Co-funded by the Erasmus+ Programme of the European Union

3rd ClimEd Online Training on "Digital Tools and Datasets for Climate Change Education"
26 October – 12 November 2021
Hosts: University of Helsinki (UHEL, Helsinki, Finland) & Odessa State Environmental University (OSENU, Odessa, Ukraine)

Water Management

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Online 3rd ClimEd Training
2 November 2021

VISTULA RIVER BASIN

Geographical region

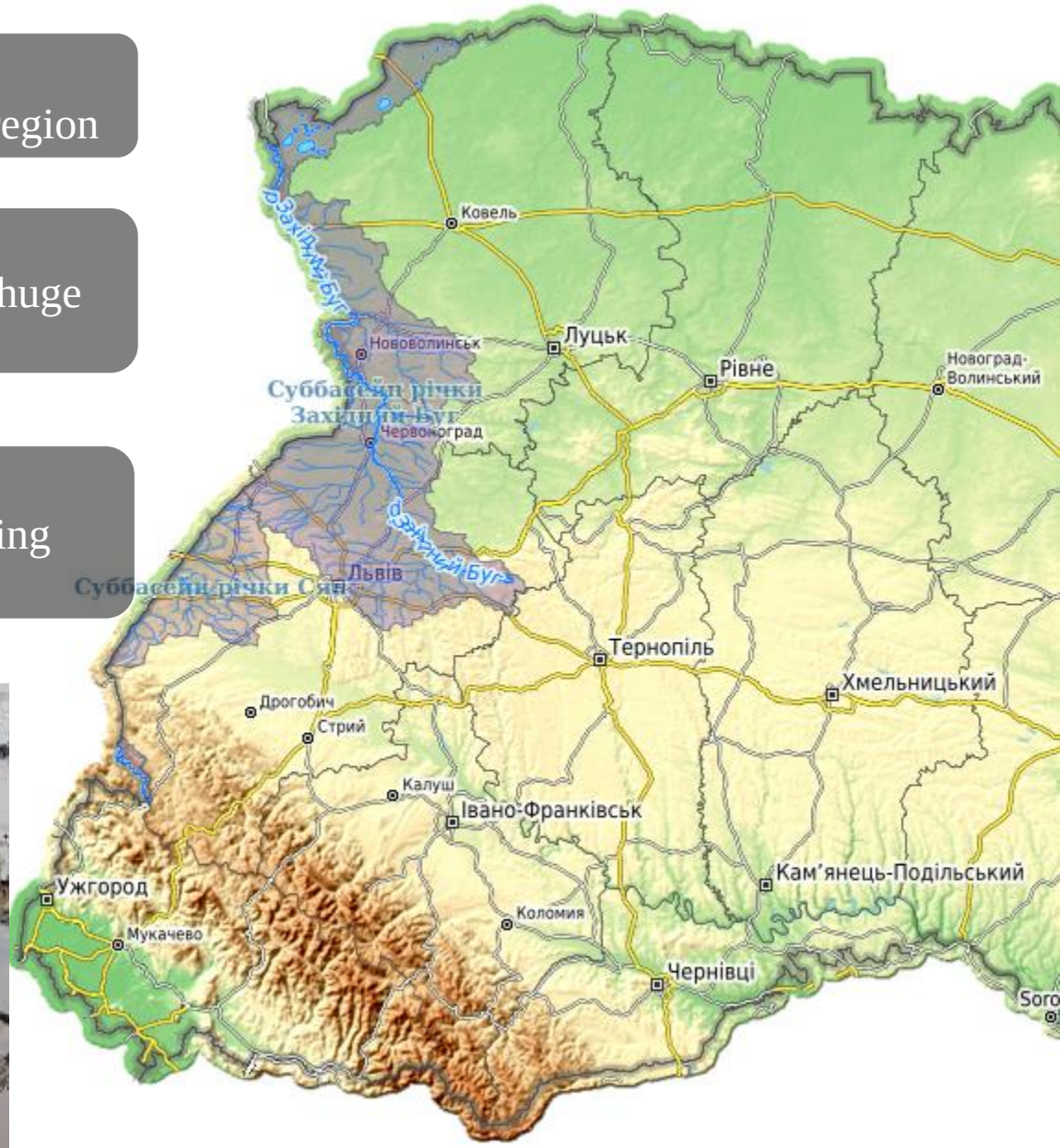
Vistula River basin within Ukrain, located in Lviv region and Volyn region

Existing or possible problem of concern

Floods that disrupt hydraulic structures, destroy buildings and cause huge damage

Main aim of group project

The main aim of the study, which we will try to achieve, is forecasting floods in the study area.



