Climate4Impact portal

Step-by-step examples how to access, visualize and process data

Below some step-by-step examples are given on how to use the Climate4Impact portal. Some more examples can be found on: https://climate4impact.eu/impactportal/help/howto.jsp?q=uc-data-discovery-and-download. This Step-by-step guide was first developed with in the EUSTACE project and will be extended with the IS-ENES3 project

Note (August 2019)!
The Climate4Impact portal will be further developed during the IS-ENES3 project (2019-2023) and moved to a different environment. Meanwhile the portal at https://climate4impact.eu will remain available, but no new information or processing options will be included. When the new portal will become available this will be announced on https://is.enes.org/.

1 How to register and sign in

In the descriptions below we use the climate4impact portal (https://climate4impact.eu) to show step-by-step how gridded climate data (in NetCDF) can be accessed, visualized and processed. This portal has been developed by the IS-ENES project and offers many options to visualize and process data. There are also other portals or tools available that can do (partly) the same things.

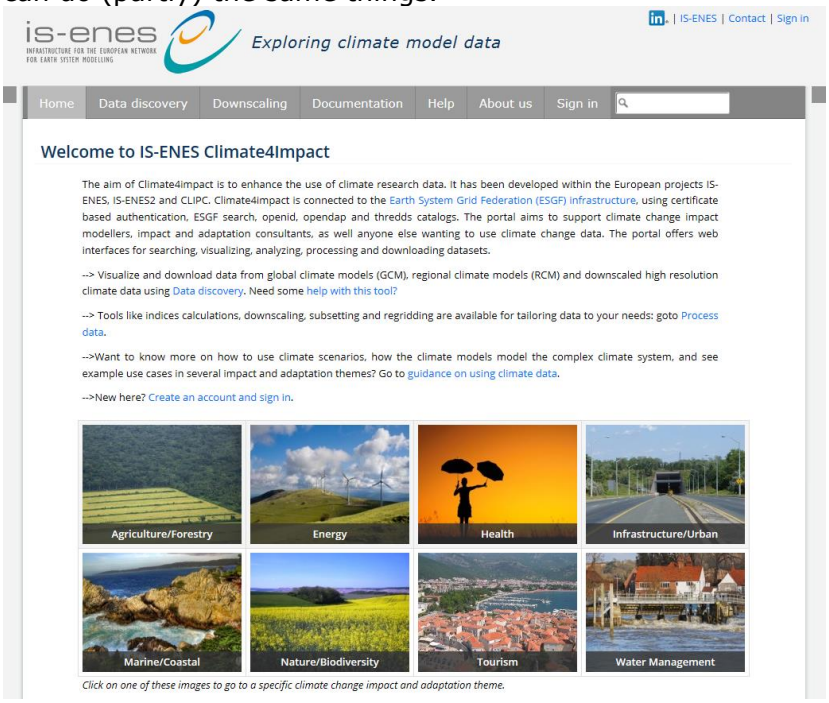

Figure 1.1 Starting page of the Climate4impact portal (https://climate4impact.eu).

To get access to certain datasets within the Climate4impact portal you have to get an account and sign in. Some datasets are freely available to all persons who want to use them, others are only available to a restricted group, e.g. only for research and not for commercial use. Below we show how you can register and sign in.

- First go to "Sign in" on the top right of the home page and you will get the screen in figure 1.2. (https://climate4impact.eu/impactportal/account/login.jsp). If you want to use the Climate4impact portal, it is easiest to sign in first. If you do not sign in directly you can see what data sets are available, but you cannot process the data without signing in if there are restrictions on the use of the data set. When you select the datasets of your interest, you will be asked to sign in at a later stage (in case of restricted data sets).
- If you do have a CEDA/BADC account, click on "Sign in with CEDA/BADC" and you will get the screen in figure 1.3. After filling in your user name and password, click on "sign in".
- If you do not have such an account, click on "Register" to get one. You will get the screen in Figure 1.4.

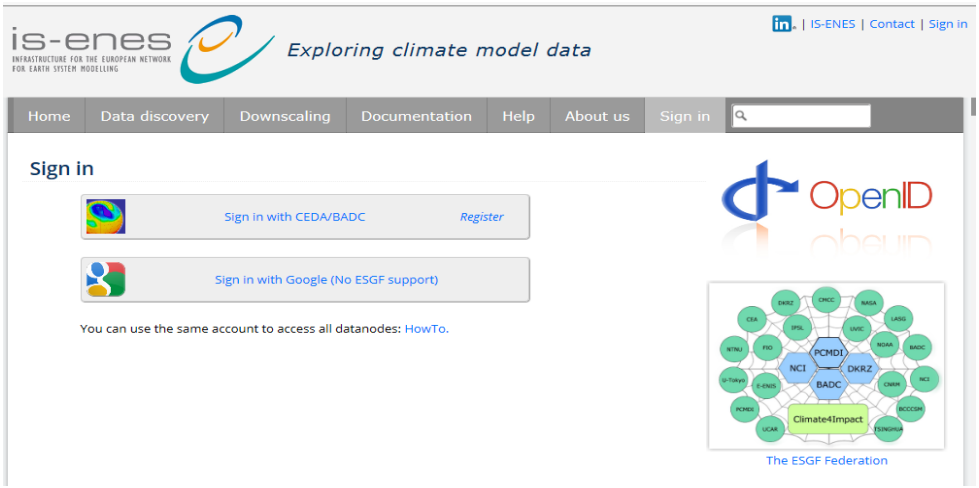

Figure 1.2. Screen to sign in at the Climate4impact portal.

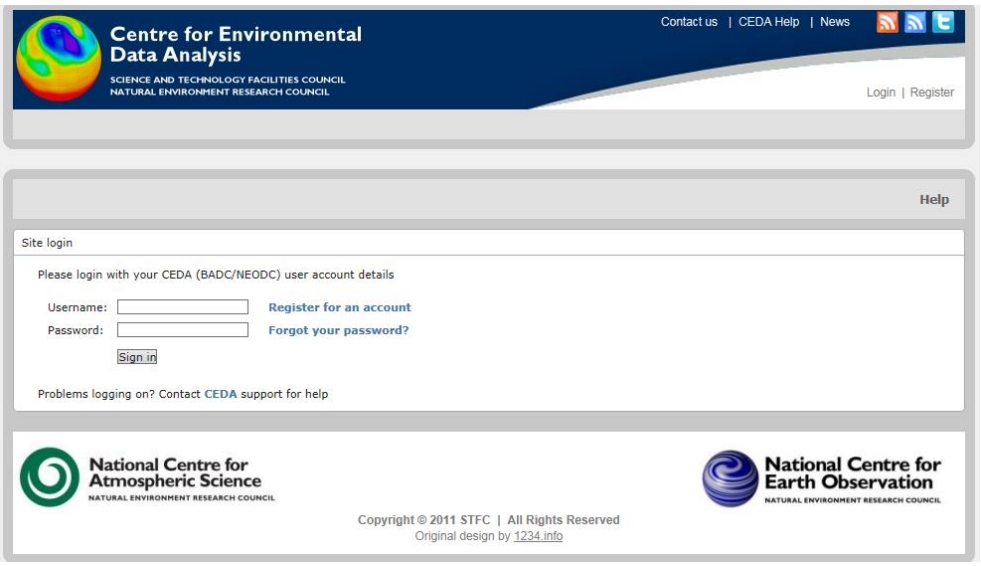

Figure 1.3. Screen to sign in with your CEDA/BADC account in the Climate4impact portal.

- If you want to use the Climate4impact portal, it is easiest to sign in first. If you do not sign in directly you can see what data sets are available, but you cannot process the data without signing in if there are restrictions on the use of the data set. When you select the datasets of your interest, you will be asked to sign in at a later stage (in case of restricted data sets).
- If you want to register, go to "continue". Fill in the form below (Figure 1.5).

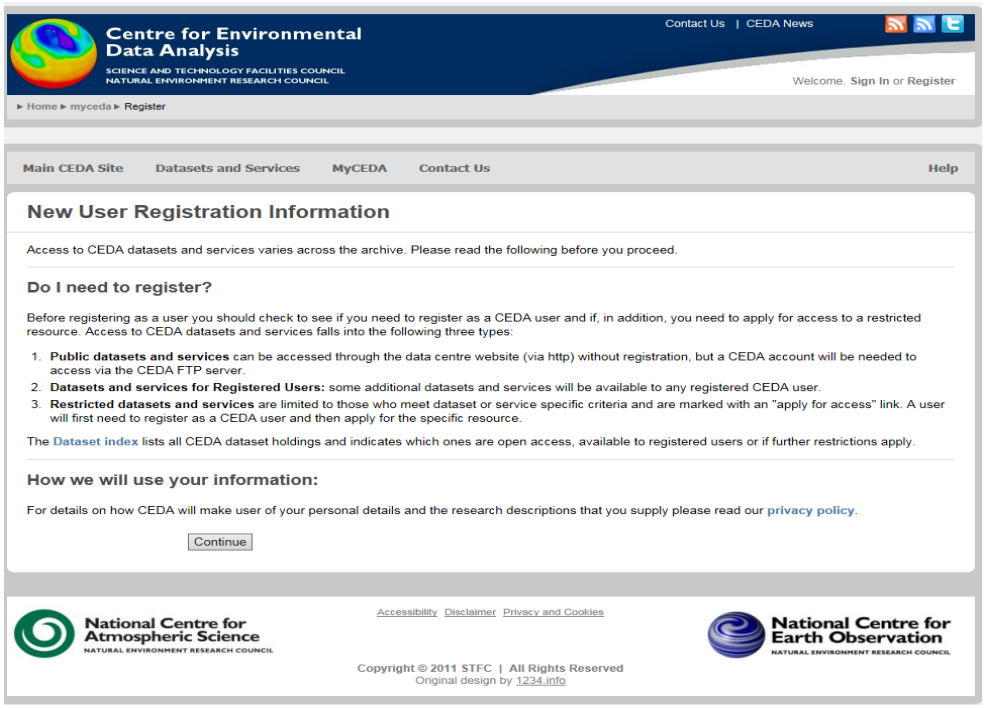

Figure 1.4. Starting screen to register for a CEDA/BADC account.

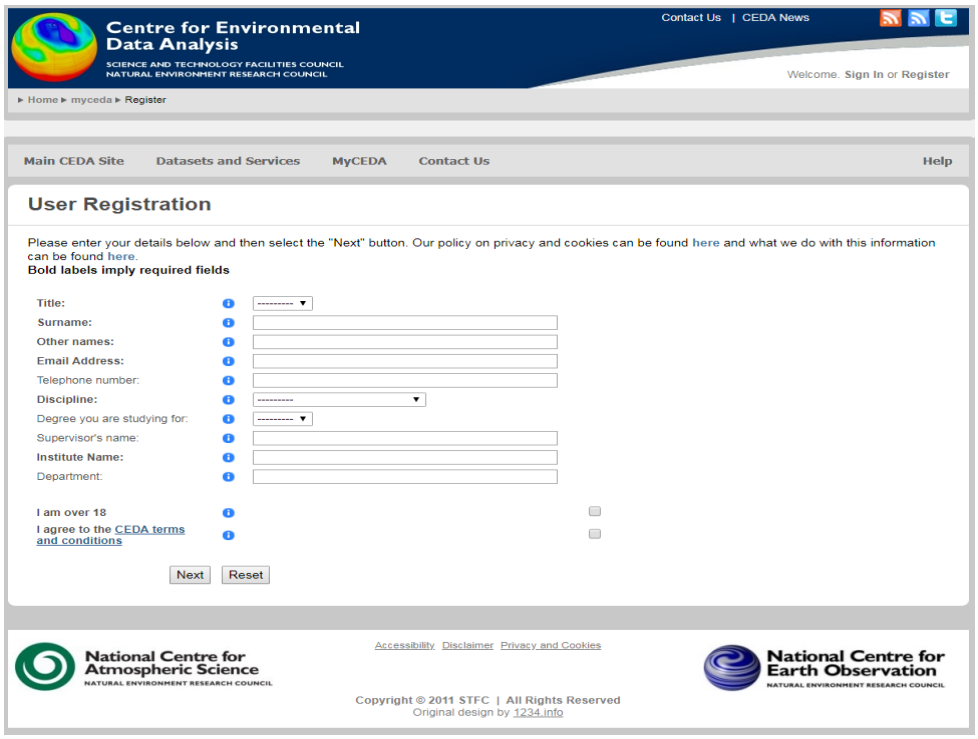

Figure 1.5 User registration form to register for a CEDA/BADC account.

