

COMPARISON OF AVERAGE MONTHLY AIR TEMPERATURES IN THE 2023/2024 SCHOOL YEAR WITH MULTI-ANNUAL AVERAGES

Primary school Turanj

Karlovac

Croatia



- We investigated and compared the average air temperatures in the 2023/2024 school year and multi-year averages measured at the meteorological station of the Forestry and Woodworking School, in the text SDSK (Šumarska i drvodjeljska škola Karlovac) and the Main Meteorological Station of the State Hydrometeorological Institute (DHMZ) in Karlovac
- we assumed that the average temperatures in that school year were higher than the multi-year averages
- our measurements showed that the temperatures measured at the school meteorological station in the 2023/2024 school year were higher than those measured at other stations.

- we used an Ayres automatic weather station



Figure 1. Automatic weather station



Figure 2. Display on the monitor of an automatic weather station in numerical form.

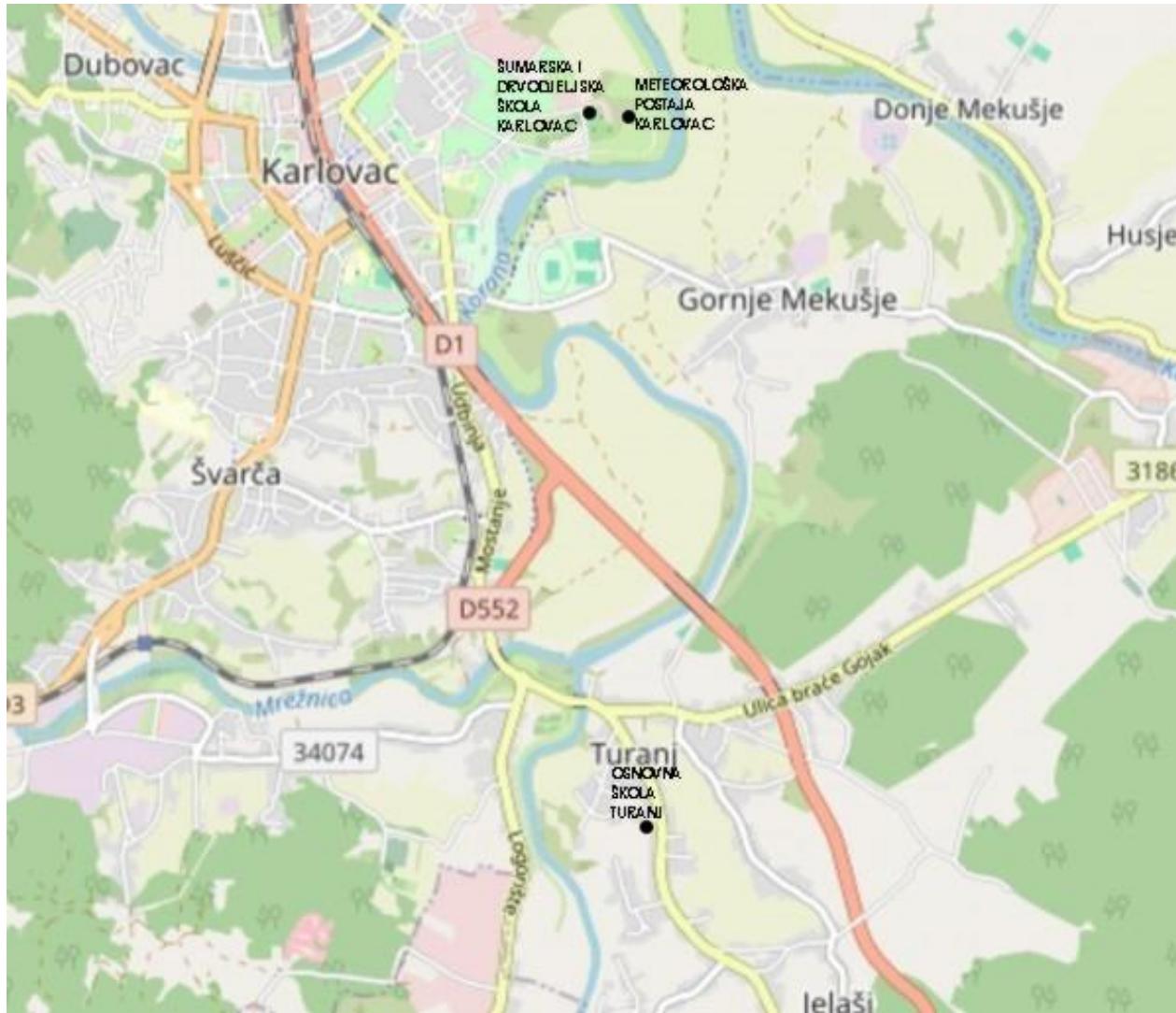


Figure 3. Data display in the aero.e-skole.hr application .