Sustainable Development Goals

Datasets to be used in the study

- Climate Data Sourse
- Giovanny
- IPCC WGI Interactive Atlas

Variables needed for analysis

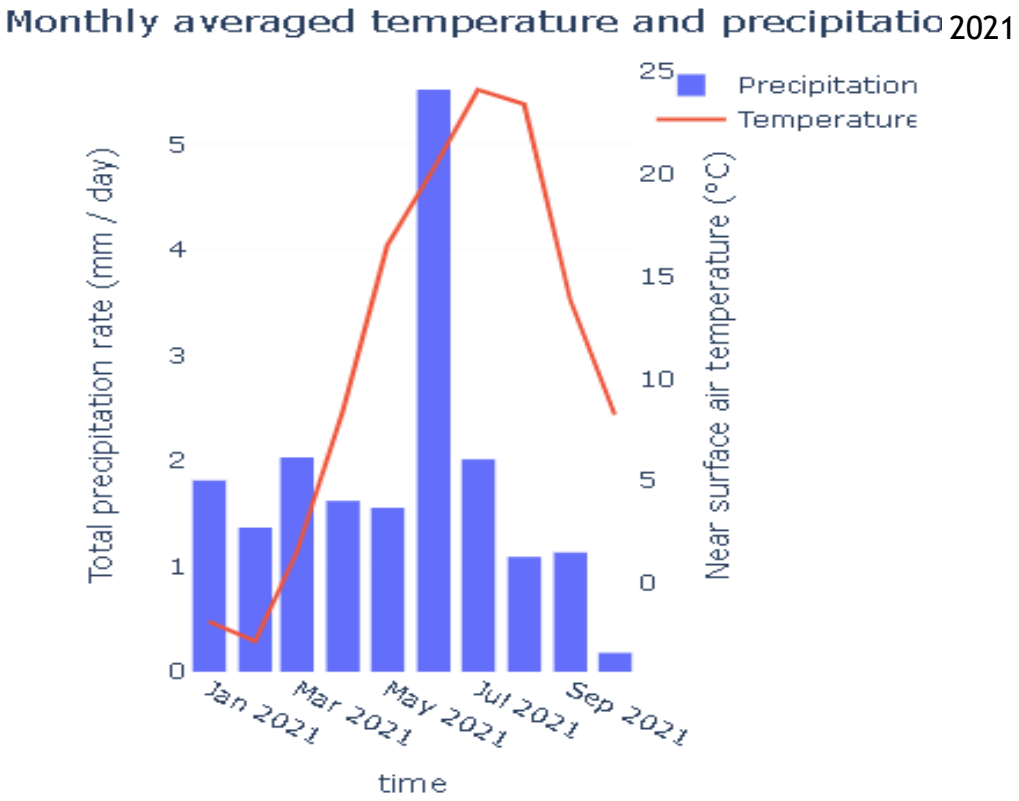
- Air temperature
- Precipitation
- Maximum river flow

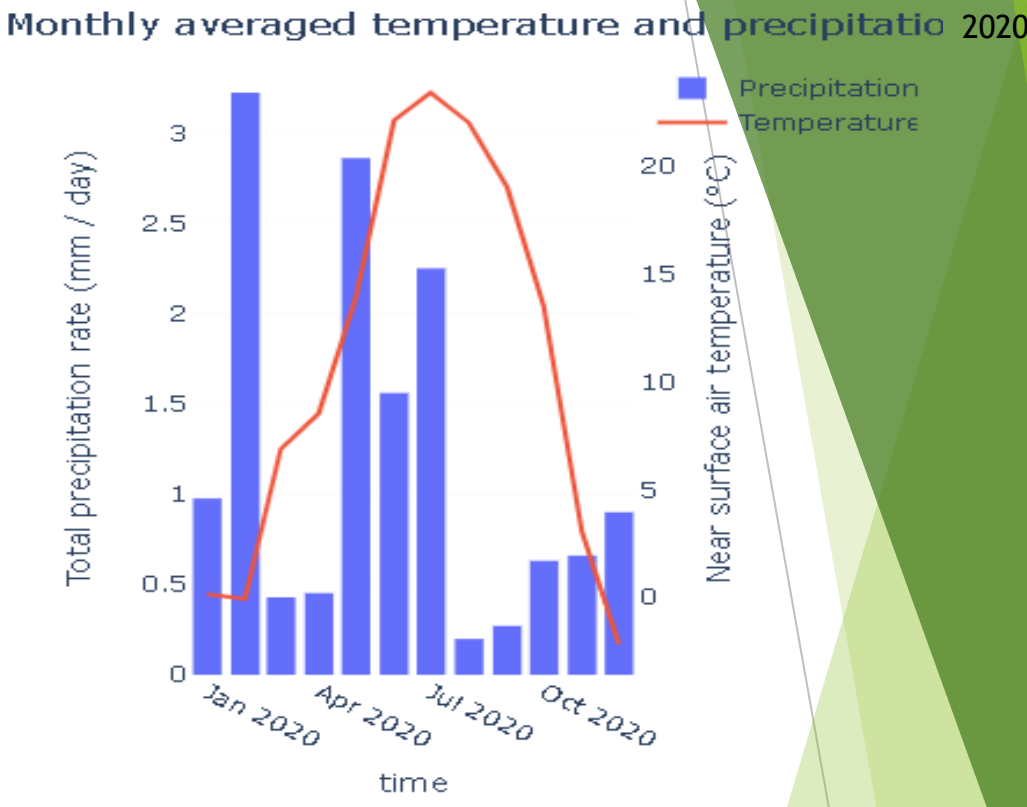
Tools for visualisation and data analysis