- After filling in the form proceed by clicking on "next". A username has been automatically generated, but you can enter an alternative name. Choose your password and go to "OK" (Figure 1.6).
- Figure 1.7 shows the screen you get after you've successfully registered. After this you will have access to all available datasets. No further applying for freely available datasets is required.
- Now sign in with your CEDA-account on the Climate4Impact portal (Figure 1.3): go to https://climate4impact.eu. Do not sign in through the "Login to my CEDA" through the screen in Figure 1.7 (this will bring you to the CEDA portal). After

singing in on the Climate4Impact portal you will get the screen in Figure 1.8 indicating that you signed in successfully. Depending on where you are working from, you may get some screen first where you may be asked to allow for something before getting the screen in figure 1.8.

- When you have the screen in figure 1.8 you can click on "Home" to go again to the home page of the Climate4Impact portal (Figure 1.1, but now signed in).

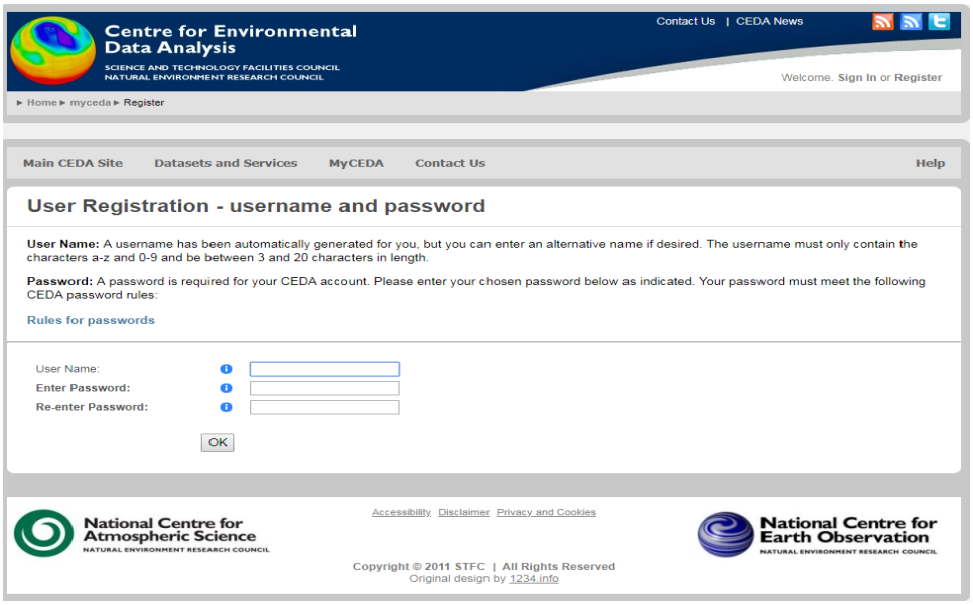

Figure 1.6. Screen for user registration: adjust user name and choose password.

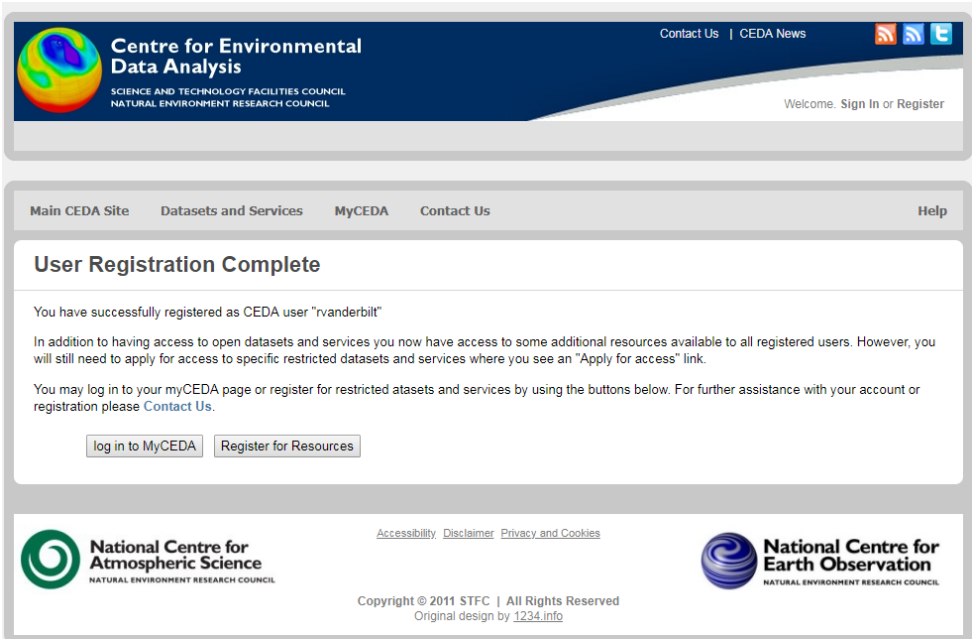

Figure 1.7. Screen after successfully registering.

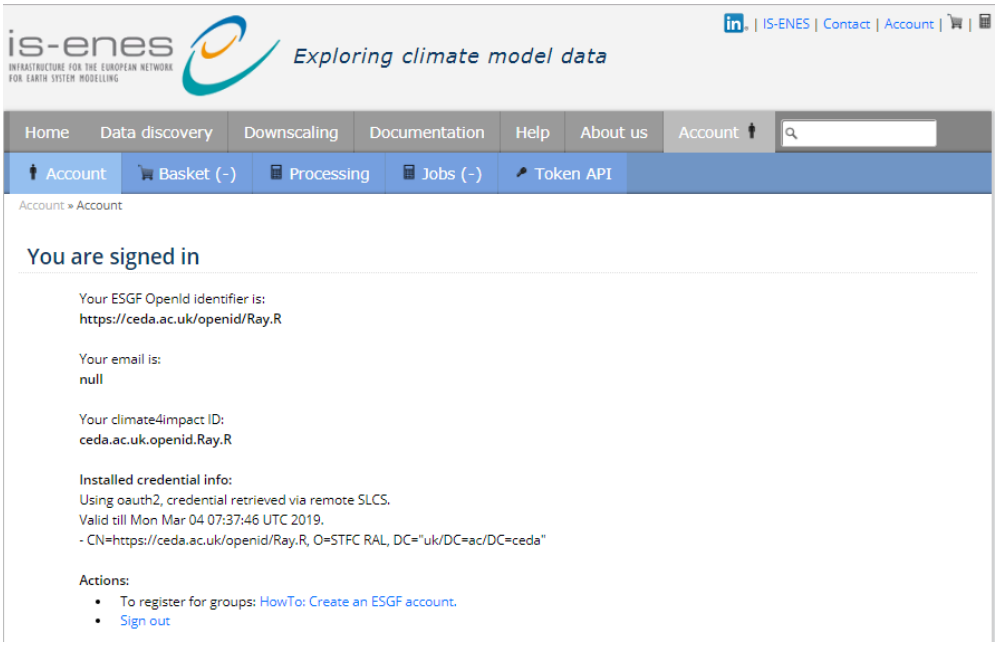

Figure 1.8 Screen after successfully signing in.

2 How to find and access data sets

Here we show how to get access to an E-OBS dataset. The E-OBS data set is the gridded dataset based on station data collected in the European Climate Assessment Database (ECAD).

- Go to 'Data discovery' and then to 'Catalogs' (See figure 2.1).

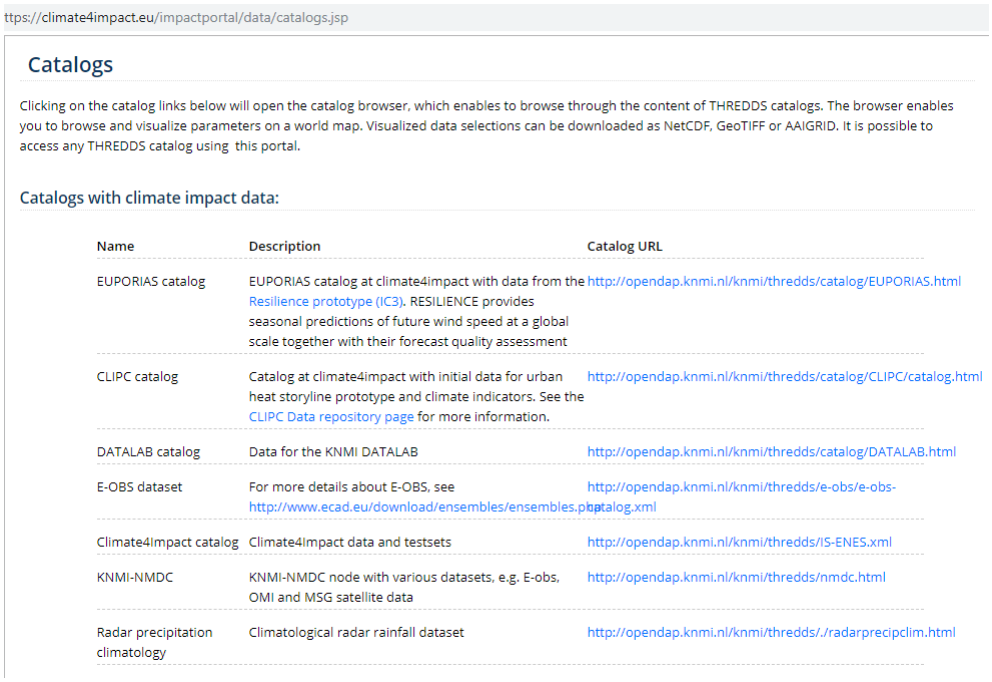

Figure 2.1. The catalogues page within the Climate4impact portal.

- Then go to 'E-OBS dataset' and click on the 'Catalog URL'. You'll get the page shown in Figure 2.2. (E-OBS cannot be found under "Search" in this case).

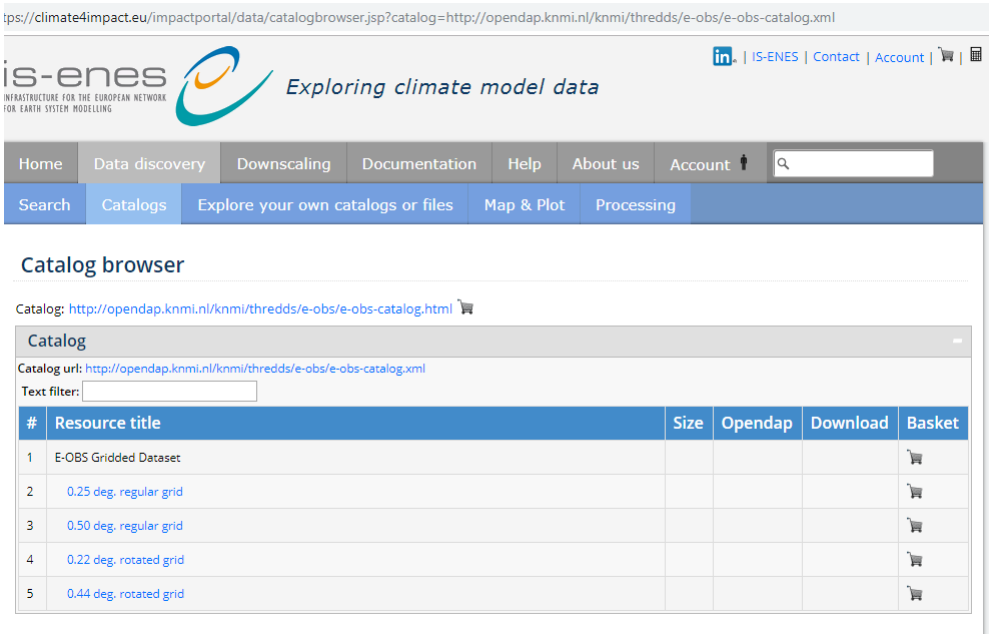

Figure 2.2. The catalogs page for the E-OBS datasets in the Climate4impact portal.

