

*How do Navarre's Asphalt Surface Temperatures
Compare with
Ivano-Frankivsk City Environmental Station?*

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**Navarre Elementary, Toledo, Ohio
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Purpose

We chose to compare surface temperatures between Navarre, Toledo, Ohio with Ivano-Frankivsk City Environmental Station in Ukraine because it seems like an interesting place

Essential Question

How do Navarre's surface temperatures compare with Ivano-Frankivsk City Environmental Station in Ukraine?

Hypothesis

We are both at similar latitudes, so we will have similar surface temperatures.

Investigation Plan

1. Take surface temperatures and cloud data at our school sites
2. Upload data to Globe website
3. Determine our research question and locations to investigate
4. Compare data with Ivano-Frankivsk City Environmental
5. Research school's ecosystem and climates
6. Compare data
7. Determine errors
8. Write conclusions and abstract

Field Research Methods / Protocols: Surface Temperatures & Cloud Observations

1. Take 9 surface temperatures with IRT (asphalt, grass, cement)
2. Collect cloud data: % cloud cover and cloud identification
3. Collect contrail data
4. Take air temperature in the shade
5. Go in the building
6. Check data to see if it was correct
7. Upload data to GLOBE website

Research: Ukraine

Latitude: 41.63484

Longitude: -83.5242

Elevation: 180 m