- CDS Toolbox Editor
- Python and R programming languages
- GIS visualization

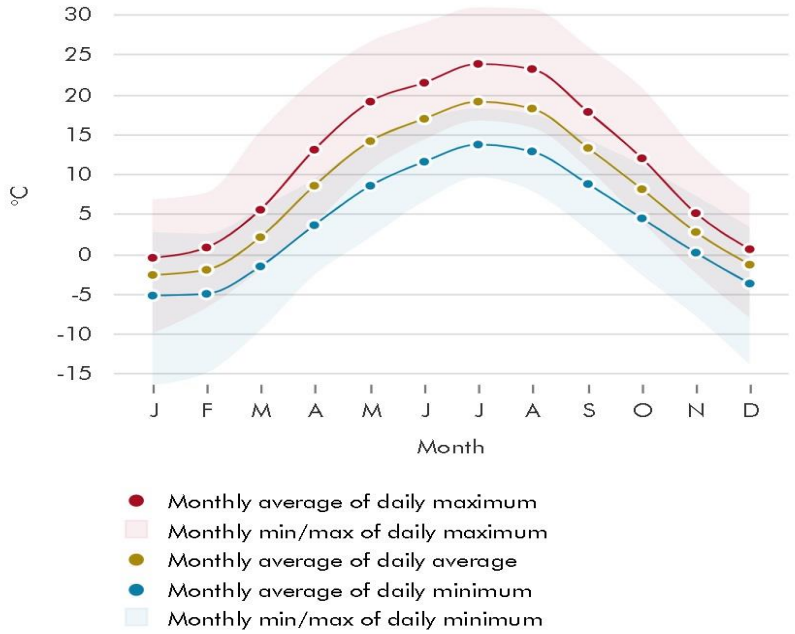
Expected results

- Compare and obtain the dependences of changes in climatic factors and the ecological state of water bodies
- Propose methods and methods to reduce the negative impact of floods
- Make a forecast according to possible scenarios
- Provide a higher quality of water for the needs of the population
- Analyze the level of self-cleaning of water bodies