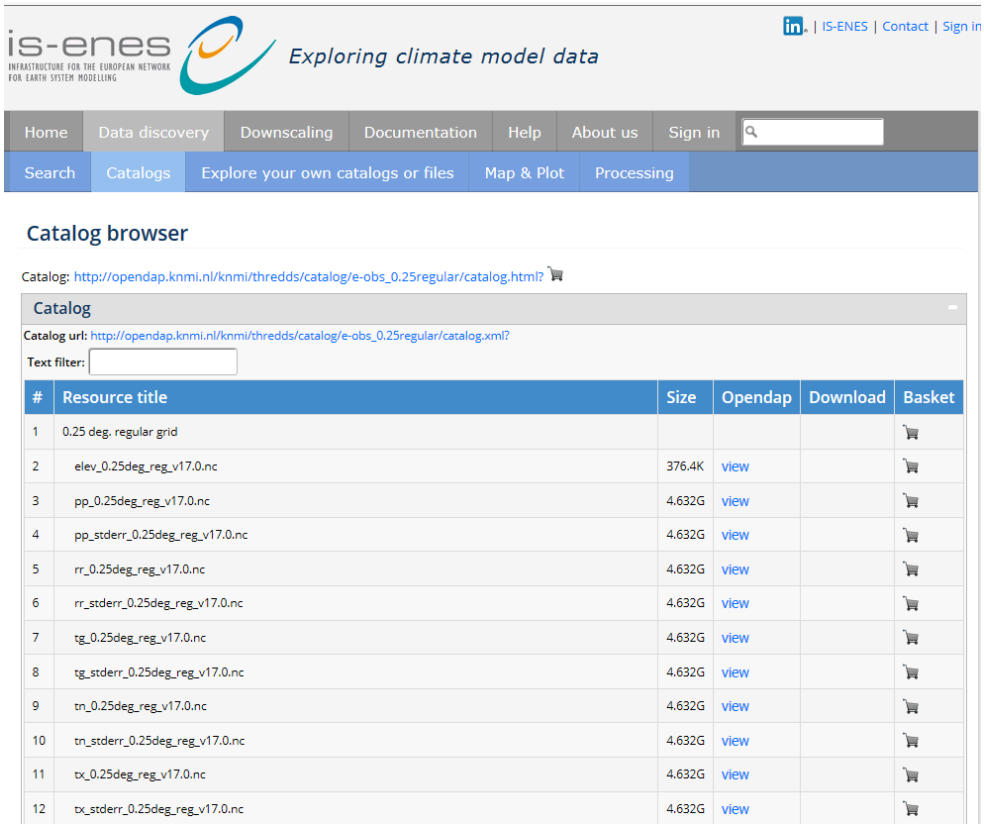

Figure 2.3. The screen with an overview of the available climate variables in the selected E-OBS dataset in the Climate4impact portal.

- Choose the E-OBS Gridded Dataset you would like to use and click on the "basket". In this case '0.25 deg. regular grid' was chosen. You will get a screen with the various climate variables available in this data set (see figure 2.3). In our case we selected "Tx_0.25_deg_reg_v17.0.nc" in which Tx stands for the maximum air temperature[1] and v17.0 indicates that it concerns version 17.0 of this dataset (not with the homogenized temperature data yet).
- If you click on the "basket" at the right side of the selected variable you can get the dataset in your account. If you didn't sign in yet, you will be asked to do so at this moment (see figure 2.4).

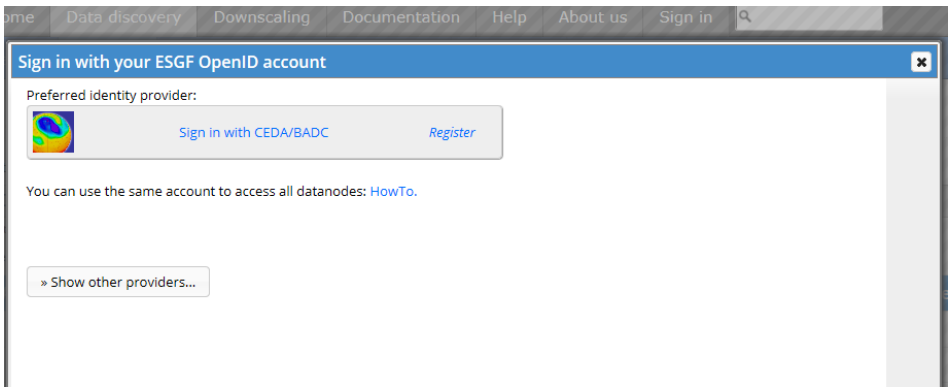

Figure 2.4. The screen you get when you're asked to sign in before you can get access to the selected dataset in the Climate4impact portal (if you didn't sign in yet).

[1] Different variable codes may be used for the same climate variable. For Maximum air temperature sometimes Tx is used, but Tasmax is also used in some cases.

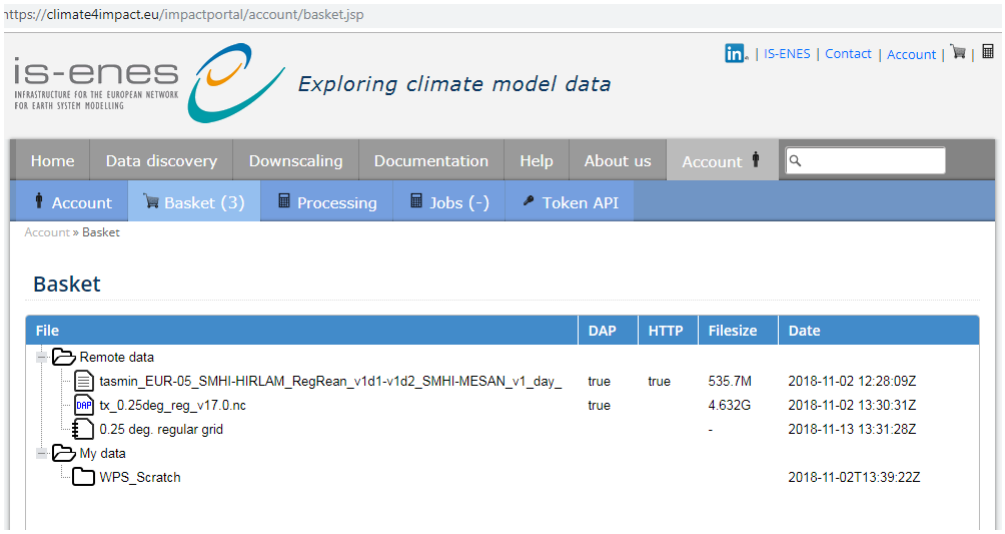

Figure 2.5. Your "basket" after you've selected some E_OBS gridded datasets in the Climate4impact portal.

- Then go to 'Account' and 'Basket' on the upper side of your screen. You will see something similar as shown in Figure 2.5.
- The dataset has been added to your basket (tx_0.25deg_reg_v17.0.nc).
- Click on the dataset and then click on "view" in the bottom of the screen to preview the dataset (figure 2.6).

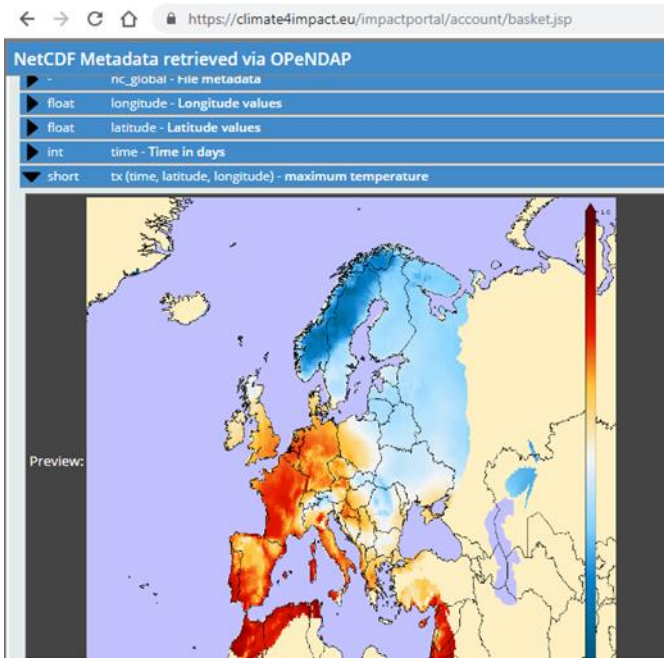

Figure 2.6. Preview of the dataset in your basket.

3 Processing: select an area

After you added the data set to your basket, you can start processing the data by using 'Processing'. Here we show how you can select a sub region of the dataset.

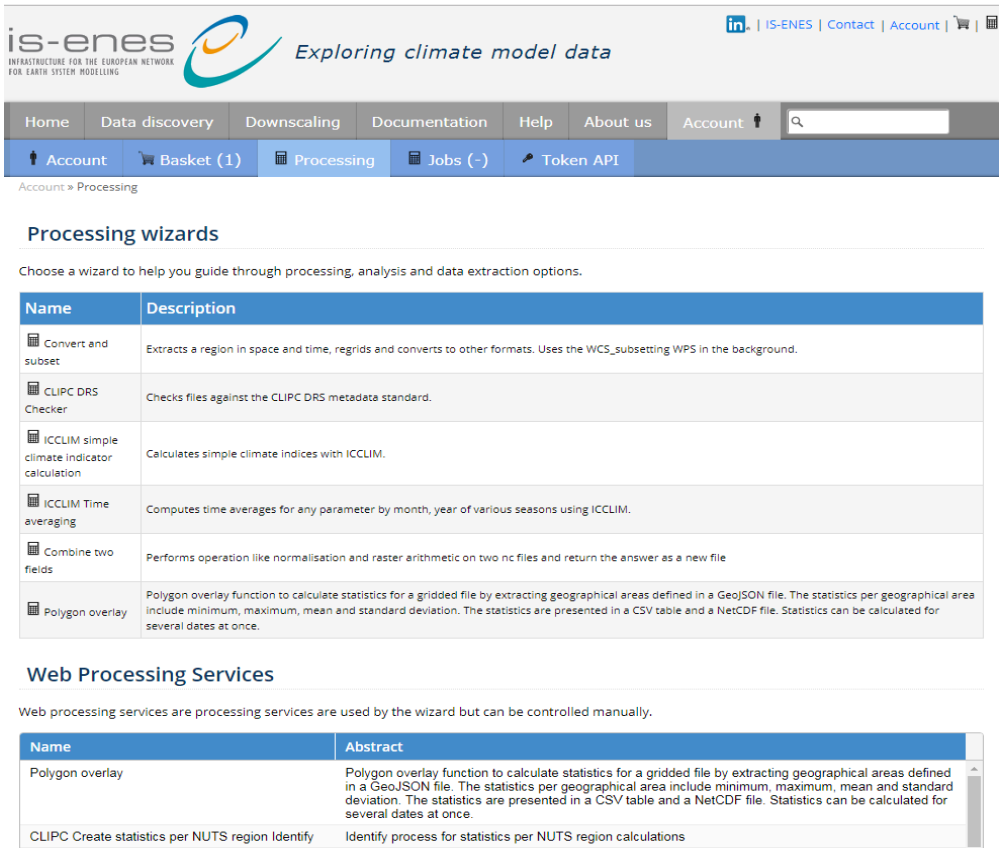

Figure 3.1. The screen you get when you click on "Processing".

- To 'narrow' the dataset (geographical extend) to The Netherlands, go to 'Processing' (in this example another data file than the E-OBS dataset has been used; Figure 3.1).
- To select a region go to 'Convert and subset' (Figure 3.2).
- Now select a file (Resource, Please select a file) by clicking on the symbol basket (figure 3.3).
- Double click on file you want to use and something similar to Figure 3.4 will appear.

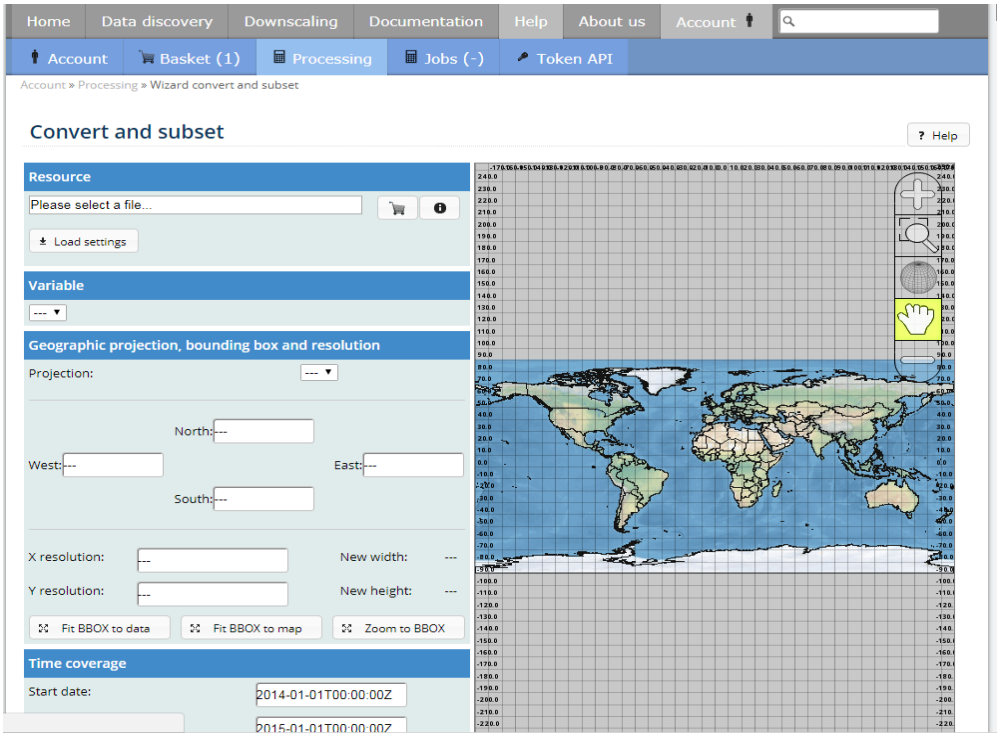

Figure 3.2. The screen you get when you click on "Convert and subset".