Population: suburban

Climate: Temperate



Research: Navarre Elementary, Toledo, Ohio

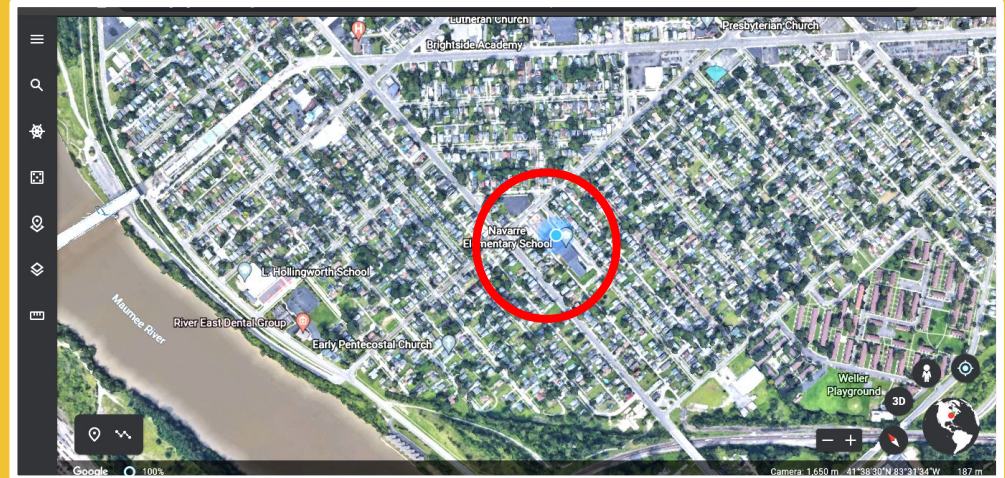
Latitude: 41.63484

Longitude: -83.5242

Elevation: 186 m

Population: Urban

Climate: Temperate



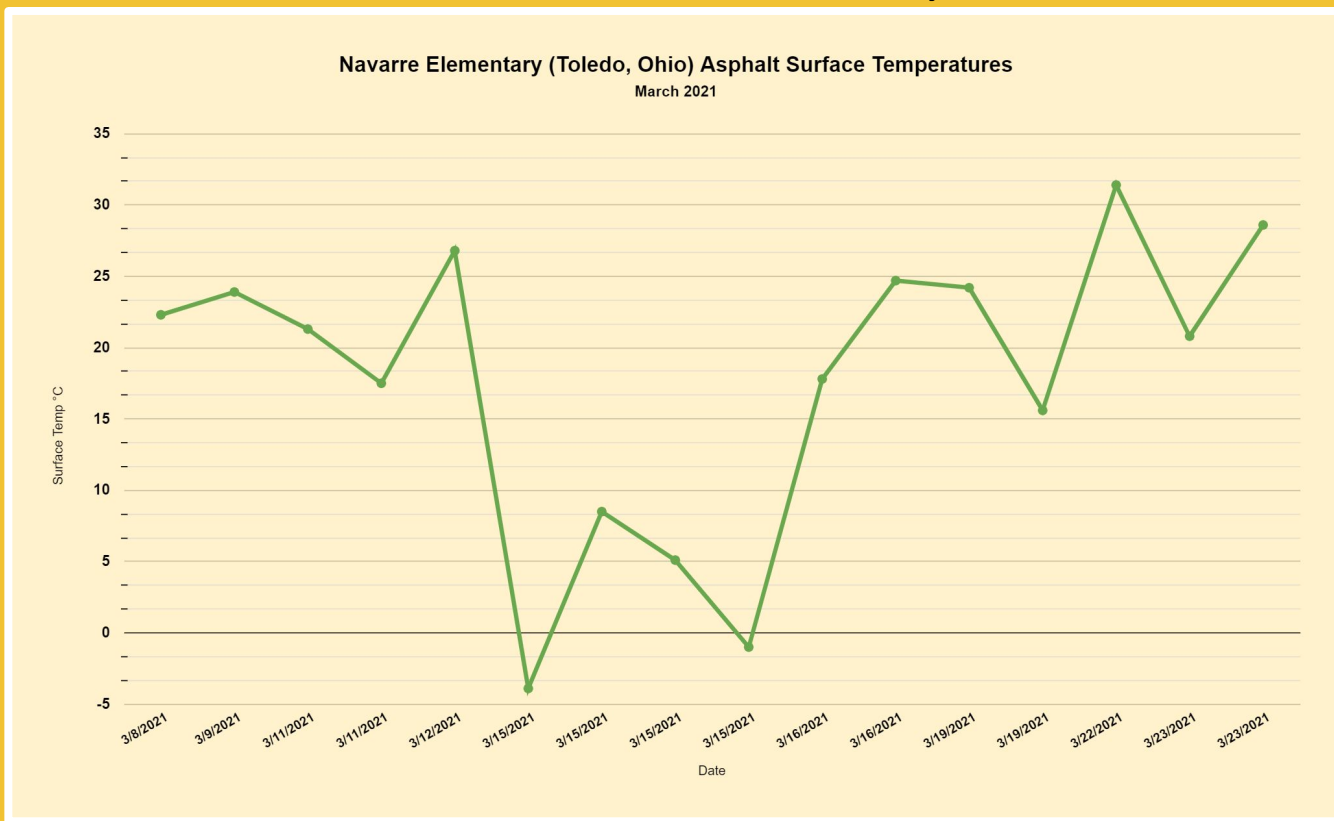
Data Tables: Navarre Elementary, Toledo, Ohio

site_name	latitude	longitude	elevation	Date	Surf Temp C
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/8/2021	22.3
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/9/2021	23.9
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/11/2021	21.3
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/11/2021	17.5
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/12/2021	26.8
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/15/2021	-3.9
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/15/2021	8.5
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/15/2021	5.1
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/15/2021	-1
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/16/2021	17.8
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/16/2021	24.7
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/19/2021	24.2
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/19/2021	15.6
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/22/2021	31.4
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/23/2021	20.8
Navarre Asphalt area in front of / East of School	41.63484	-83.5242	186	3/23/2021	28.6