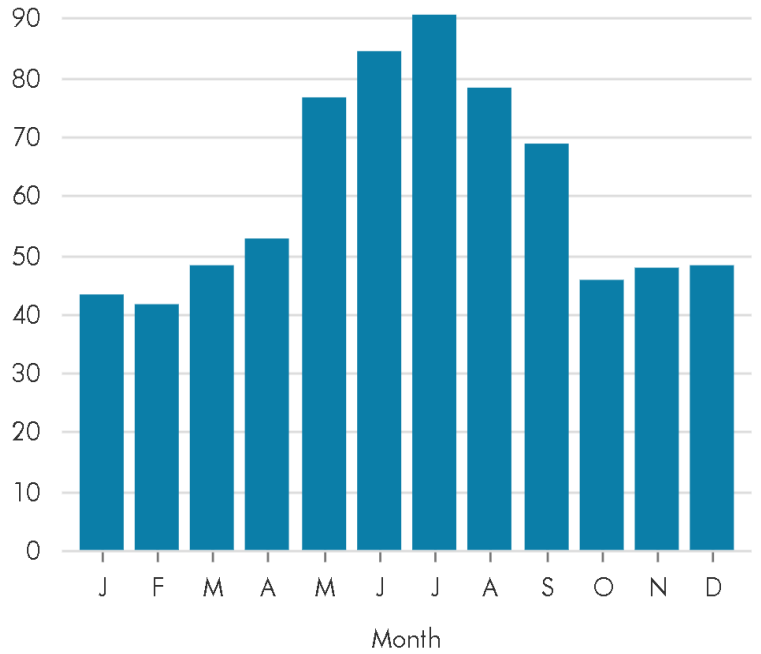


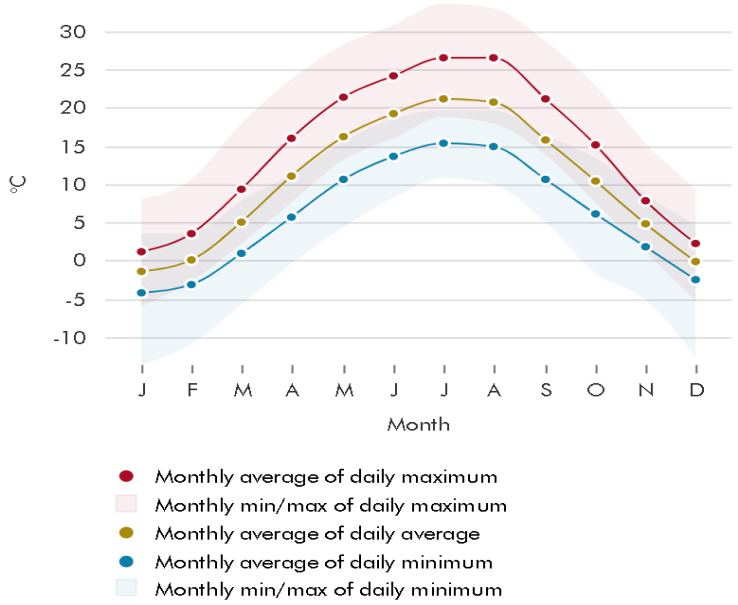
The territory located within 52.000 ° N 22.000 ° E and 48.000 ° N 37.000 ° E was selected.
For 2021 and 2020, data on the monthly amount of precipitation and the average monthly air temperature at a height of 2 m were selected.Reanalysis-era5-single-levels-monthly-means data was used.
The graphs show that in 2021 the warmest month was July - 24.0 °C (2,0 mm/day), the coldest - February -2.8 °C (1.4mm/day).
The month with the highest precipitation is June 5.5 mm/day(20.2 °C), with the lowest is October 0.2 mm/day (8.2°C).
In 2020, the warmest month was July - 23.4 °C (2.2 mm/day), the coldest - December -2.2 °C (0.9 mm/day).
The month with the highest precipitation is February 3.2 mm/day (-0.1 °C), with the lowest is August 0.2 mm/day (22.0 °C)



Svityaz (northernmost station)

Monthly average temperatures range from -2.7 °C (January) to 19 °C (July). Yearly average temperature is 8.1 °C. Monthly precipitation values range from 41 mm (February) to 91 mm (July). Average yearly precipitation is 726 mm

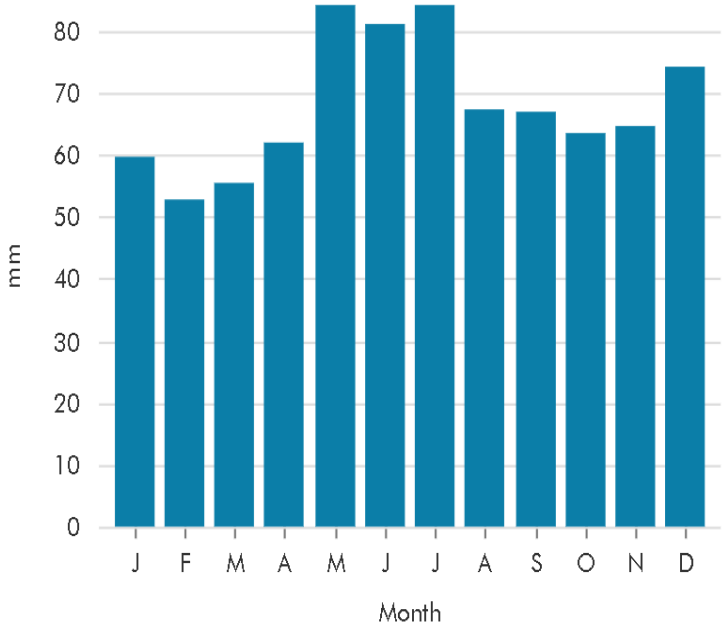




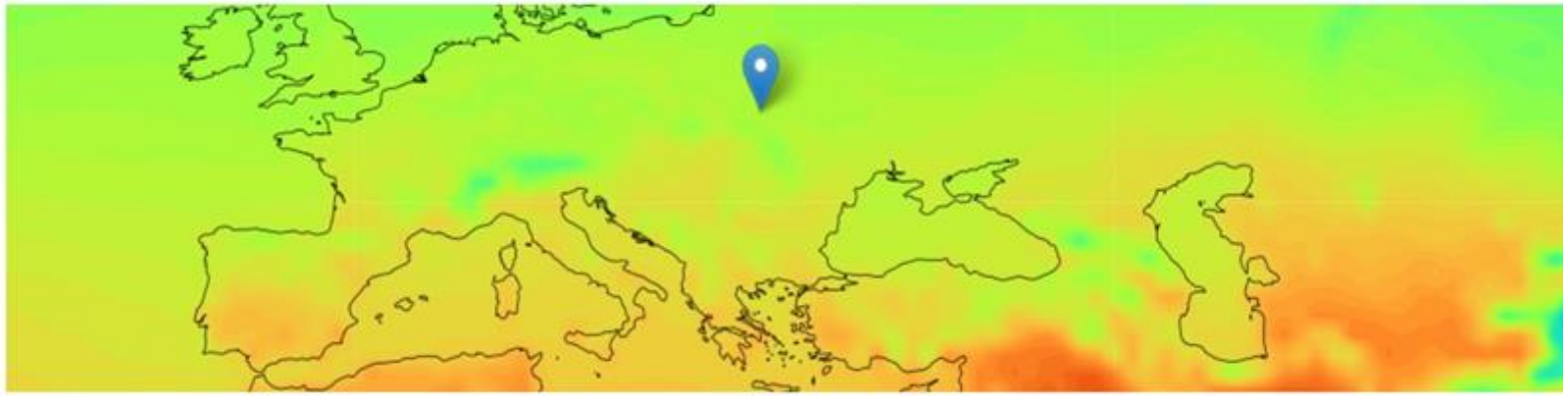
Uzghorod (southernmost station)

Monthly average temperatures range from -1.5 °C (January) to 21 °C (July). Yearly average temperature is 10 °C.