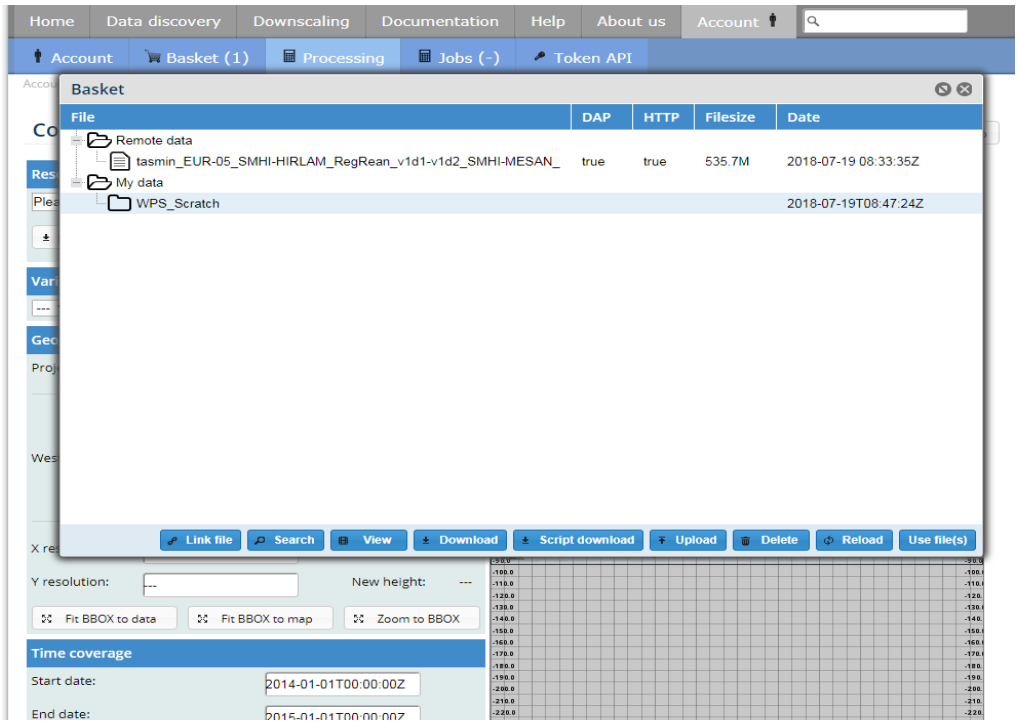

Figure 3.3. The screen you get when you click on the basket after "Please select a file".

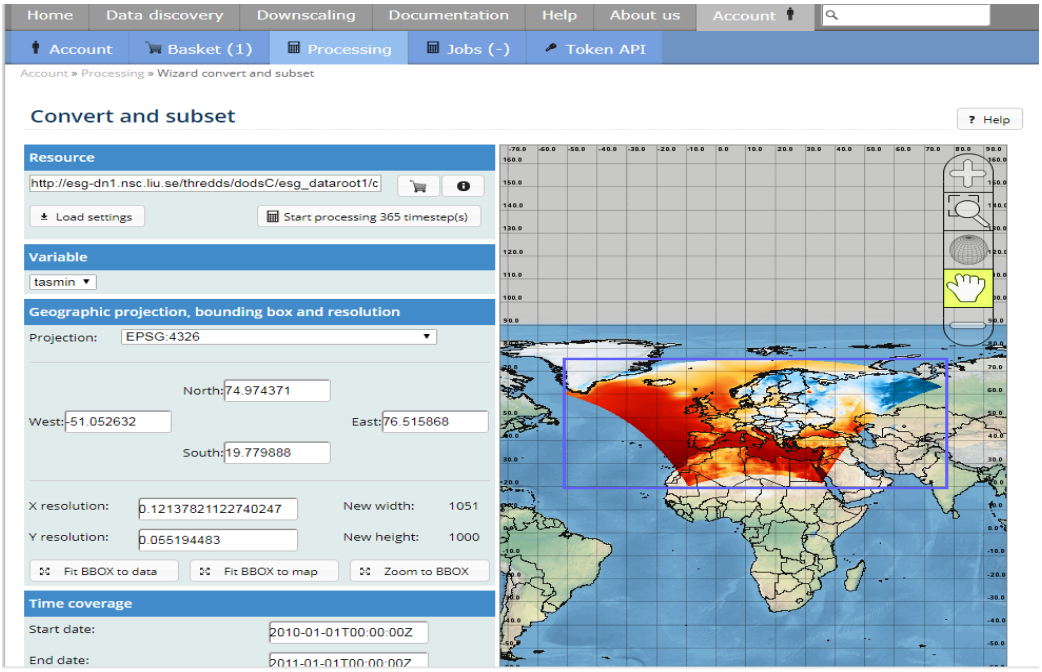

Figure 3.4. The screen you get when you select the file after clicking on "Convert and subset".

- The file has been loaded and is ready for adjustment. To adjust the file to "The Netherlands area", change the coordinates (e.g. 50 degrees South, 0 degrees West, 55 degrees North and 10 degrees East) under 'Geographic projection, bounding box and resolution'.
- The selected area is shown in the blue deliniated rectangle on the map (the blue rectangle in figure 3.4 is the area in the original file and will be adjusted with the new coordinates).
- To zoom in to the selected area, choose 'Zoom to BBOX' (just above 'Time coverage'). 'Fit BBOX to map' selects all the data in the selected map, to go back to the whole data file, choose 'Fit BBOX to data' followed by 'Zoom to BBOX'. It is also possible to zoom using the mouse by clicking on the '+' on the top right in the map or selecting the 'magnifying glass' (top right) followed by using the left mouse button to The Netherlands area.
- Under 'Format' you can select the file format, default .nc (or geotiff or aaigrid if wanted). The available file has a .nc extinction. If you don't adjust the file name, the name will automatically be 'out.nc' (default) or 'out.zip' if geotiff or aaigrid has been selected.
- Now start processing with 'Start processing 365 (one year) time step(s)' (top left under 'Resource'). You will get the box as presented in figure 3.5.
- Choose 'Start' after checking and confirming the processing settings. If the settings are not correct, use 'Cancel' to go back to the former screen and to adjust e.g. the variable, geographic projection, bounding box, resolution, the time period used and the area selected.

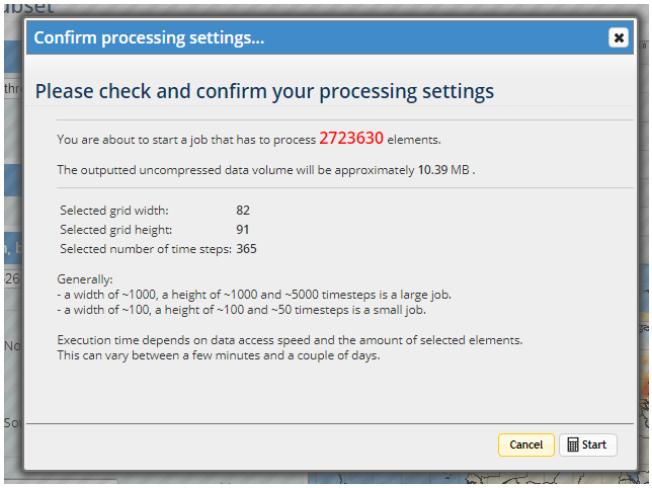

Figure 3.5. The box that will appear after you clicked on 'Start processing 365 (one year) time step(s)'.

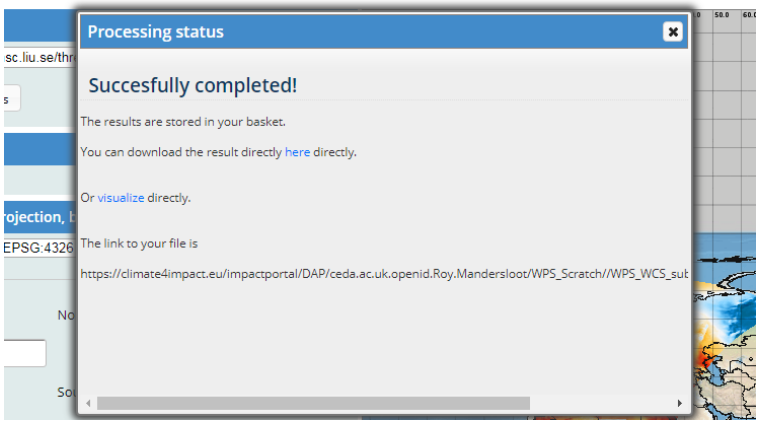

Figure 3.6. The box that will appear after the processing has been completed successfully.

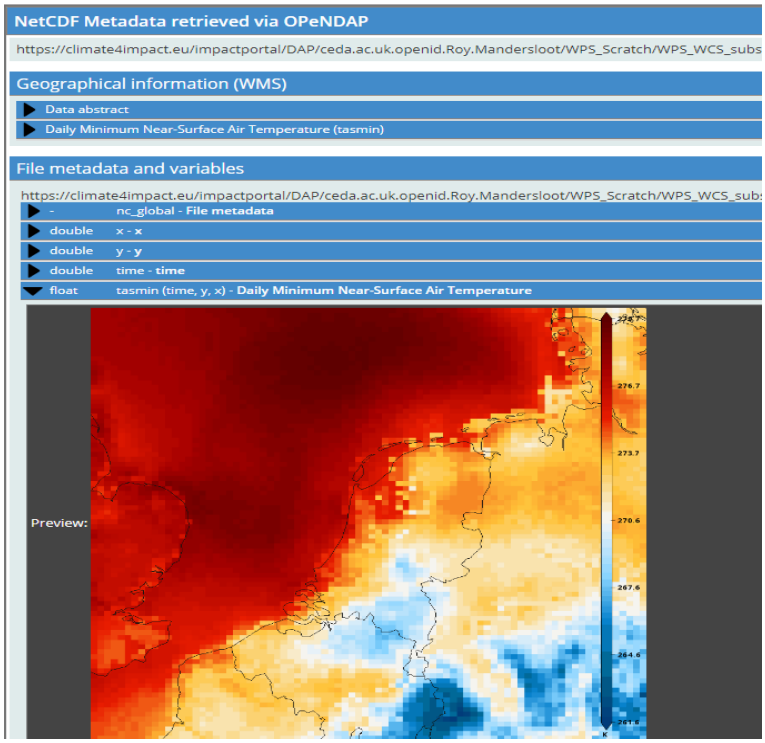

Figure 3.7. Visualisation of the processed dataset.

- The data are now available in a NetCDF format.
- After the processing is successfully completed (Figure 3.6) the data can be downloaded (filename out.nc if not adjusted) or visualized (Figure 3.7).
- The data can also be found in your basket. Go to 'Basket' and after double clicking on 'out.nc' the following appears.
- Data and file information can be found under 'NetCDF Metadata retrieved via OPeNDAP', 'Geographical Information (WMS)' and 'File metadata and variables' (Figure 3.7).
- By double clicking in the map the viewer in Figure 3.8 appears.
- With this viewer you can select and add (predefined) layers, base maps and overlays and play animations. For animations click on the clock in the top left part of the screen in figure 3.8 and you will get the screen in figure 3.9. Select the starting time and on 'Play animation' to start it.

Figure 3.8. Screen shot of the viewer.