Table 1. List of measuring stations with basic data (latitude, longitude and altitude)

NAME OF THE STATION	LATITUDE	LONGITUDINAL	ALTITUDE
Primary School Turanj	45.460 N	15.569 E	123 m
Forestry and Carpentry School Karlovac (SDSK)	45.494 N	15.562 E	119 m
Main meteorological station Karlovac	45.494 N	15.563 E	119 m

Figure 3. Map of the city of Karlovac with marked measuring stations



RESEARCH QUESTION

Are the average monthly temperatures measured in the 2023/2024 school year higher than multi-year averages?

HYPOTHESIS

Temperatures measured in the 2023/2024 school year are higher than multi-year averages.

Research methods

- we measured and recorded air temperature data according to the GLOBE protocol during the 2023/2024 school year
- we downloaded the data from the automatic station at local time from 12:00 to 13:00 at our measuring station located on the school wall at a height of about 5 meters above the grassy ground

Data display and analysis

- we have measured the air temperature at our station since the beginning of the 2023 school year (September 1, 2023 to August 31, 2024)
- the temperature data of the Forestry and Carpentry School (SDSK) is from 1998 to 2024.
- we have measured temperatures for all months of the year (at least 16 for April and September each)
- data from the Croatian Hydrometeorological Institute were taken from the table of average monthly temperatures from 1949 to 2023.
- (https://meteo.hr/klima.php?section=klima_podaci¶m=k1&Grad=karlovac).

Table 2. Average temperatures by month for specific measuring stations.

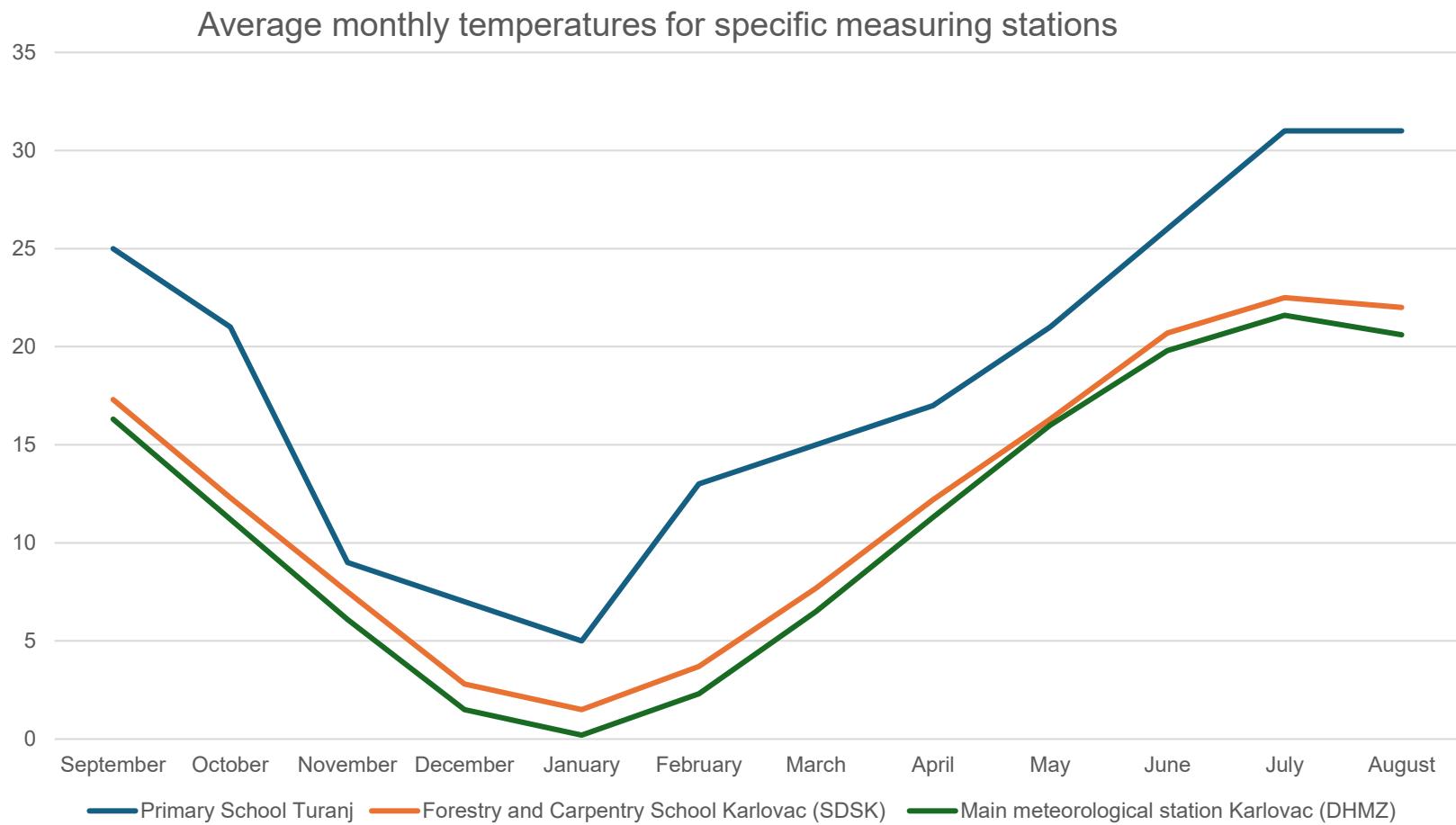
Month	Average monthly temperature at the measuring station (°C)		
	Primary School Turanj (2023. -2024.)	Forestry and Carpentry School Karlovac (SDSK) (1998. 2024.)	Main meteorological station Karlovac (DHMZ) (1949. - 2024.)
September	25	17,3	16,3
October	21	12,3	11,2
November	9	7,5	6,1
December	7	2,8	1,5
January	5	1,5	0,2
February	13	3,7	2,3
March	15	7,7	6,5
April	17	12,2	11,3
May	21	16,3	16,0
June	26	20,7	19,8
July	31	22,5	21,6
August	31	22,0	20,6

