Temperature data Tallinn, Helsinki and Globally. From 1915 to 2013

year	avg_temp_estonia	est_moving_average	avg_temp_finland	fin_moving_average	global_avg_temp	glob_moving_average
1915	3.34	3.34	2.33	2.33	8.59	8.59
1916	4.87	4.11	4.19	3.26	8.23	8.41
1917	4.08	4.10	3.51	3.34	8.02	8.28
1918	5.07	4.34	4.34	3.59	8.13	8.24
1919	4.29	4.33	3.69	3.61	8.38	8.27
1920	6.12	4.63	5.67	3.96	8.36	8.29
1921	5.31	4.73	4.61	4.05	8.57	8.33
1922	4.19	4.66	3.69	4.00	8.41	8.34
1923	4.33	4.62	3.58	3.96	8.42	8.35
1924	5.07	4.67	4.75	4.04	8.51	8.36
1925	5.75	4.77	5.04	4.13	8.53	8.38
1926	4.49	4.87	3.60	4.24	8.73	8.39
1927	4.79	4.86	4.08	4.23	8.52	8.42
1928	4.77	4.93	4.17	4.29	8.63	8.47
1929	4.34	4.86	3.92	4.25	8.24	8.48
1930	6.33	5.04	5.84	4.45	8.63	8.50
1931	4.20	4.87	3.66	4.27	8.72	8.54
1932	5.78	4.91	5.27	4.33	8.71	8.55
1933	4.58	4.95	4.14	4.37	8.34	8.54
1934	7.07	5.20	6.51	4.63	8.63	8.56
1935	5.57	5.24	5.08	4.66	8.52	8.56
1936	6.30	5.29	5.65	4.72	8.55	8.57
1937	6.14	5.44	5.66	4.91	8.70	8.56
1938	6.88	5.63	6.45	5.12	8.86	8.59
1939	5.85	5.73	5.11	5.21	8.76	8.61
1940	3.53	5.66	3.04	5.13	8.76	8.65
1941	2.76	5.33	1.96	4.78	8.77	8.67
1942	2.85	5.21	2.40	4.66	8.73	8.67
1943	6.44	5.27	5.95	4.72	8.76	8.67
1944	5.95	5.39	5.36	4.83	8.85	8.72
1945	5.03	5.21	4.27	4.63	8.58	8.71
1946	5.11	5.17	4.56	4.58	8.68	8.73
1947	4.41	5.00	3.86	4.42	8.80	8.75
1948	5.87	4.97	5.27	4.38	8.75	8.75
1949	6.83	4.97	6.22	4.36	8.59	8.73
1950	5.34	4.92	4.80	4.34	8.37	8.69
1951	5.19	5.07	4.65	4.48	8.63	8.68
1952	4.49	5.23	3.95	4.66	8.64	8.67
1953	5.82	5.50	5.38	4.93	8.87	8.68
1954	5.13	5.38	4.73	4.82	8.56	8.67
1955	4.43	5.24	3.54	4.66	8.63	8.65
1956	3.64	5.11	2.97	4.54	8.28	8.62
1957	5.69	5.17	5.03	4.58	8.73	8.62
1958	4.42	5.17	3.53	4.55	8.77	8.62
1959	6.03	5.18	5.49	4.57	8.73	8.62
1960	5.00	5.02	4.40	4.41	8.58	8.62
1961	6.67	5.14	6.12	4.53	8.80	8.66
1962	4.75	5.10	4.10	4.48	8.75	8.67
1963	4.35	5.08	3.95	4.48	8.86	8.69
1964	5.27	5.03	4.67	4.41	8.41	8.65
1965	4.62	4.99	4.05	4.35	8.53	8.64
1966	4.15	4.96	3.28	4.33	8.60	8.64
1967	5.50	5.13	4.86	4.50	8.70	8.68
1968	4.81	5.05	3.97	4.40	8.52	8.66
1969	3.96	5.01	3.43	4.39	8.60	8.64
1970	4.35	4.86	3.91	4.25	8.70	8.64
1971	5.53	4.91	4.62	4.27	8.60	8.64
1972	6.03	4.85	5.55	4.22	8.50	8.62
1973	5.67	4.93	4.93	4.29	8.95	8.63
1974	6.39	5.12	6.03	4.48	8.47	8.60
1975	7.06	5.28	6.38	4.64	8.74	8.63
1976	3.99	5.22	3.28	4.57	8.35	8.61
1977	4.82	5.28	4.08	4.64	8.85	8.63
1978	4.06	5.15	3.18	4.49	8.69	8.63
1979	4.83	5.15	4.27	4.51	8.73	8.65
1980	4.61	5.21	4.09	4.57	8.98	8.69
1981	5.21	5.29	4.50	4.63	9.17	8.73
1982	5.57	5.29	4.88	4.65	8.64	8.73
1983	6.22	5.31	5.47	4.64	9.03	8.78
1984	5.84	5.33	5.33	4.68	8.69	8.76
1985	3.65	5.08	2.81	4.39	8.66	8.78
1986	4.94	4.89	4.25	4.19	8.83	8.78
1987	3.42	4.83	2.58	4.13	8.99	8.84
1988	5.80	4.92	5.22	4.23	9.20	8.87
1989	7.21	5.21	6.67	4.55	8.92	8.89
1990	6.83	5.39	6.07	4.72	9.23	8.94
1991	6.32	5.55	5.62	4.85	9.18	8.96
1992	6.51	5.66	5.80	4.97	8.84	8.93
1993	5.26	5.64	4.74	4.96	8.87	8.95
1994	5.35	5.56	4.66	4.89	9.04	8.95
1995	6.23	5.59	5.63	4.91	9.35	9.01
1996	4.63	5.68	4.20	5.04	9.04	9.04
1997	5.95	5.77	5.36	5.14	9.20	9.08
1998	5.50	5.96	4.71	5.33	9.52	9.13
1999	6.55	6.03	5.70	5.38	9.29	9.13
2000	7.12	6.02	6.57	5.37	9.20	9.16
2001	6.08	5.95	5.35	5.30	9.41	9.18
2002	6.34	5.96	5.54	5.30	9.57	9.21
2003	5.74	5.89	5.02	5.23	9.53	9.27
2004	6.03	5.96	5.40	5.29	9.32	9.32
2005	6.04	6.02	5.80	5.39	9.70	9.38
2006	6.70	6.06	5.91	5.41	9.53	9.39
2007	6.97	6.27	6.23	5.60	9.73	9.45
2008	7.39	6.41	6.77	5.73	9.43	9.48
2009	6.14	6.46	5.49	5.80	9.51	9.47
2010	5.06	6.33	4.36	5.68	9.70	9.51
2011	6.98	6.32	6.38	5.66	9.52	9.54
2012	5.57	6.27	5.12	5.64	9.51	9.55
2013	7.28	6.35	6.17	5.70	9.61	9.55