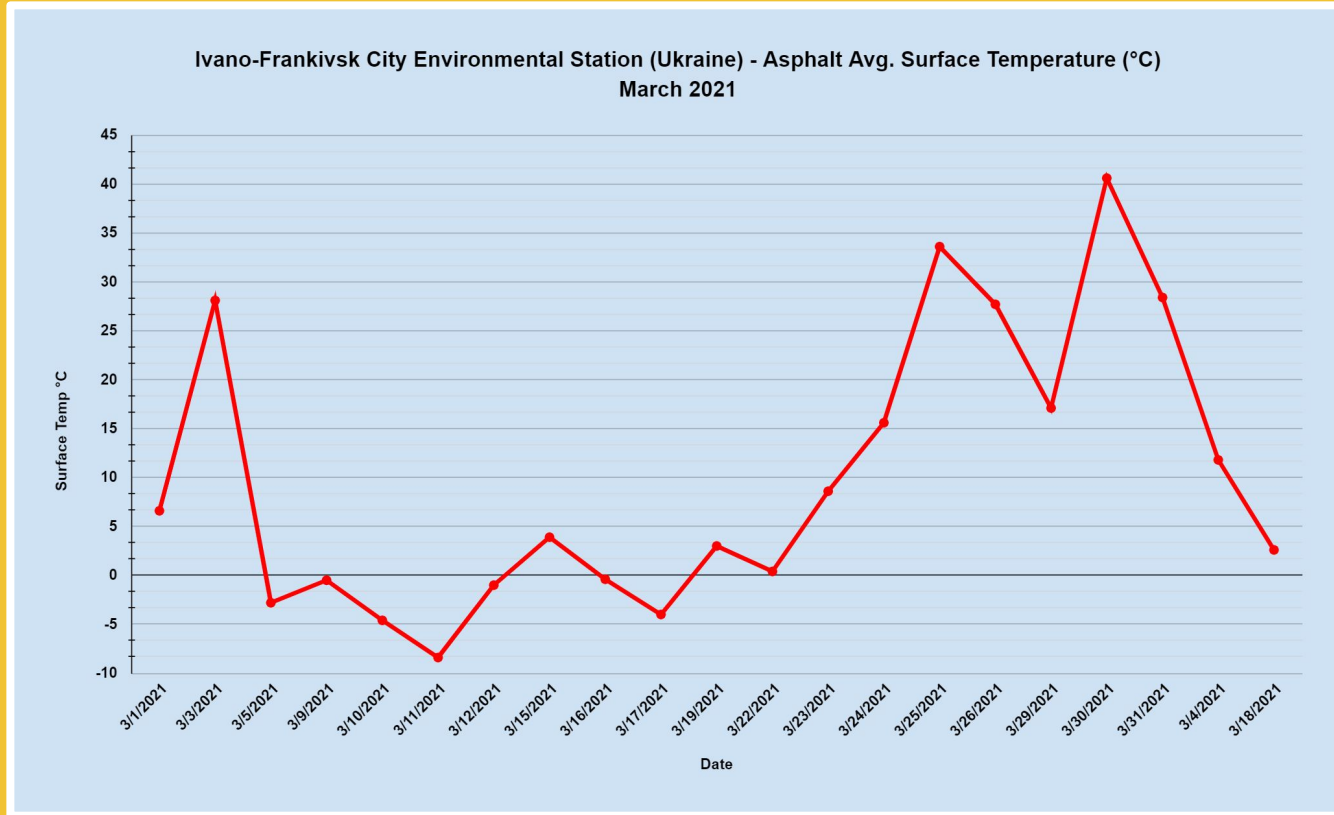
Data Table: Ivano-Frankivsk City Env Station, Ukraine

orig_name	latitude	longitude	elevation	Date	Surface temperature [°C]
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/1/2021	3.3
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/3/2021	14
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/5/2021	-1.4
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/9/2021	-0.2
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/10/2021	-2.3
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/11/2021	-4.2
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/12/2021	-0.5
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/15/2021	2
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/16/2021	-0.2
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/17/2021	-2
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/19/2021	1.5
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/22/2021	0.2
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/23/2021	4.3
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/24/2021	7.8
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/25/2021	16.8
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/26/2021	13.8
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/29/2021	9.1
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/30/2021	20.3
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/31/2021	14.2
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/1/2021	3.3
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/3/2021	14.1
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/4/2021	11.8
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/5/2021	-1.4
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/9/2021	-0.3
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/10/2021	-2.3
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/11/2021	-4.2
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/12/2021	-0.5
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/15/2021	1.9
Ivano Frankivsk City Environmental Station	48.92	24.69	260	3/16/2021	-0.2