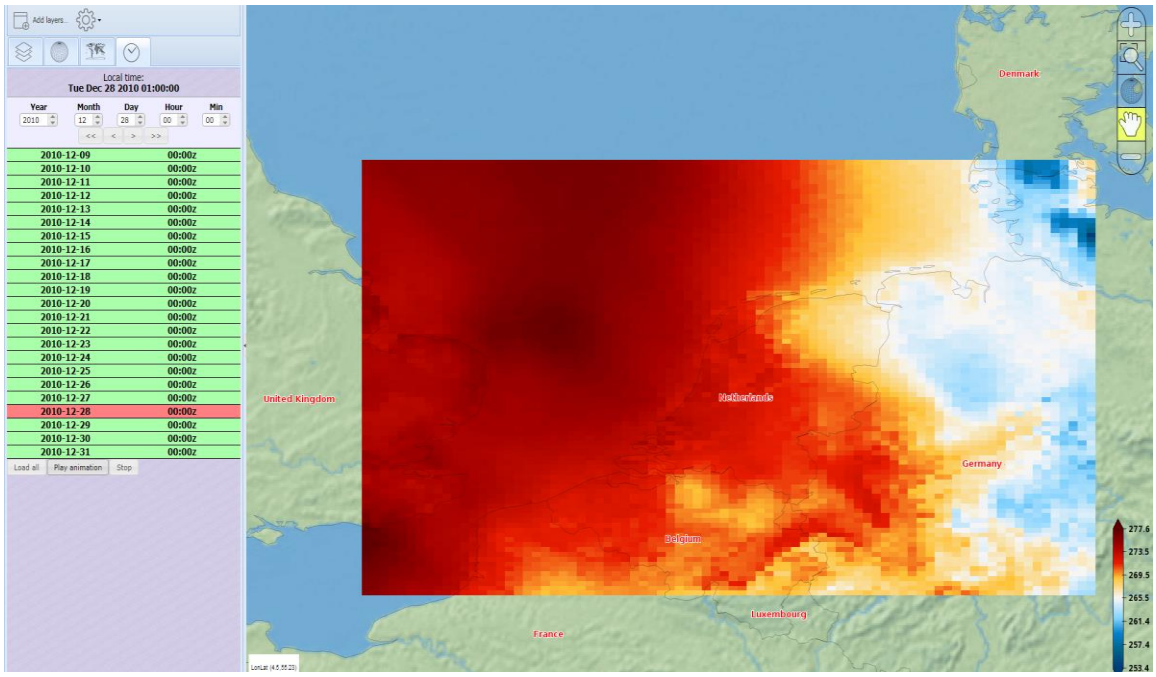

Figure 3.9. How to start animations within the viewer.

There are more options to select an area than just defining a rectangle (e.g. select a country). This is not explained at the moment in this document.

4 Processing: select a time period

Besides narrowing the area you can also select a time period. Here we show how you can select a time period of the dataset (in this case one month, January 2010).

- To select a time period of the dataset, go to 'Processing' (in this example another data file has been used). To select a time period go to 'Convert and subset' (Figure 3.2).
- Now select a file (Resource, Please select a file) by clicking on the symbol basket (figure 3.3).
- Double click on file you want to use and something similar to Figure 3.4 will appear.
- The file is now loaded and is ready for adjustment. To adjust the file to one month (January 2010), go to under 'Time coverage and adjust the 'End date' to 2010-02-01T12:00:00Z (see figure 4.1). (for other options for adjustments (format, area, etc.) look in chapter 2)
- Now start processing by clicking on 'Start processing 32 (one month) time step(s)' (top left under 'Resource'; here with an example for 1 year=365 time steps). You will get the box as presented in figure 4.2.
- Choose 'Start' after checking and confirming the processing settings. If the settings are not correct, use 'Cancel' to go back to the former screen and to adjust e.g. the variable, geographic projection, bounding box, resolution, the time period used and the area selected. When the processing is ready you will get a similar screen as presented in figure 3.6.

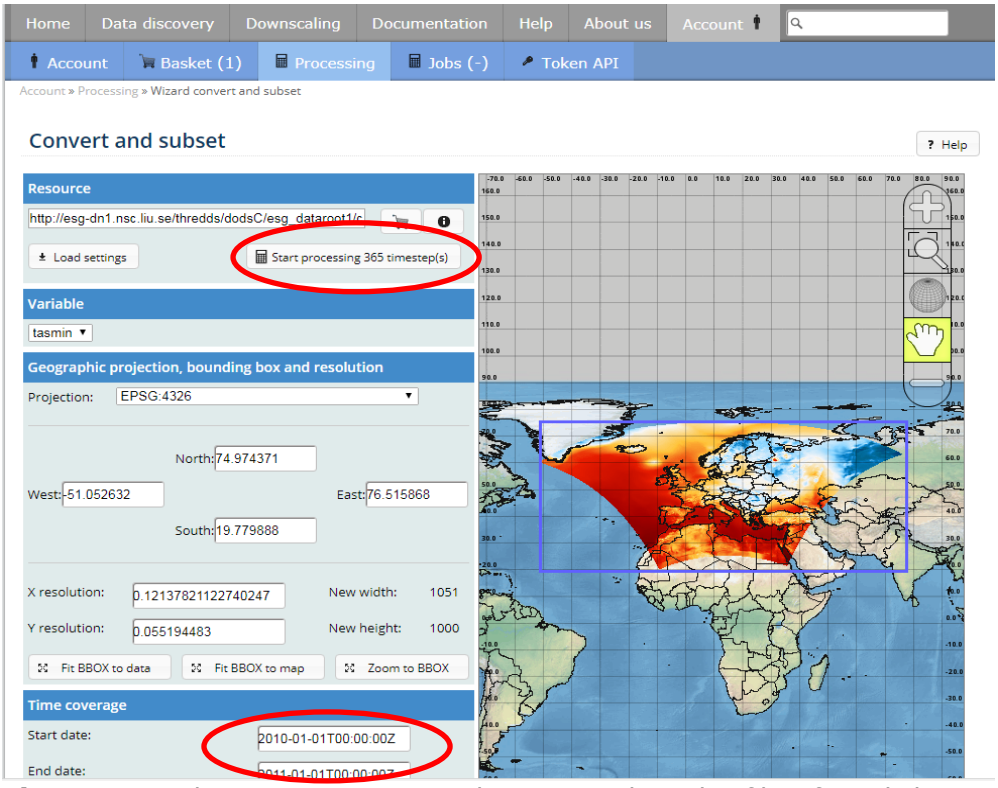

Figure 4.1. The screen you get when you select the file after clicking on "Convert and subset".

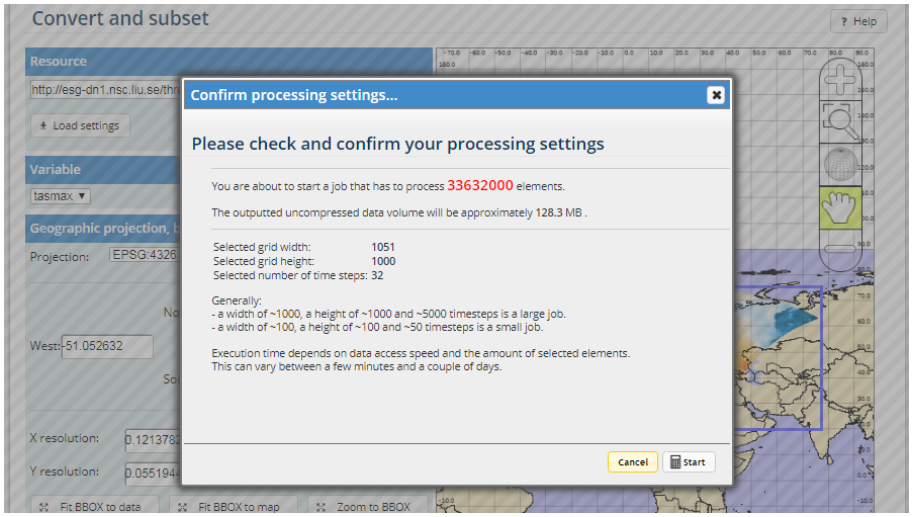

Figure 4.2. The box that will appear after you clicked on 'Start processing 32 (one month) time step(s)' (as Figure 3.5)

- After the processing is successfully completed the data can be downloaded (filename out.nc if not adjusted) or visualized (Figure 4.3).
- The data can also be found in your basket. Go to 'Basket' and after double clicking on 'out.nc' the following appears.

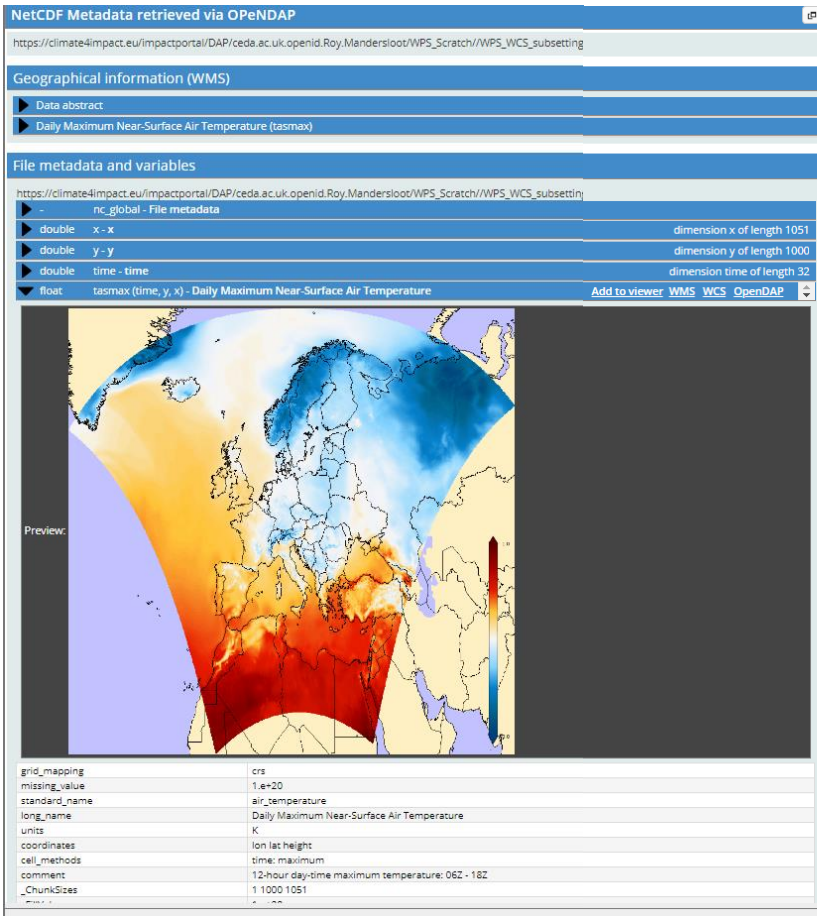

Figure 4.3. Screen after the successful selection of the time period.

Data and file information can be found under 'NetCDF Metadata retrieved via OPeNDAP', 'Geographical Information (WMS)' and 'File metadata and variables' (Figure 4.7).

- By double clicking in the map, the viewer in Figure 4.4 appears.

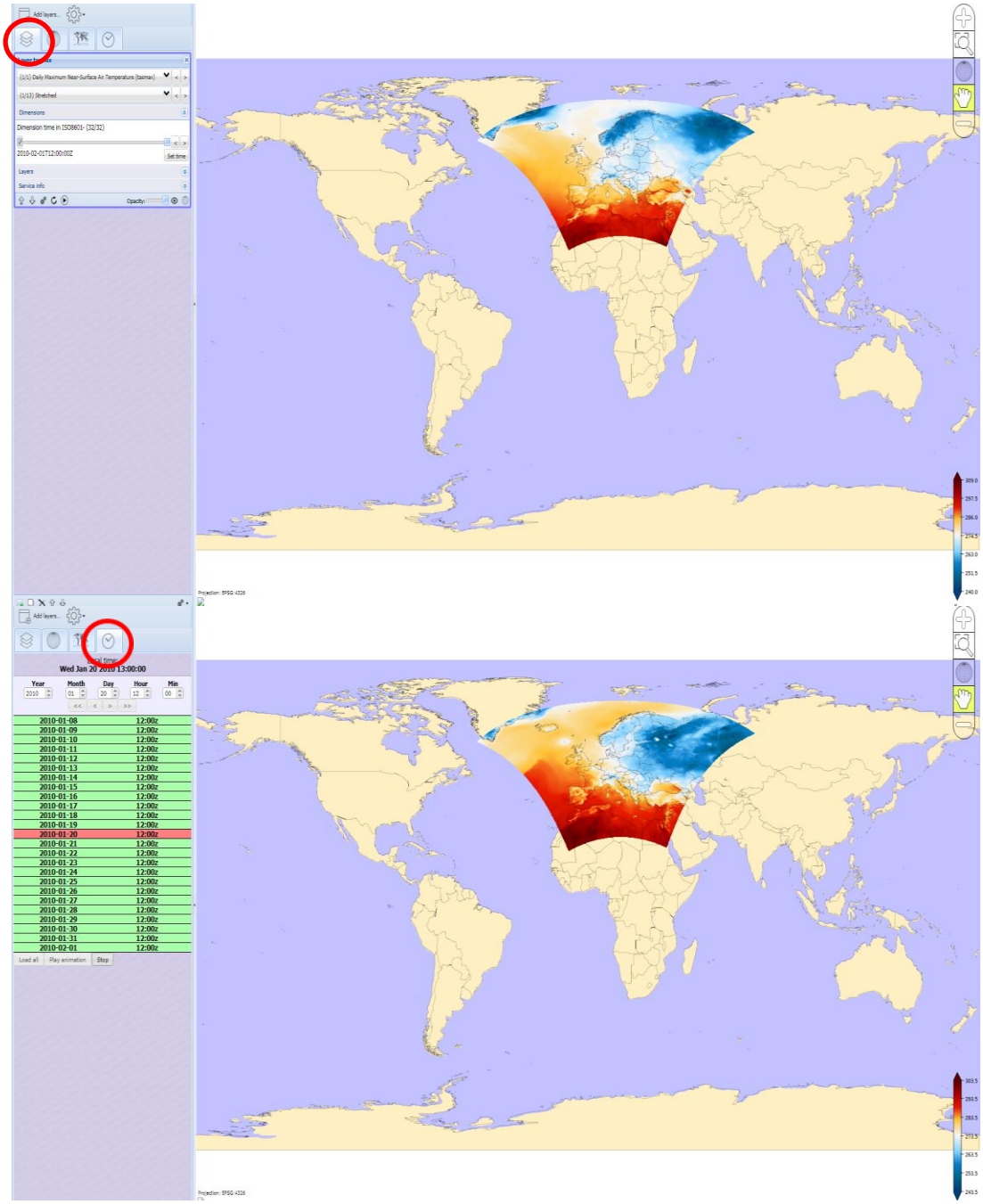

Figure 4.4 Different ways in which the data for the days in the selected period can be viewed, by selecting one of the icons in the top left of the screen.