Project submission

Conclusion

Using the data obtained and building linear temperature graphs, we can say with confidence the following:
- the temperature in my city of residence, namely Tallinn, during the entire period under review was lower than the average temperature in the world;
- the difference in temperatures globally and the point of my residence is not constant.
- during the period under review, the temperature globally increased within two degrees Celsius, while in Tallinn the temperature rose by more than three and a half degrees;
- according to the data received, the general trend, both globally and at the point of my residence, is towards warming. The trend is stable over the considered period.

Description of the working process on the project

To build the visualization and get the data I needed for the period I selected from 1915 to 2013, I followed the steps below:

1. Created a query to the database using and combining subqueries, which in turn filtered information from three separate tables to me according to my criteria by city and period. I used a window function to get a moving average. The result was written down in a separate column, rounded up to two digits. The query is given below.

```
SELECT
    t1.year AS year,
    t1.avg_temp AS avg_temp_Estonia,
    ROUND(AVG(t1.avg_temp) OVER(ORDER BY t1.year
    ROWS BETWEEN 10 PRECEDING AND CURRENT ROW ), 2)
    as Est_moving_average,

    t2.avg_temp AS avg_temp_Finland,

    ROUND(AVG(t2.avg_temp) OVER(ORDER BY t1.year
    ROWS BETWEEN 10 PRECEDING AND CURRENT ROW ), 2)
    AS Fin_moving_average,

    t3.avg_temp AS global_avg_temp,

    ROUND(AVG(t3.avg_temp) OVER(ORDER BY t1.year
    ROWS BETWEEN 10 PRECEDING AND CURRENT ROW ), 2)
    AS glob_moving_average

FROM (SELECT *
    FROM city_data
    WHERE city = 'Tallinn' AND year BETWEEN '1915' AND '2015') AS t1
JOIN (SELECT *
    FROM city_data
    WHERE city = 'Helsinki' AND year BETWEEN '1915' AND '2015') AS t2
    ON t1.year = t2.year
JOIN (SELECT *
    FROM global_data
    WHERE year BETWEEN '1915' AND '2015') AS t3
    ON t2.year = t3.year
;
```

2. To plot and create a visualization after receiving data in .csv format, I used Python by writing code and using two libraries, namely Pandas and Mathplotlib.

```
# import Pandas library for working with data sets
import pandas as pd
# import graph plotting library
import matplotlib.pyplot as plt

# open a SCV file and assign one to <df> variable
df = pd.read_csv(
    'CSV_files/data.csv')

# DataFrame plotting accessor and method from pandas
df.plot(y=['est_moving_average', 'fin_moving_average',
           'glob_moving_average'], x='year')

# plots lines to the axes
plt.plot()

plt.title(
    'Visualization for comparing changing temperature for period from 1915 to
2013')
plt.ylabel('temperature')
plt.xlabel('period for analysis, years')

# displays all open figures
plt.show()
```

The resulting visualization is added to the examination of individual files.