Graph: Navarre Elementary, Toledo, Ohio



Graph: Ivano-Frankivsk City Env Station, Ukraine



Data Analysis

Navarre: Asphalt

- Range Of Temperature:: $-4^{\circ}\text{C} - 32^{\circ}\text{C}$
- Average Temperature:: 18°C

Ukraine: Asphalt

- Range of Temperature: $-8^{\circ}\text{C} - 40^{\circ}\text{C}$
 - Average Temperature: 5°C
- The average temperatures at Ivano-Frankivsk were lower than the average temperature at Navarre Elementary.
- Ivano-Frankivsk had a wider range of temperatures than Navarre: they had colder low temperatures and hotter high temperatures.

Limitations / Sources of Error

- **The times that temperatures were taken may have been different and/or entered incorrectly**

**Example: Some Navarre temps were taken between 12:00 and 19:45
Although we took temperatures at two basic times of day (11:45 a.m and
2:45 p.m) it shows an error when entering the time in Globe website.**

**Ivano-Frankivsk data time was taken earlier than Navarre's data time
(between 9 a.m. - 12:00)**

Conclusions

Our hypothesis was that because we are at similar latitudes north of the equator so the temperatures may be similar at different times

The data is inconclusive as a result of the different times temperatures were taken, however, the temperatures seem to be somewhat similar.

Our hypothesis was somewhat valid.

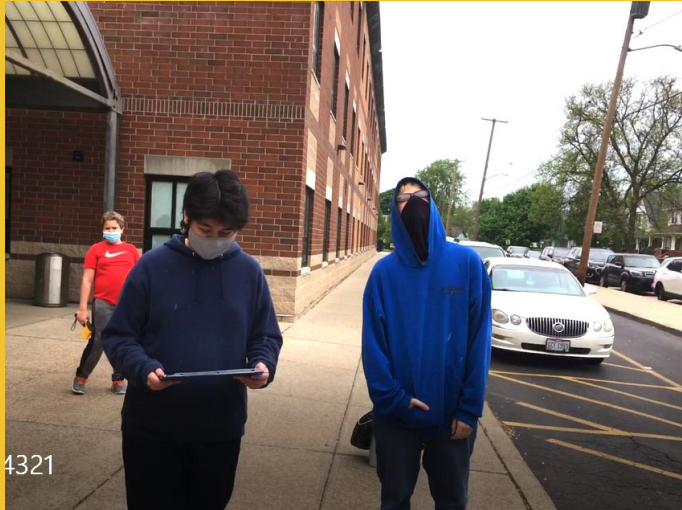
Abstract

The purpose of our project was to compare surface temperatures between Navarre, Toledo Ohio with Ukraine because it was and interesting to look at Our hypothesis was that we are at similar latitudes north of the equator, so our temperatures would be similar. We took 9 surface temperatures of asphalt, cement and grass during the month of March and then picked another school that had similar latitude and data taken. Ivano-Frankivsk had a wider range of temperatures than Navarre: they had colder low temperatures and hotter high temperatures. The average temperatures at Ivano-Frankivsk were lower than the average temperature at Navarre Elementary. Ivano-Frankivsk took temperatures in the morning and Navarre took temperatures between noon and 2:45 p.m. Our conclusion was that the data somewhat supports our hypothesis.

Works Cited / Bibliography

<https://www.google.com/earth/>

<https://www.globe.gov/>



Thank you!