Table 3. Differences in average monthly temperatures at our measuring station and other stations (°C).

Month	Differences in average monthly temperatures at our measuring station and other stations (°C)		
	Primary School Turanj	Forestry and Carpentry School Karlovac (SDSK)	Main meteorological station Karlovac (DHMZ)
September	7,7 do 8,7	17,3	16,3
October	8,7 do 9,8	12,3	11,2
November	1,5 do 2,9	7,5	6,1
December	4,2 do 5,5	2,8	1,5
January	3,5 do 4,8	1,5	0,2
February	9,3 do 10,7	3,7	2,3
March	7,3 do 8,5	7,7	6,5
April	4,8 do 5,7	12,2	11,3
May	4,7 do 5	16,3	16,0
June	5,3 do 6,2	20,7	19,8
July	8,5 do 9,4	22,5	21,6
August	9 do 10,4	22,0	20,6

- Table 3 shows the deviations between the measured temperatures at the meteorological station of the Turanj Elementary School (2nd column) and the multi-year monthly averages of the Karlovac Forestry and Carpentry School (3rd column) and the Karlovac Meteorological Station of the DHMZ (4th column)
- if we look at the absolute values, we see that the largest difference in average temperatures was in February 2024 ($10,7^{\circ}\text{C}$) and August 2024. ($10,7^{\circ}\text{C}$)
- October 2023 and July 2024 also had a difference of slightly less than 10°C
- The smallest difference in average temperatures is in November 2023 ($1,5^{\circ}\text{C}$)
- no other month has a difference of less than 3°C

Chart 1. Display of average monthly temperatures for specific measuring stations



Discussion and conclusions

By collecting, processing and analyzing data, we confirmed that the average air temperatures in the 2023/2024 school year measured by an automatic measuring station mounted on the wall of the Turanj Elementary School were higher than the multi-year average of average monthly air temperatures at the stations of the Forestry and Woodworking School Karlovac (SDSK) and the Main Meteorological Station Karlovac (DHMZ). Greater differences are seen in comparison with the DHMZ Meteorological Station Karlovac.

Data sources

1. Applications aero.e-skole.hr
2. GLOBE database www.globe.gov
3. DHMZ database <https://meteo.hr>
4. Program GLOBE Hrvatske – Atmosfera -
<http://globe.hr/upute-za-provedbu>
5. Orešić, D., Tišma, I., Vuk, R., Bujan, A., Kralj, P.
2020. Gea 2 - 6th grade geography textbook,
Školska knjiga, Zagreb 2020. godine