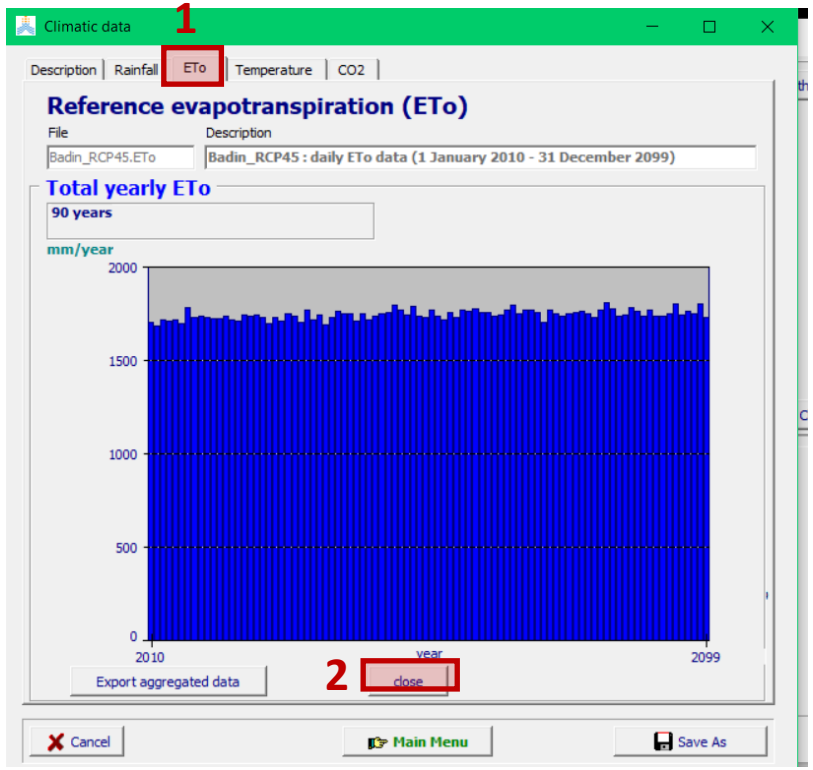
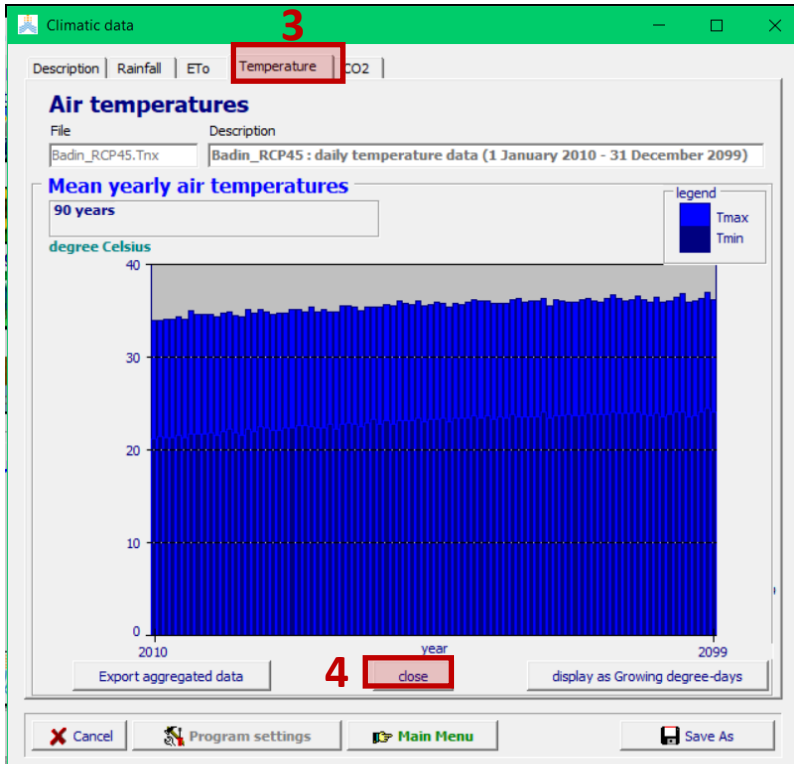
Visualize the climatic results for Badin

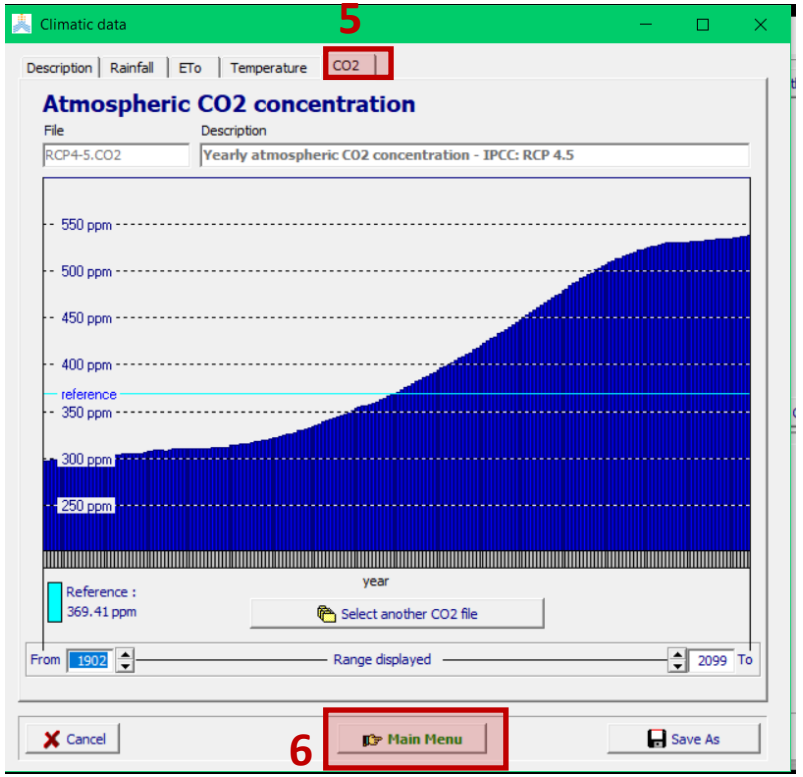
Steps 1-2: Click on the **ETo** tab and visualize the ETo data → then **close**



Steps 3-4: Click on the **Temperature** tab and visualize the temperature data → then **close**



Steps 5-6: Click on the **CO_2** tab and visualize the CO_2 data for RCP 2.6 → then click on **Main Menu**



Take away messages

- Creating climatic files in AquaCrop it is a long, but straightforward process.
- If the user wants to produce daily simulations, daily weather values are required; and so forth for 10-day values and monthly
- To compute ETo, the user needs at least three input climatic parameters (precipitation, Tmax and Tmin).
- The maximum number of climatic parameters is 6.
- AquaCrop automatically computes missing parameters (e.g., wind speed or relative humidity) necessary for running the Penman Monteith equation.
- It is important to use the right naming when saving the climatic files.
- AquaCrop automatically produces visuals for precipitation, ETo, temperature and CO_2.