5 Processing: calculate the average temperature

Below we will explain how to calculate the average temperature per year or per month over a certain period with the help of the Climate4impact-portal.

- First go to 'Processing' (Figure 3.1).
- Then click on 'ICCLIM time averaging' (Computes time average for any parameter by month, year of various seasons using ICCLIM) and you'll get the screen in figure 5.1.

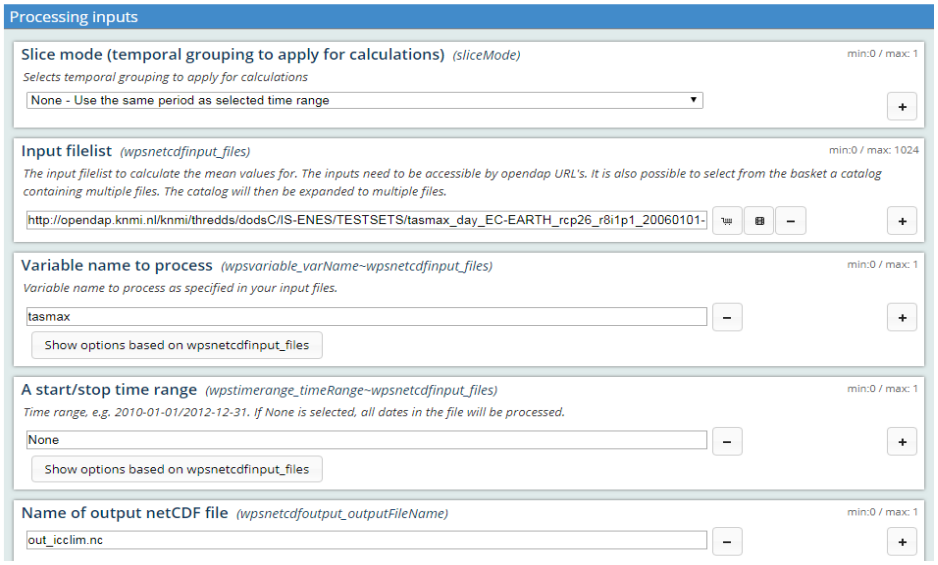

Figure 5.1. The screen you get after clicking on 'ICCLIM time averaging'.

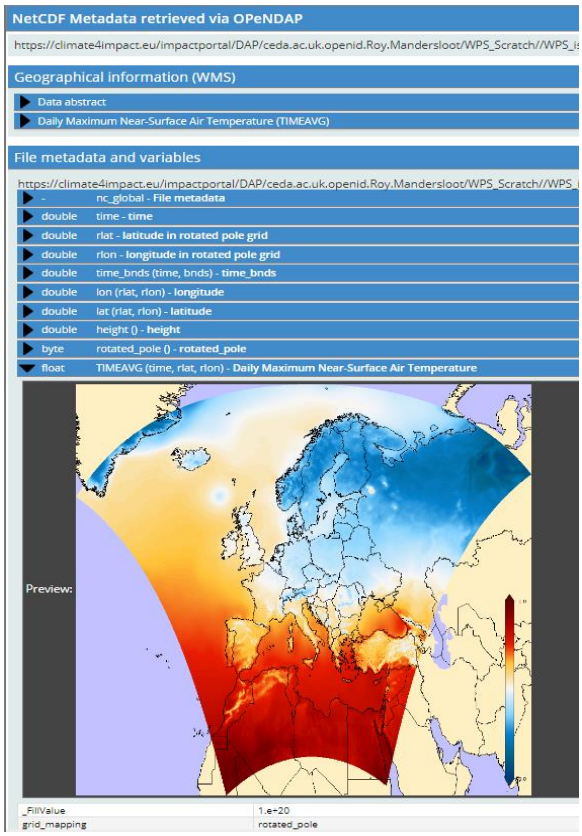

Figure 5.2. Screen after going to 'Jobs' and selecting the output file of interest.

- Choose 'year' or 'month' as selected time range under 'Slice mode'. In this case 'month' has been selected to calculate the average temperature per month.
- Choose the required dataset under 'Input filelist'
- Choose the climate variable under 'Variable name to process'
- Choose none under 'A start/stop time range' and the whole data file will be used for calculation.
- Give the output file a name under 'Name of output netCDF file' (default out_icclim.nc).
- Then click on 'Start processing'. This may take a while depending on the size of the dataset to be processed. The result of the processing is found under both 'Jobs' and 'Basket' (besides 'Processing' in the blue screen bar). In this example the file contains one value for each grid point (land area) per year (2001-2010). Go to 'Jobs' and click on 'View' and then on the link under value (Figure 5.2).
- Click on the map beside 'Preview', to go to the viewer in Figure 5.3.
- Go to the clock at the upper left corner.
- Select the year/month/…. of interest and click on 'Play animation' (under the dates) to see the average value (Figure 5.4).

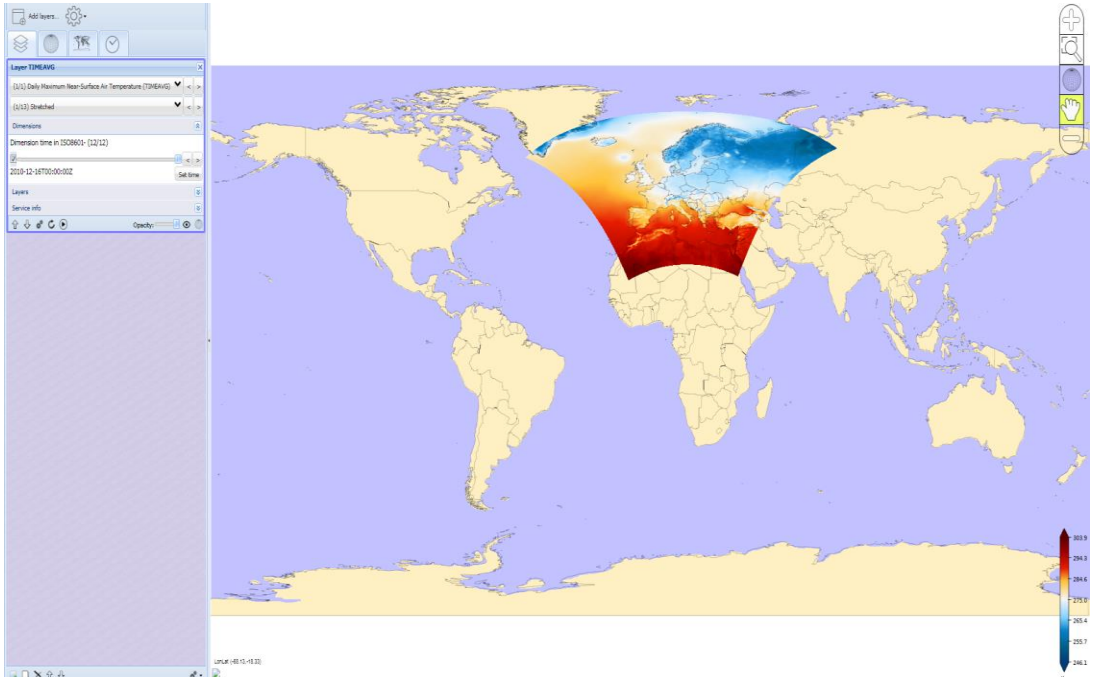

Figure 5.3. Screen shot of the viewer within Climate4impact.

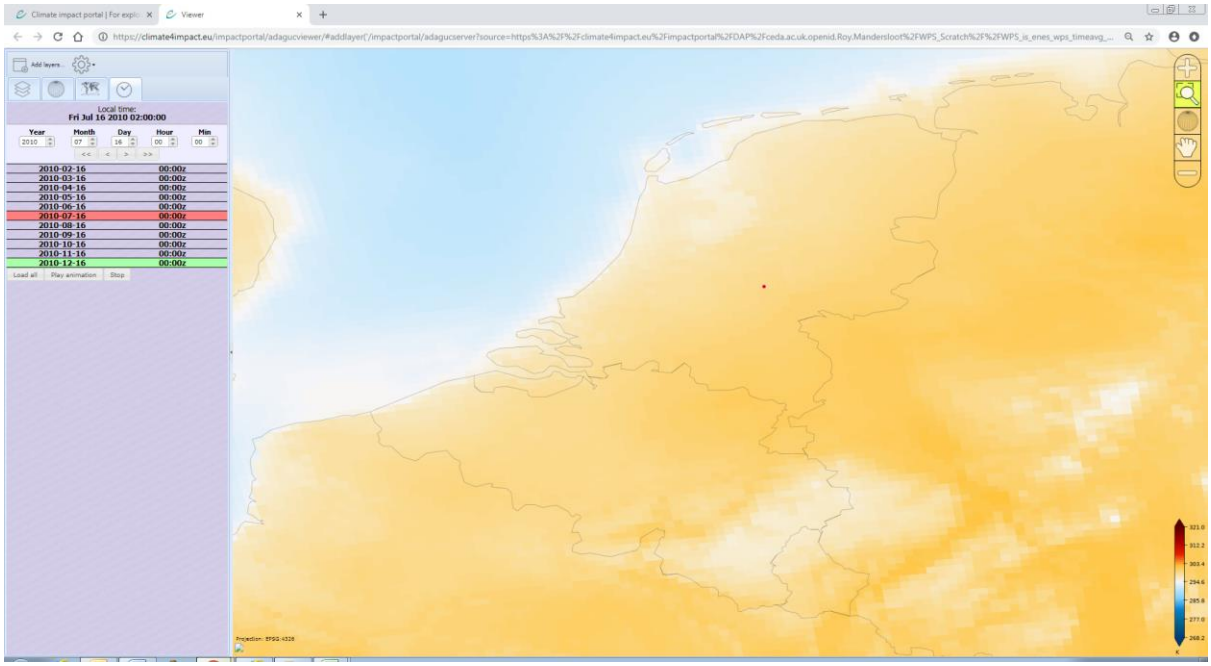

Figure 5.5. Screen shot of the viewer after zooming in and clicking on the clock in the upper left part.

To get the average per year follow the same procedure as above, but select "year" under 'Slice mode' in Figure 5.1 and use another output file name.

6 Processing: highest daily maximum temperature per year

Here we show how you can calculate the highest daily temperature per year. A similar approach can be used for the lowest temperature.

- To select the dataset of interest, go to 'Processing' (in this example another data file has been used; Figure 3.1).
- To select the highest maximum daily maximum temperature per year go to 'ICCLIM simple climate calculator' (Calculate simple climate indices with ICCLIM).
- Now select a file under "Input filelist" by clicking on the symbol basket (figure 7.1). Double click on file you want to use.
- Select under 'The indicator to calculate' TXx (Maximum daily maximum temperature calculated from tasmax). Make sure that the input variable mentioned is the name that is used in the input file that you use[2], in this case tasmax (Figure 6.1).
- Check also whether the time slice mode is correct (here "yearly"), whether the name of the output file is what you want, etc.