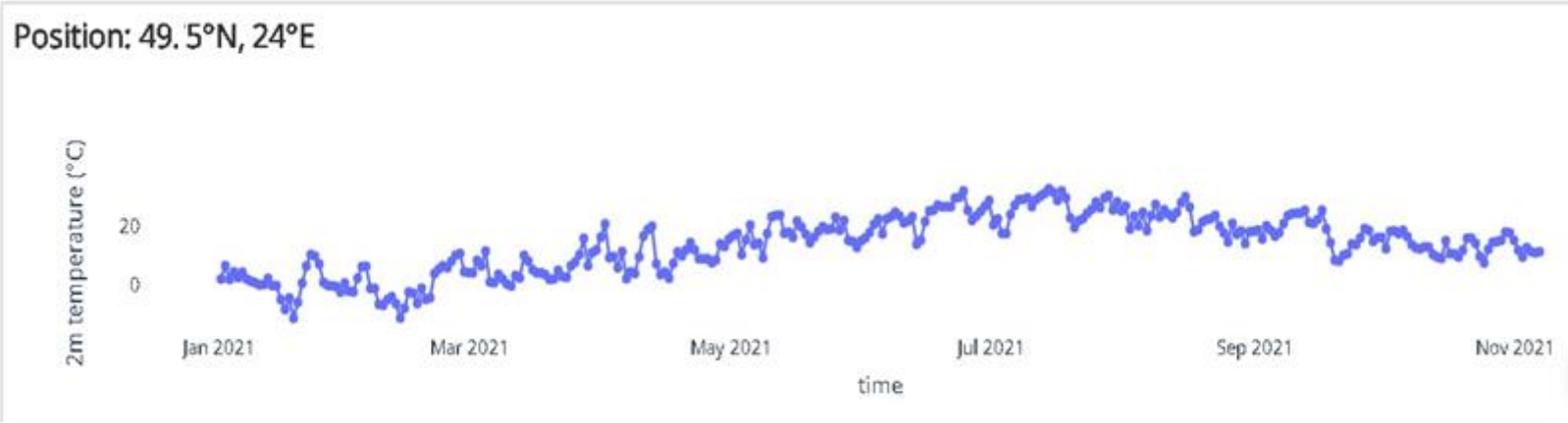
Monthly precipitation values range from 53 mm (February) to 84 mm (May). Average yearly precipitation is 816 mm.



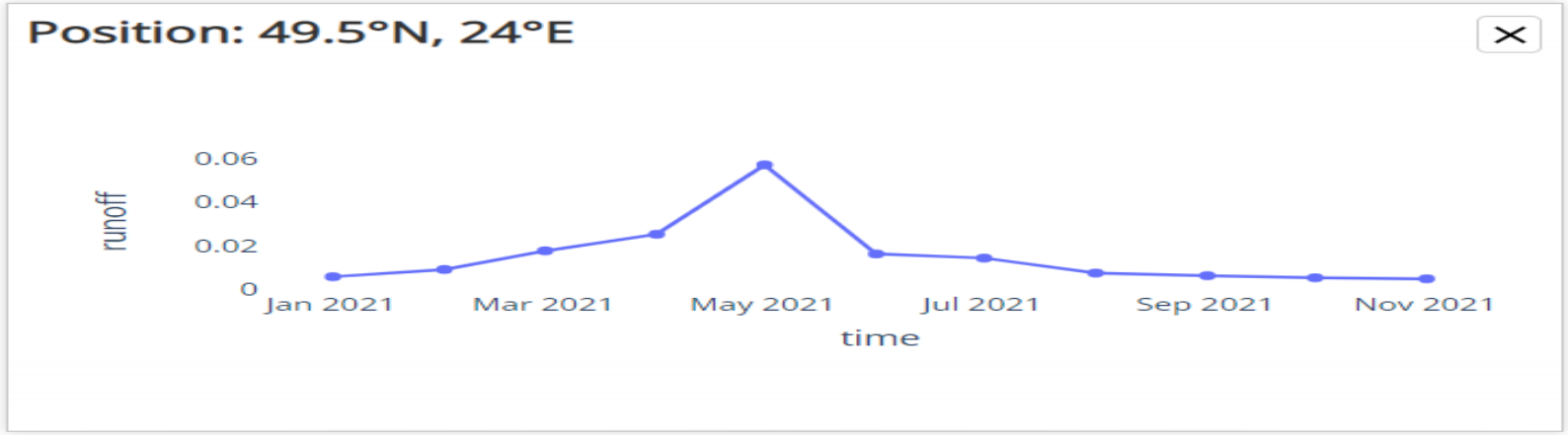
Visualization of river runoff and annual temperature variation at the catchment point of the Vistula river



