Intermediate Results

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Introduction

This report presents the latest results of our work on the project. We will present the results of our analysis on the data we have been given, mostly through visualizations.

We will conduct our analysis country by country, focusing on Europe through Ukraine, Poland, Spain and Portugal. For each country we will conduct analysis on data at the country level, then we will do it for specific geographical points. All t-tests are performed at the 5% level.
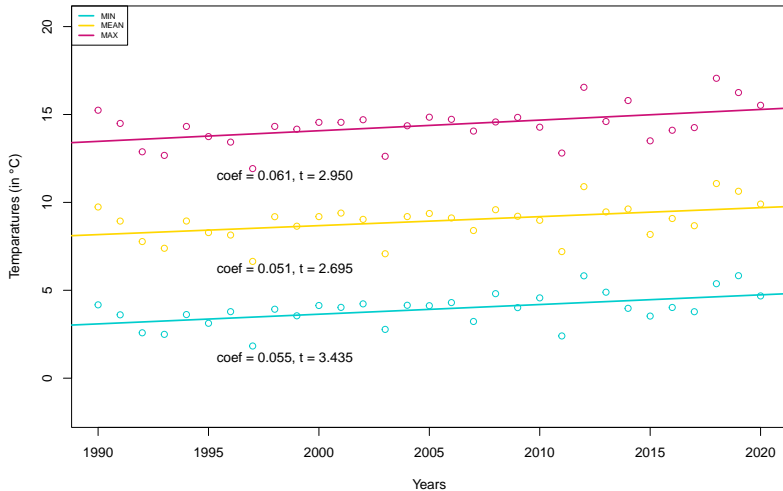
Ukraine

Country level

First, we plot the regression line of the median of our 3 statistics: minimum, maximum and mean temperature.

Median

Regression of the median temperature in Ukraine across years

We can see that the median mean, minimum and maximum temperatures are slightly increasing (but still increasing) over the years. The t-tests support this observation, the variable 'Years' is significant. For example, every year, the median of the maximum temperature increases in average by 0.061°C. This is similar to an increase of approximately 1.8°C of the median temperature over 30 years.

We will now analyze the quantiles of order 0.05 and 0.95 of each variable, instead of the medians. We will also plot the regression lines of these quantiles.

Quantiles
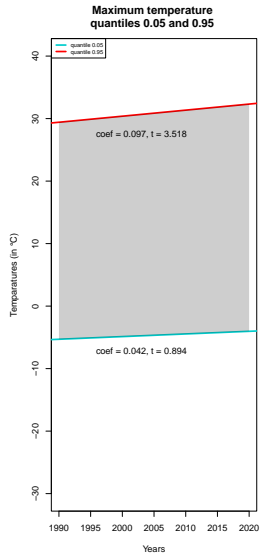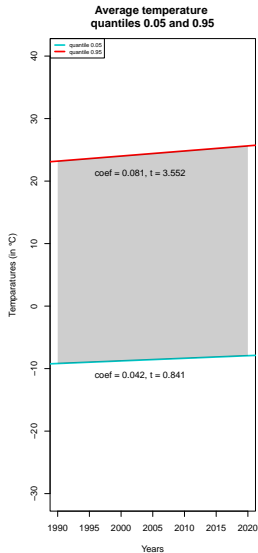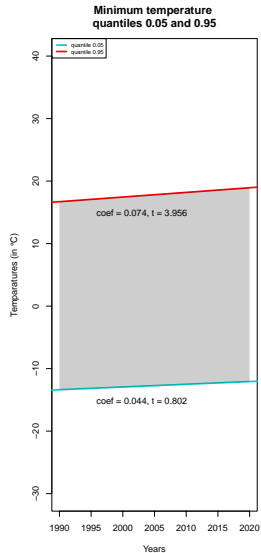
The variable is significant for the quantiles of order 0.05 and 0.95 of all variables of temperature. This means that the quantiles of order 0.05 and 0.95 of the minimum, average and maximum temperatures are increasing over the years. This is consistent with the results obtained with the medians. The quantile of order 0.95 shows a much stronger increase than the quantile of order 0.05. This means that the maximum temperatures are increasing much more than the minimum temperatures. For example, the quantile of order 0.95 of the maximum temperature has increased by almost 3°C over 30 years.
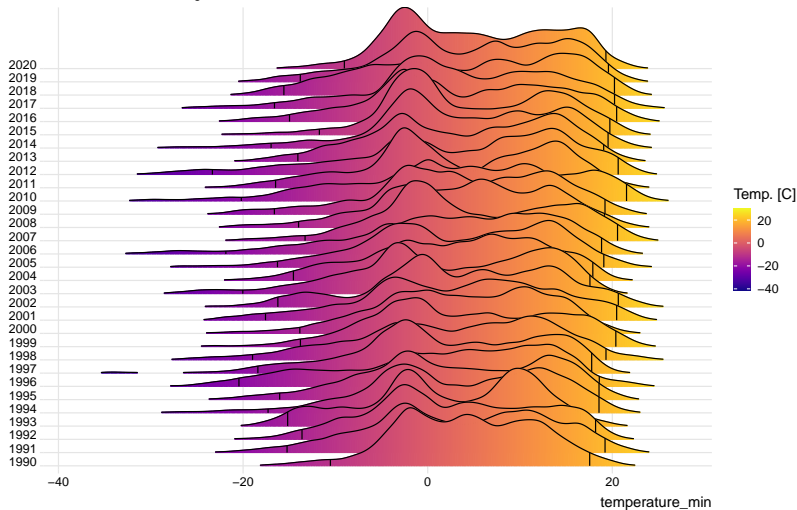
We will now look at the minimum and maximum temperature densities across years in Ukraine.