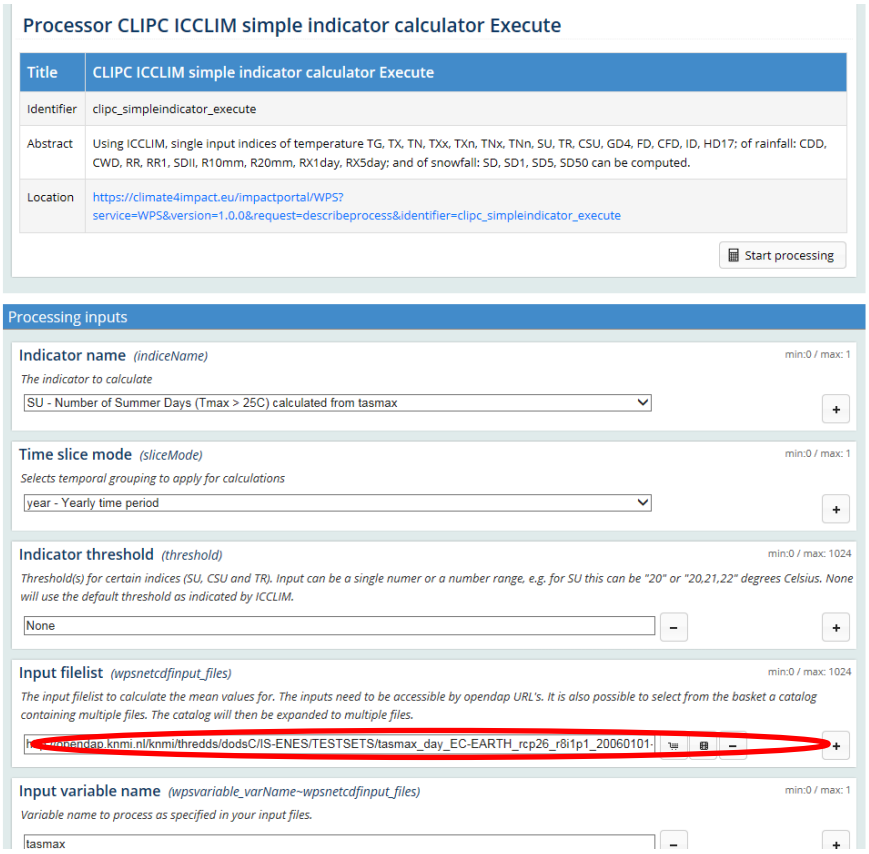

Figure 6.1. Selecting the input file for calculating the required climate index.

- Now click on 'Start processing' (top right in Figure 6.1). You will get the box as presented in figure 6.2.
- Choose 'Start' after checking and confirming the processing settings. If the settings are not correct, use 'Cancel' to go back to the former screen and to adjust e.g. the indicator to calculate, the input file, the variable name to process, and the time period used.

[2] In some file Tmax is used to denote the maximum daily temperature, in other file tasmax is used.

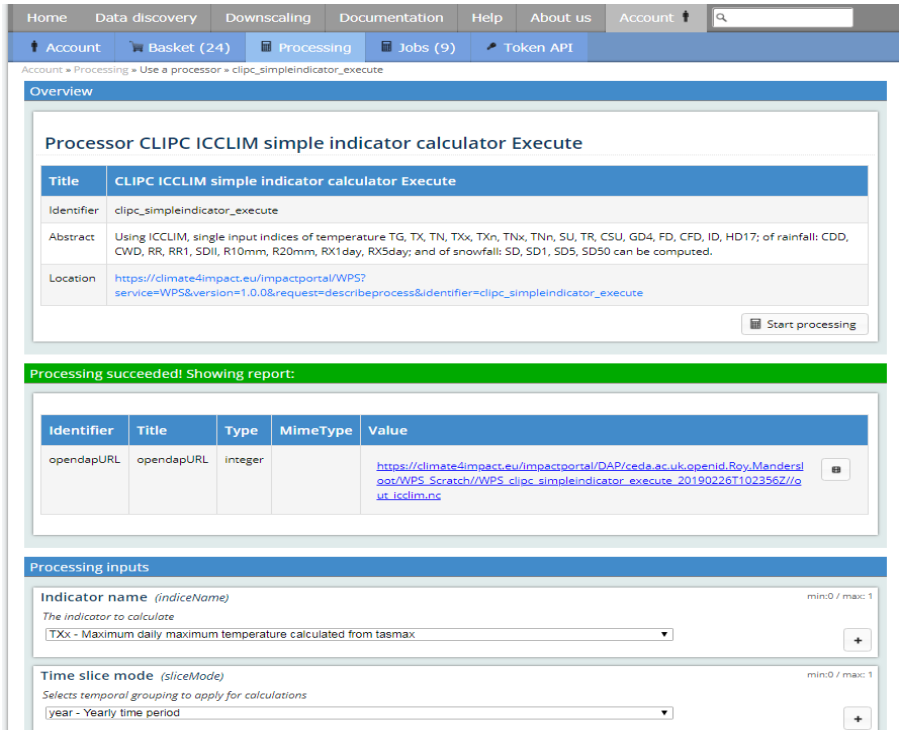

Figure 6.2. Screen after successfully calculating the yearly maximum maximum temperature.

- The data are now available in a NetCDF format (or geotiff or aaigrid, can be selected under 'Format'). The available file has an .nc extinction. If you don't adjust the file name, the default name will be 'out.icclim.nc'. The data can be downloaded or visualized (Figure 6.3).
- The data can also be found in your basket. Go to 'Basket' and after double clicking on 'out_icclim.nc' (or the name you specified for the output).

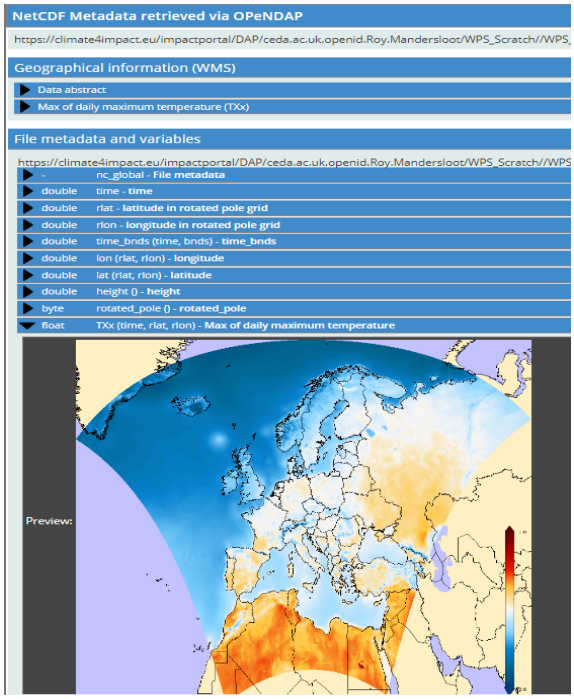

Figure 6.3 Preview of the visualization of the calculation of the yearly maximum maximum temperature.

- Data and file information can be found under 'NetCDF Metadata retrieved via OPeNDAP', 'Geographical Information (WMS)' and 'File metadata and variables' (Figure 6.3).
- By double clicking the map in Figure 6.3 the screen in figure 6.4 appears.
- One can zoom in to e.g. a country by using the "+" or the zooming tool on the top right. By clicking in the map on a certain location a box with coordinates and associated values of the location of interest appears (Figure 6.5, in this case one value, the maximum of the maximum daily temperature).

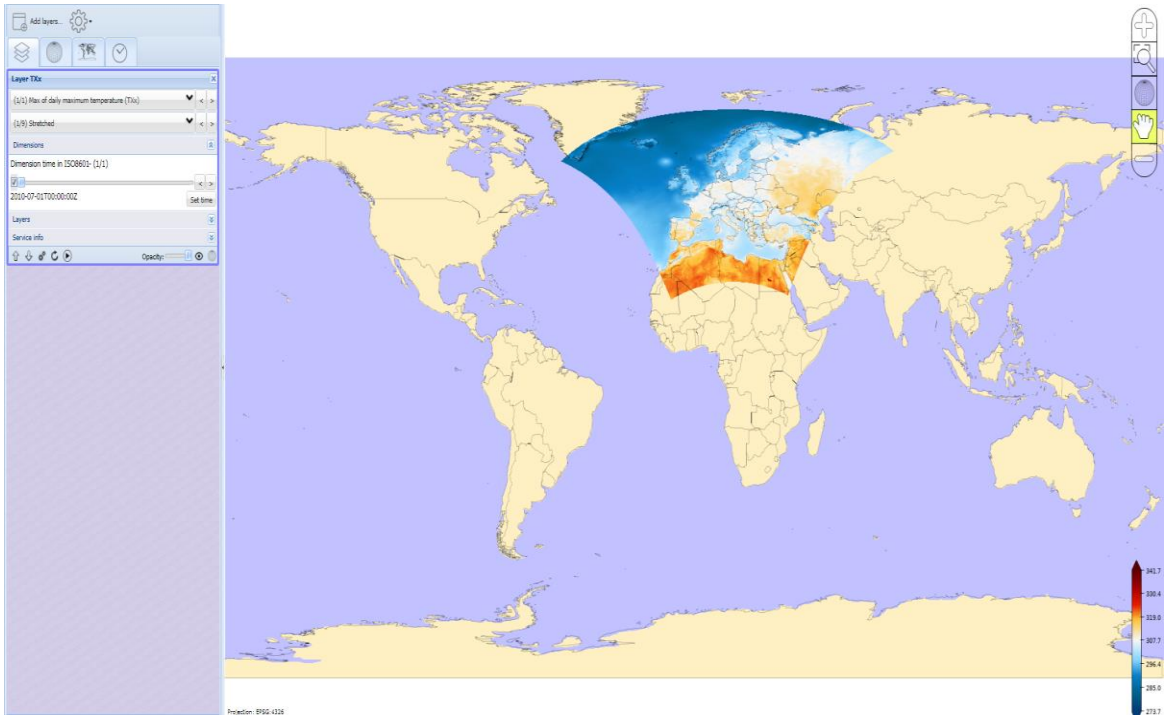

Figure 6.4. Visualization of the calculation of the yearly maximum maximum temperature in the viewer.

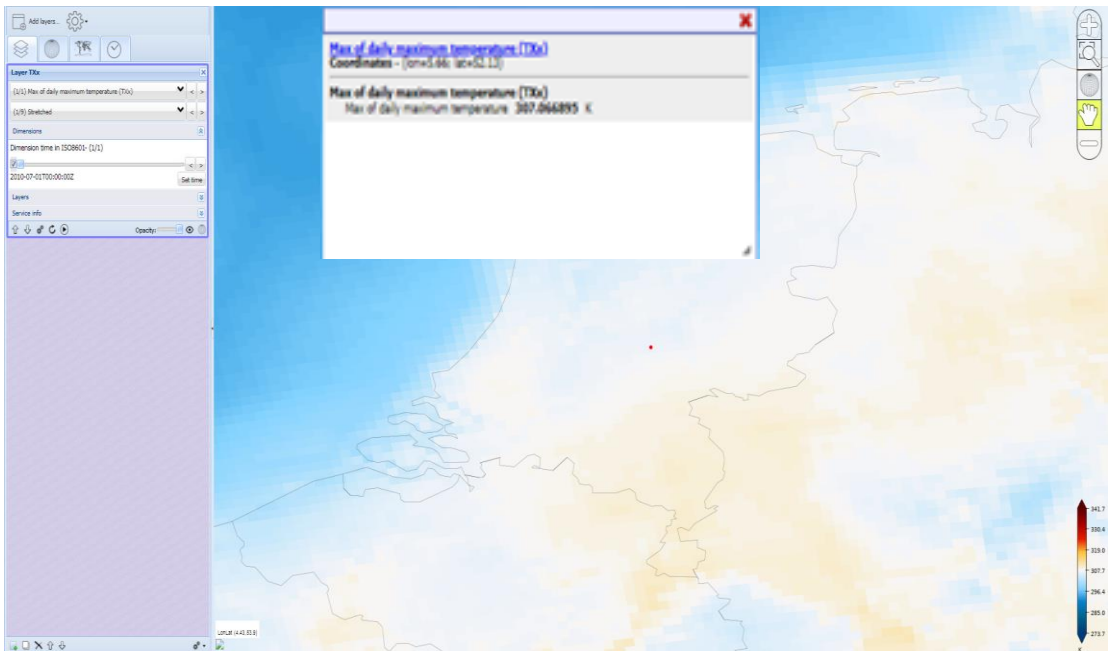

Figure 6.5. Zoomed in visualization of the calculation of the yearly maximum temperature in the viewer with a box that gives details for a certain location (red point in the middle of the figure).

7 Processing: number of days with a maximum temperature ≥25˚C

Here we show how you can get the number of days with a maximum temperature ≥25˚C. For other thresholds a similar approach has to be used.

- To select the dataset of interest, go to 'Processing' (in this example another data file has been used; Figure 3.1).
- To select the number of days with a maximum temperature ≥25˚C go to 'ICCLIM simple climate calculator' (Figure 3.1).
- Select under 'Indicator name' SU (Number of Summer Days (Tmax>25C) calculated from tasmax). Make sure that the "input variable name" is correct, in this case tasmax.
- Check whether the other settings such as "Time range" and "Name of output netCDF file name" are correct.
- Now select a file by clicking on the symbol "basket" right of "Input filelist" (figure 6.1). Double click on file you want to use. If you don't get a similar screen as in figure 6.3, you can click on the symbol just right of the "basket" behind the "Input filelist".
- Then click on "Start Processing" (top right in Figure 6.1). You will get a box similar to wat is presented in figure 7.1.