A point was chosen in the studied basin of the Vistula river within Ukraine with coordinates 49.500 ° N 24.000 ° E

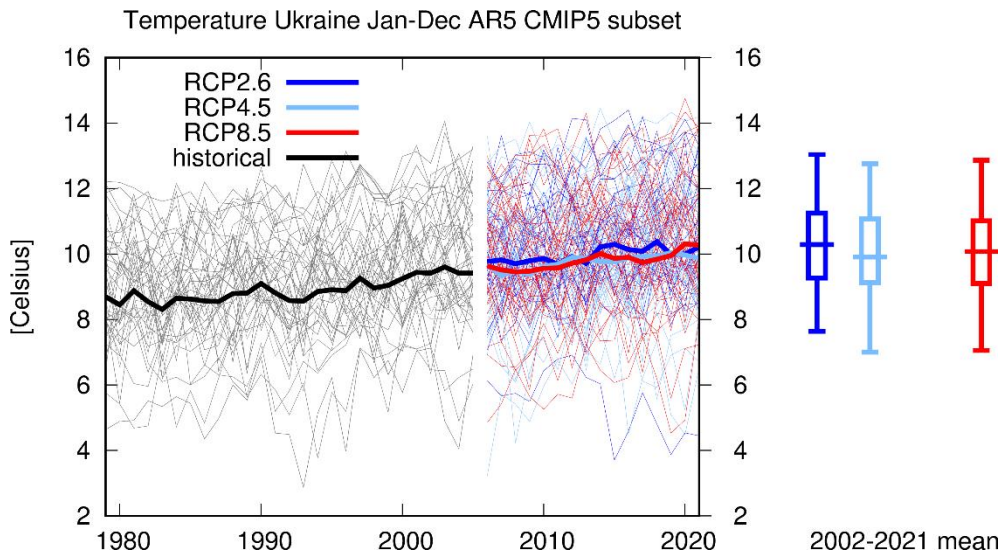


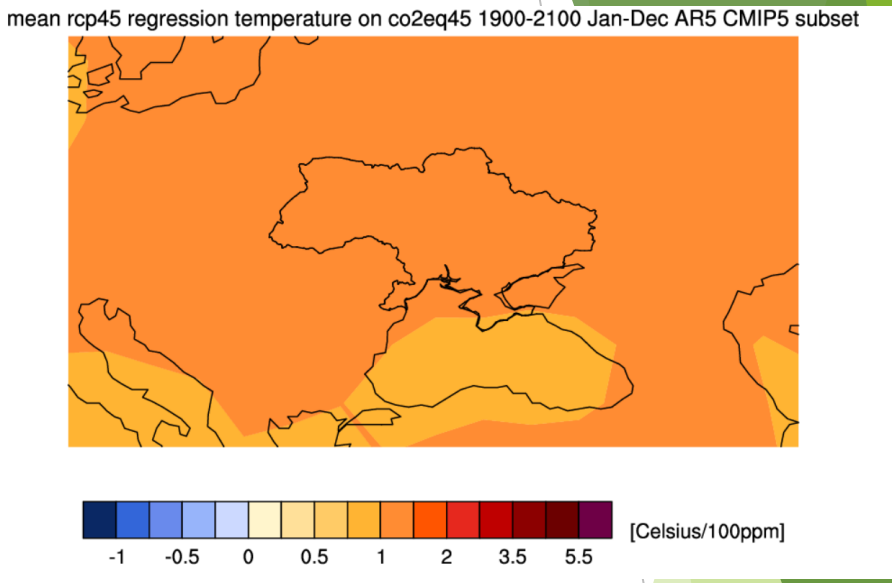
According to Reanalysis-era5-single-levels-monthly-means data visualization was carried out.