Minimum temperature

Temperatures in Ukraine
temperature_min (Celsius) by year between 1990 and 2020
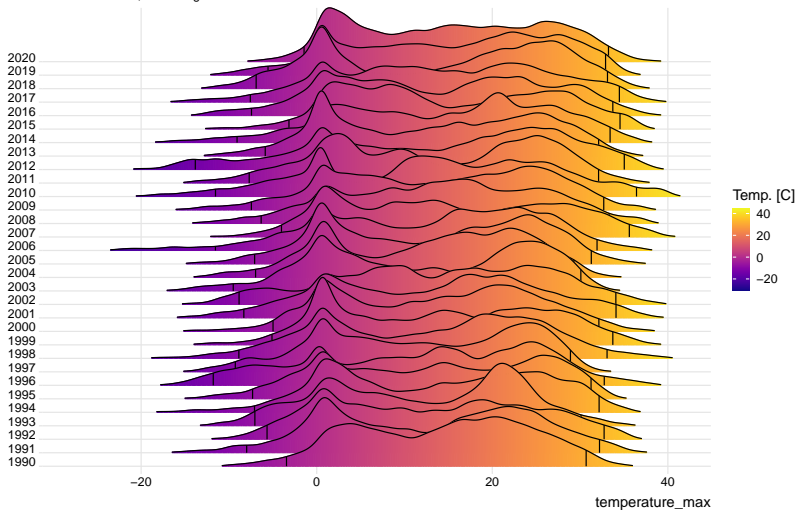bandwidth = 0.75, kernel = gaussian

Maximum temperature

Temperatures in Ukraine

temperature_max (Celsius) by year between 1990 and 2020
bandwidth = 0.75, kernel = gaussian

We can see that the maximum values seem to be increasing over the years.

Geographical points analysis

We will now analyze the data at specific geographical points. We will focus on 4 points in Ukraine, one at the West, that is in a mountainous area, one at the East, that is in a flat area, one at the North, and one at the South, that is in an area close to the sea.
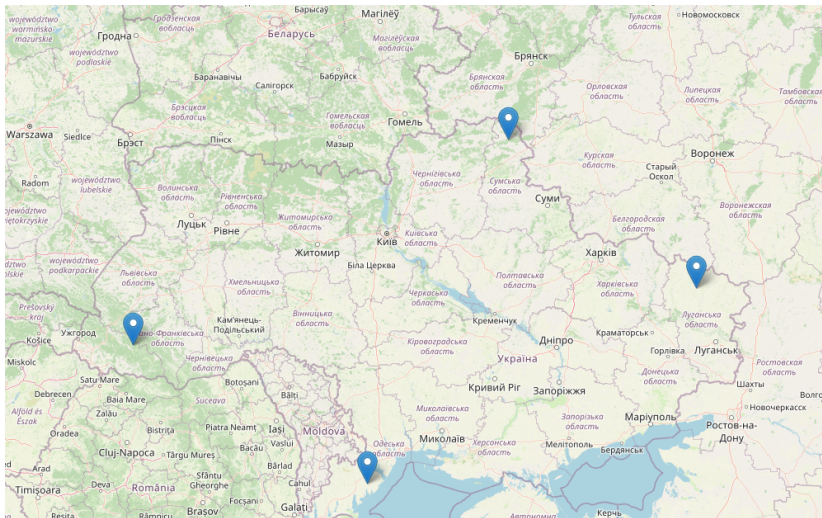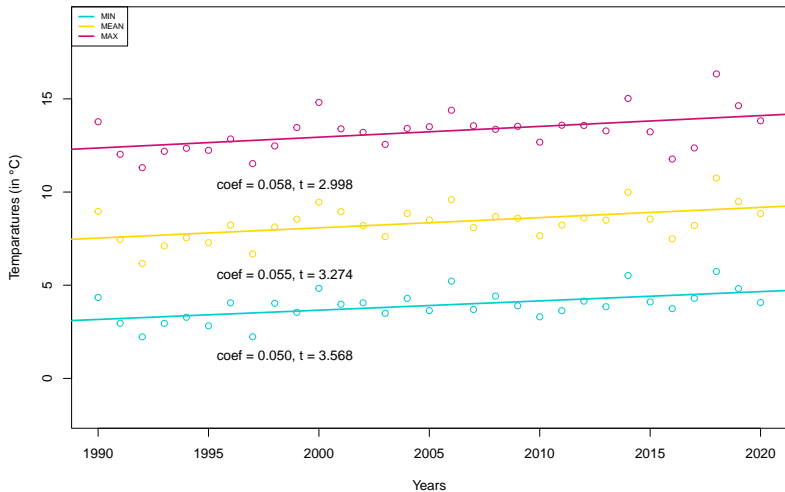
Median
Todo

Poland

Country level

First, we plot the regression line of the median of our 3 statistics: minimum, maximum and mean temperature.

Regression of the median temperature in Poland across years

The results are very similar to the ones we obtained for Ukraine. The median mean, minimum and maximum temperatures are slightly increasing (but still increasing) over the years. The t-tests support this observation, the variable 'Years' is significant. For example, every year, the median of the maximum temperature increases in average by 0.058°C. This is similar to an increase of approximately 1.7°C over 30 years.