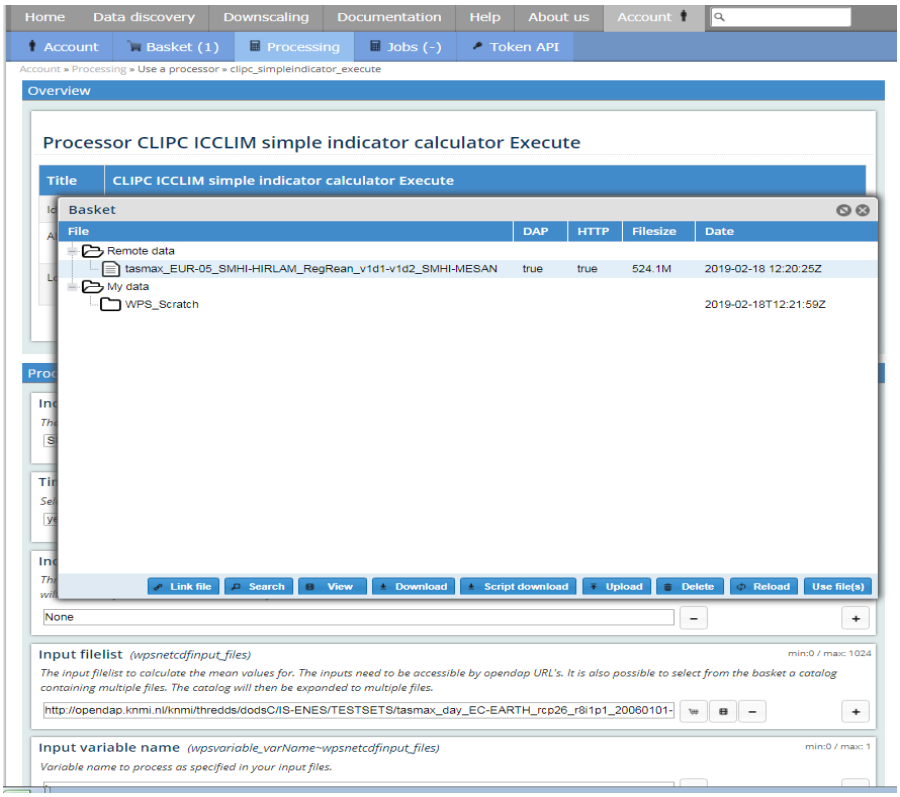

Figure 7.1. Screen shot of the web page you get after clicking on "Start Processing".

- The data are now available in a NetCDF format (or geotiff or aaigrid, can be selected under 'Format'). The available output file has an .nc extinction. If you don't adjust the file name, the name will automatically be 'icclim.nc' (default).
- After the processing is successfully completed the data can be downloaded or visualized by double clicking the output file.

8 Processing: select a daily time series for one point/grid

- Time series are obtained by going to the viewer (Figure 8.1).
- Go to the upper left hand side and select the 'gear' (Figure 8.1 and 8.2).
- Then go to 'time series mode' and click in the map on the location for which you want a time series and the time series is shown on the upper right hand side for that particular point (Figure 8.3).

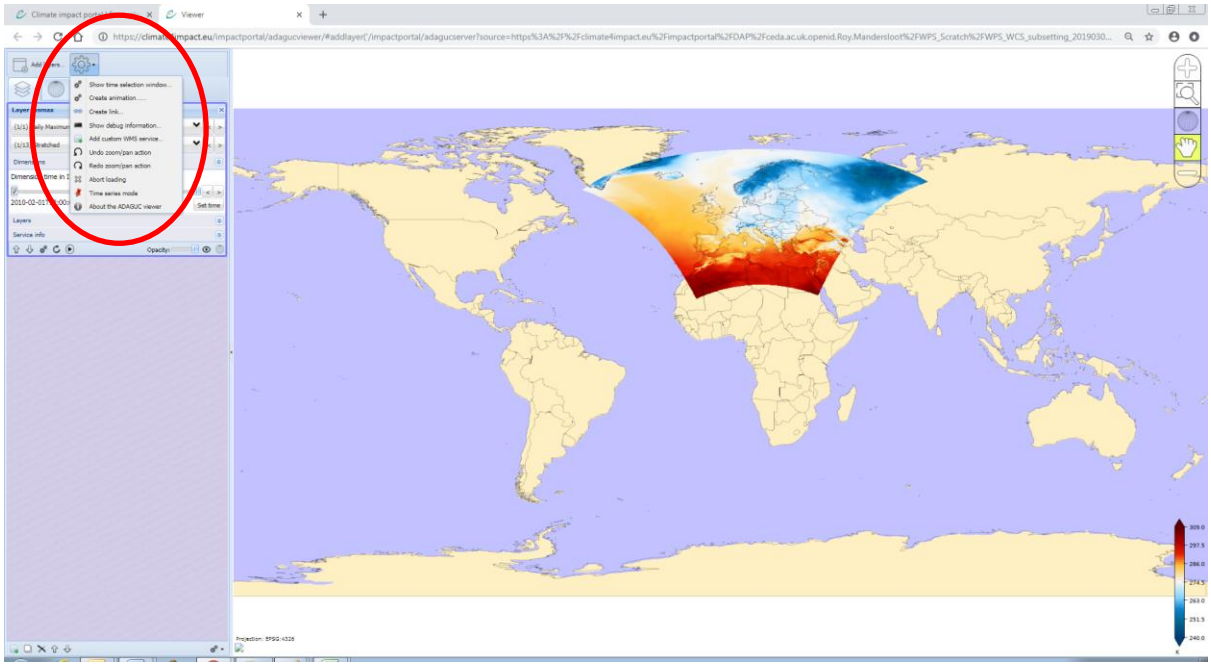

Figure 8.1. Screen shot of the viewer

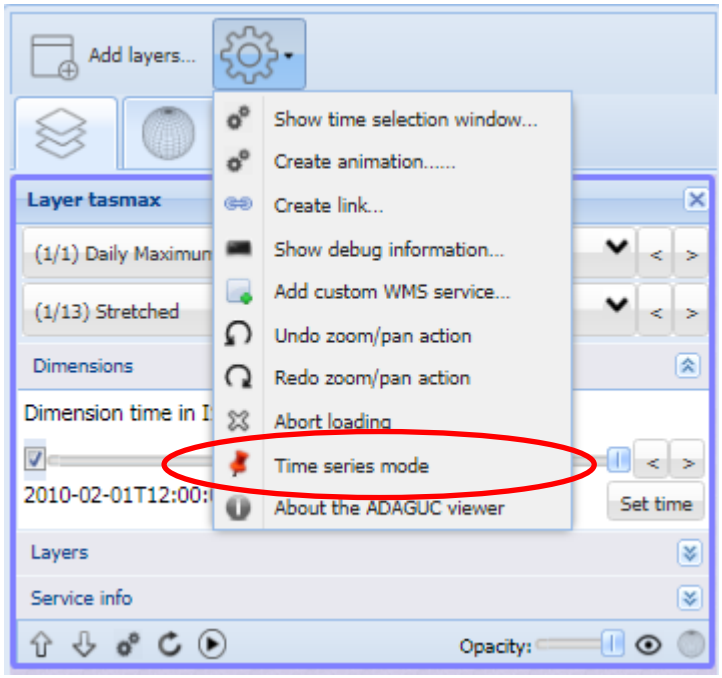

Figure 8.2. Screen shot of the panel in Figure 8.1 in the red circle.

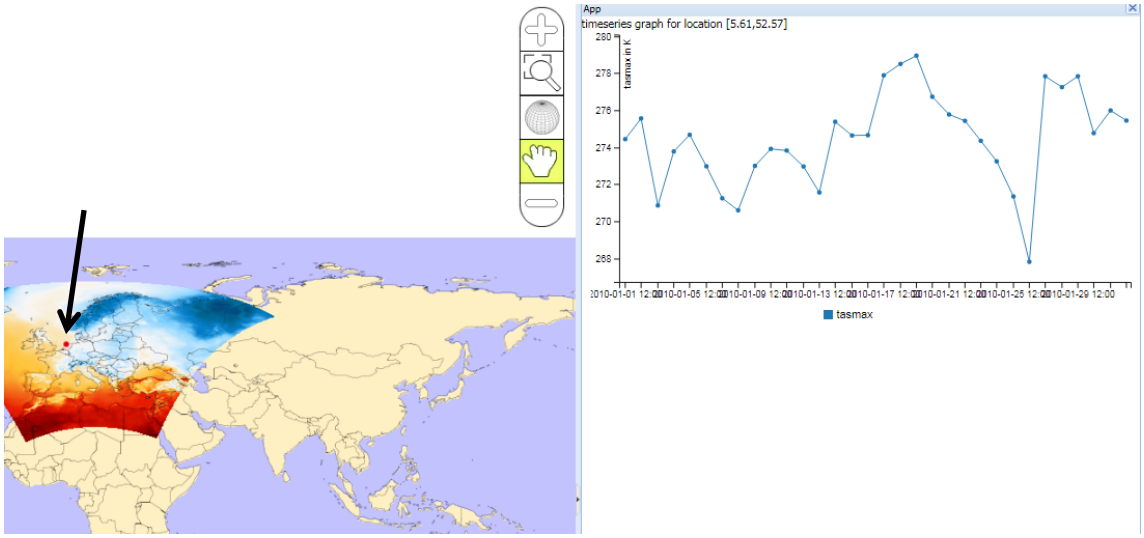

Figure 8.3. Part of the screen after selecting the time series mode. In the top right a time series is shown for the maximum annual maximum temperature (tasmax) for the location with the red dot (indicated with the arrow).

Links to some useful websites and tools

Other portals to climate datasets (datasets in these portals can generally also be accessed through the Climate4Impact portal):

- Climate Data Guide: https://climatedataguide.ucar.edu/climate-data/global-temperature-data-sets-overview-comparison-table. With summaries, metadata, a comparison table and links to a large number of temperature datasets.
- ECA&D and ICA&D: European and International Climate Assessment Databases: https://www.ecad.eu/. Collects information on station observations in different parts of the world. Where the daily observations are not available, often derived indices and trends are freely available (for non-commercial use). Part of the functionalities is moved to Copernicus Climate Change Services websites.
- E-OBS: gridded dataset bases on data from ECA&D: http://eca.knmi.nl/download/ensembles/ensembles.php. Also a version with the homogenized temperature station data will be made available later on.
- Copernicus Climate Change Services (C3S) Climate Data Store: https://cds.climate.copernicus.eu/#!/home. Through this website a large number of climate data sets will be made available or is already available. The connected Toolbox offers a variety of processing and visualizing tools (or will provide this in the future).
- IPCC DCC: Data Distribution Centre: http://www.ipcc-data.org/index.html. With observational datasets and climate model simulations used for the various Assessment reports. Also guidance material available (http://www.ipcc-data.org/guidelines/index.html)
- Climate Explorer: https://climexp.knmi.nl/start.cgi. Website where many observational, re-analysis and climate model data can be accessed and processed (especially for climate researchers)

Portals with tools to visualize, process, check datasets, etc.

- Climate4Impact portal: https://climate4impact.eu/impactportal/general/index.jsp and https://climate4impact.eu/impactportal/data/esgfsearch.jsp. Portal to access, visualize and processing climate data. The ADAGUC viewer is used within this tool.
- Climate data guide: https://climatedataguide.ucar.edu/climate-data-tools-and-analysis. With a variety of tools for climate data processing.
- Climate data guide, Common Climate Data Formats: Overview: https://climatedataguide.ucar.edu/climate-data-tools-and-analysis/common-climate-data-formats-overview. Also with some example codes to read, write or change data files
- Panoply: https://www.giss.nasa.gov/tools/panoply/. For viewing and processing of MetCDF, HDF and GRIB data sets (also mentioned in the Climate Data Guide).
- KML tool: https://developers.google.com/kml/documentation/. Tool from Google to visualize and process data.

Background information:

- IPCC Glossary: https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_Glossary.pdf. With many terms related to climate data, climate and climate change.
- General information about climate data. C3S User Learning Services: https://uls.climate.copernicus.eu/login. Portal for on-line learning about many aspects of climate data. Freely available, only registration needed. Related to the Climate Data Store of C3S. For those with very little knowledge about climate data the lesson/resource on "Introduction to climate data" may be a good introduction.
- Common Climate Data Formats: Overview. Climate Data Guide: https://climatedataguide.ucar.edu/climate-data-tools-and-analysis/common-

climate-data-formats-overview. Also with some example codes to read, write or change data files

- NetCDF: https://www.unidata.ucar.edu/software/netcdf/ Potential users mentioned that there are some issues with NetCDF data used in certain packages . Check on internet whether this is the case when you encounter problems in a specific package.