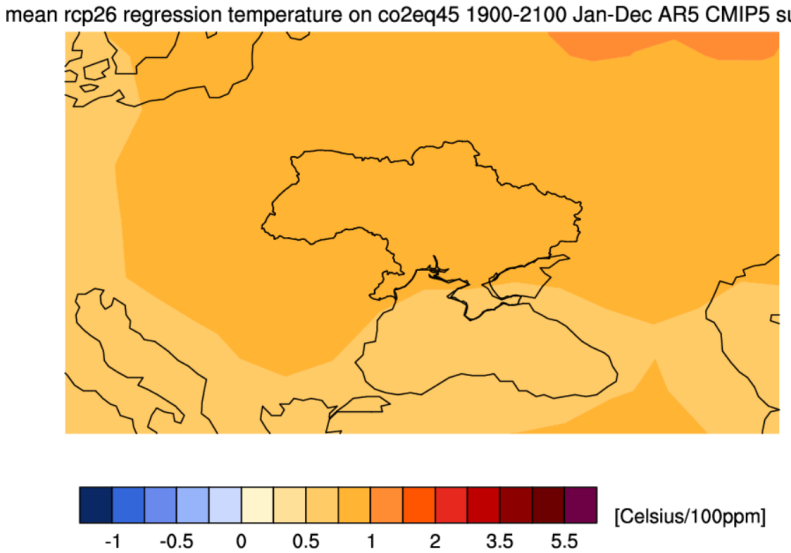


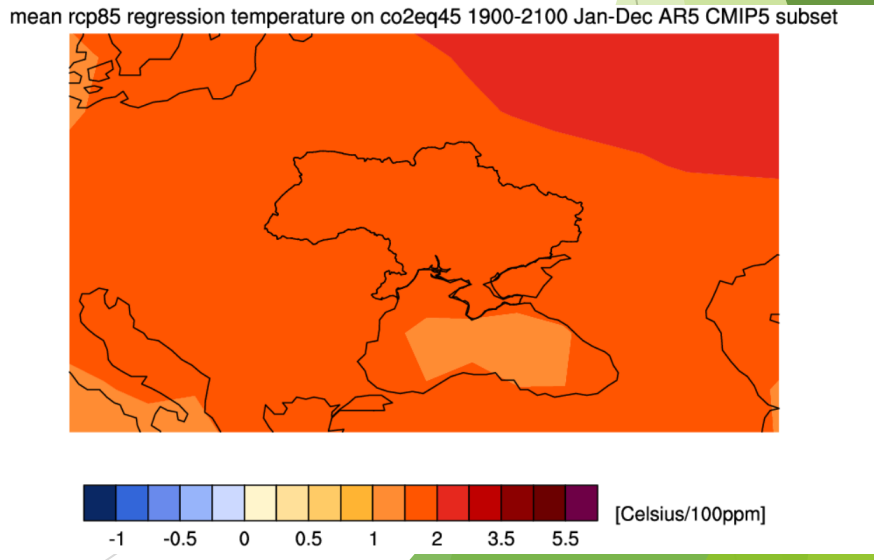
The figures shows the annual variation of the surface air temperature and river runoff

Visualization of average monthly air temperatures using AR5 CMIP5 subset within Ukraine

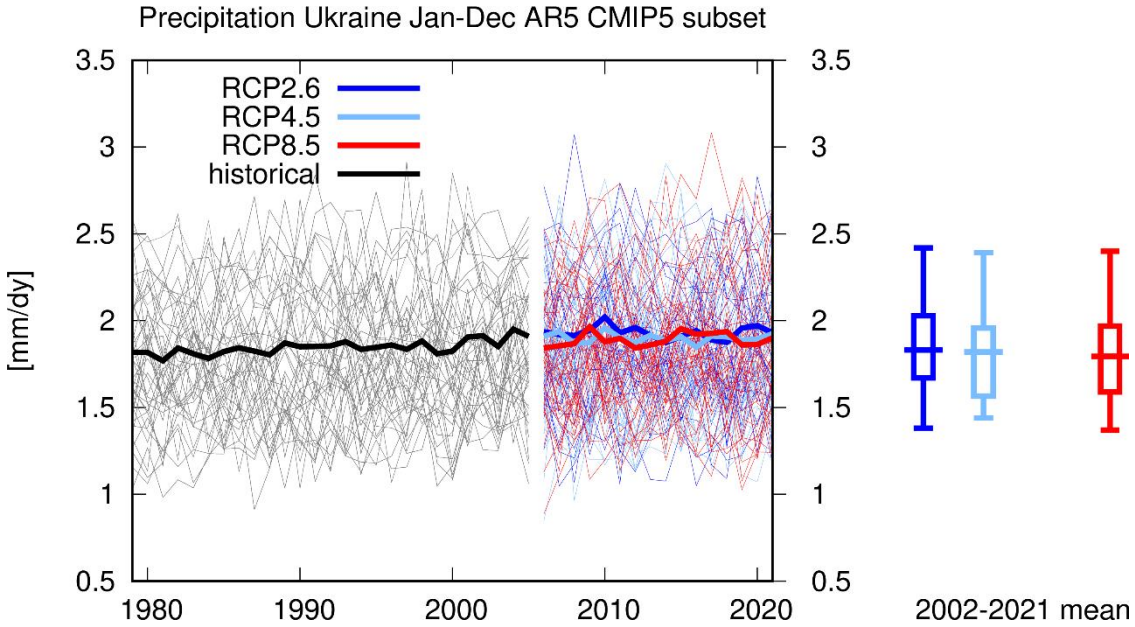


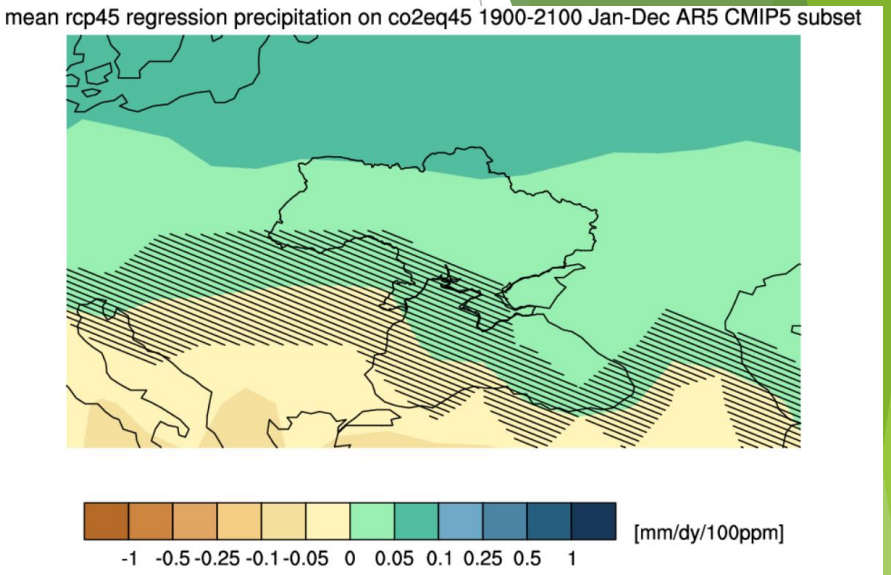


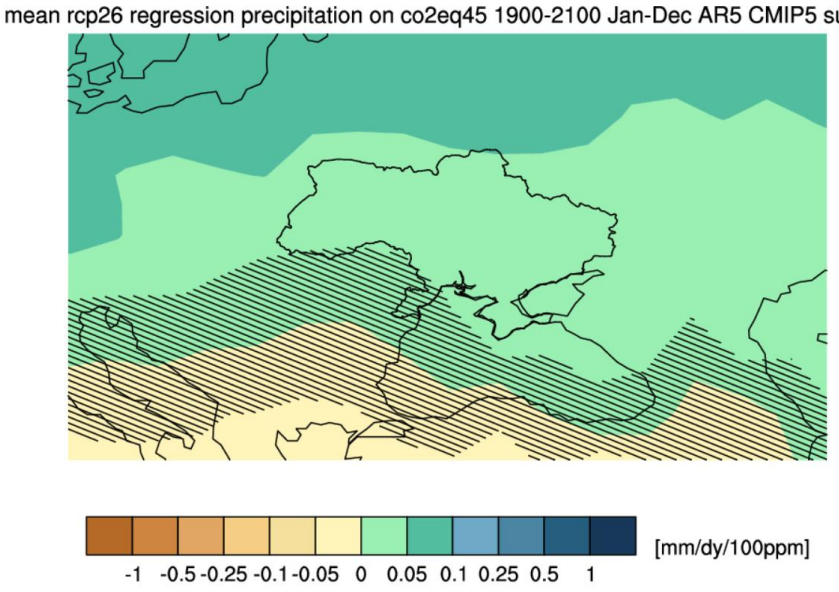


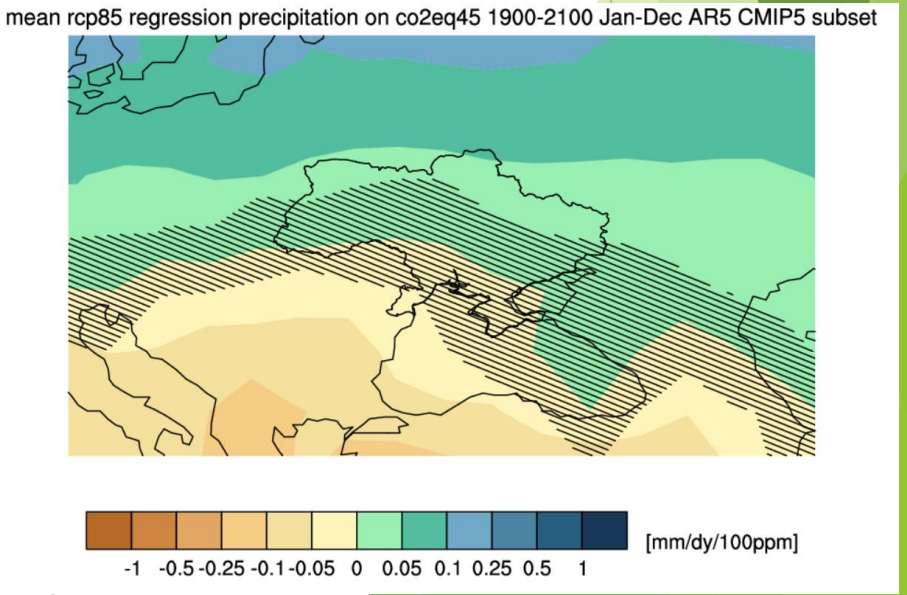


Visualization of monthly precipitation using AR5 CMIP5 subset within Ukraine









Conclusions

During the training we got acquainted with the sources of climate information, services that allow to obtain data and methods of data visualization

With the help of CDS and other climatic services it is possible to obtain and use in further calculations the necessary climatic data such as air temperature, precipitation, snowfall, evaporation for calculations and forecasts of river runoff

An important point in the calculations is the impact of different RCP scenarios on the maximum river runoff

Thank you for attention!