

HOW DO NAVARRE SURFACE TEMPERATURES COMPARED TO BRAZIL PAVEMENT SURFACE TEMPERATURES

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Purpose To see how our temperatures compare to a hotter place.

Essential Question Is it warmer in Brazil in March than it is in Toledo?

Hypothesis I think Brazil will be hotter because they're right on the equator.

Investigation Plan

- **Take surface Temperature and Cloud data at our school sites**
- **Upload Data to GLOBE website**
- **Determine our research question and locations to investigate**
- **Compare data with another school**
- **Research school ecosystem and climates**
- **Compare data**
- **Determine errors**
- **Write conclusion and abstract**

FIELD RESEARCH METHODS / PROTOCOLS:

SURFACE TEMPERATURES & CLOUD OBSERVATIONS

- 1. We went outside to take surface temperatures with the IRTs**
- 2. Next we face them down and take temperatures of grass, asphalt, concrete. We took nine temperatures**
- 3. We also took cloud cover, contrails, and cloud types, and took pictures of the sky**
- 4. We uploaded this information up to GLOBE**
- 5. We are researching a Brazil's surface temperature**
- 6. We are comparing and contrasting Brazil and Navarre Elementary**

Research: Brazil Globe School

- **Latitude: -7.2363**
- **Longitude: -39.4149**
- **Elevation: 497.2 m**
- **Population: urban**
- **Climate description: Tropical**



Data Tables for Brazil Globe School: Pavement

org_name	latitude	longitude	elevation	Date	Avg Surface Temp °C
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/8/2021	39.8
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/9/2021	41.3
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/11/2021	41.2
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/12/2021	27.9
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/15/2021	33.5
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/16/2021	37.1
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/19/2021	35.8
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/22/2021	37.1
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/23/2021	21.2
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/24/2021	22.1
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/25/2021	35.5
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/26/2021	33.6
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/27/2021	30.1
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/28/2021	29.8
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/29/2021	23.6
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/30/2021	24.1
Brazil GLOBE v-School	-7.2363	-39.4149	497.2	3/31/2021	37.3

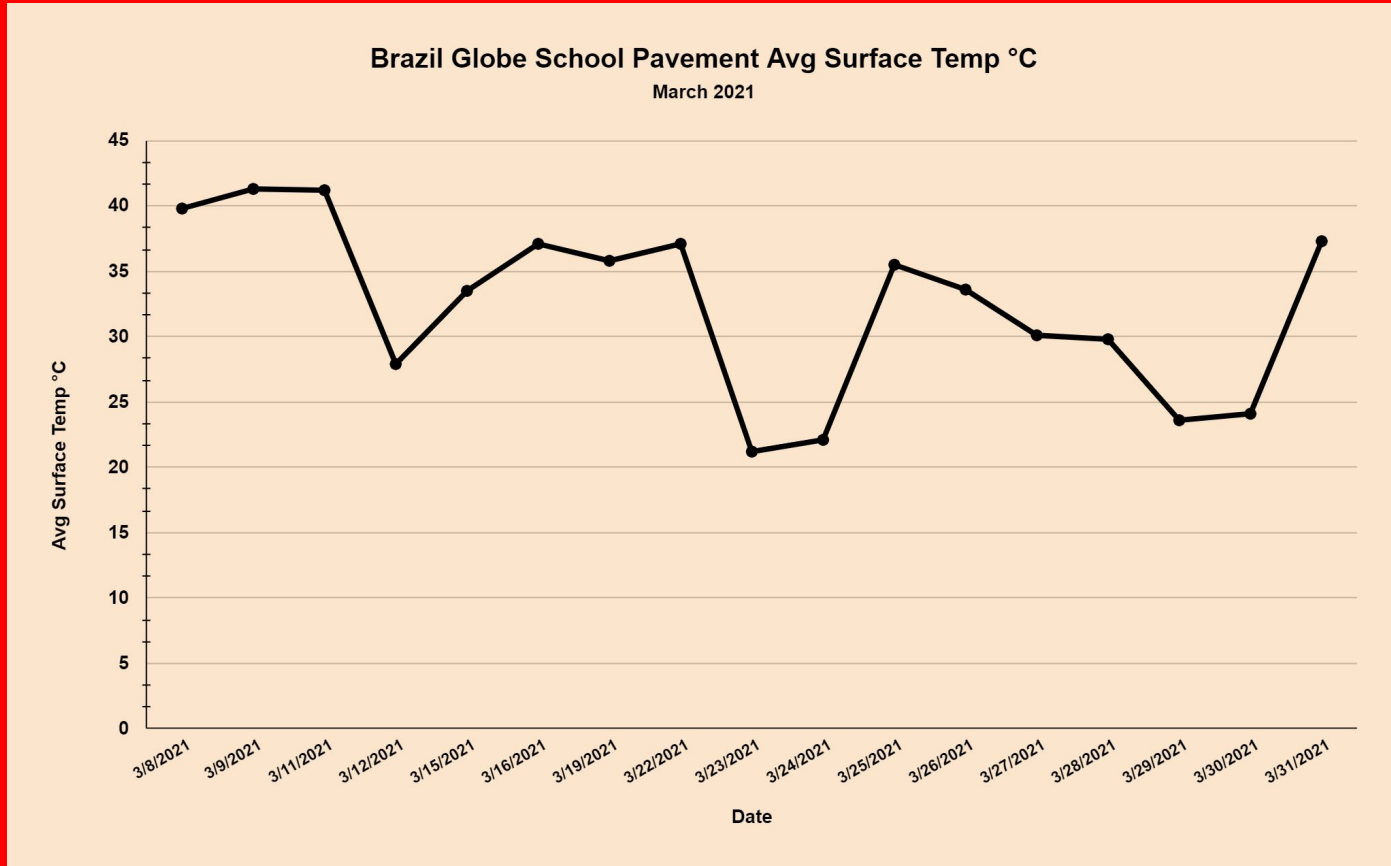
Data Table: Navarre, Toledo, Ohio: Asphalt

site_name	latitude	longitude	elevation	Date	Ssurface temperature: 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

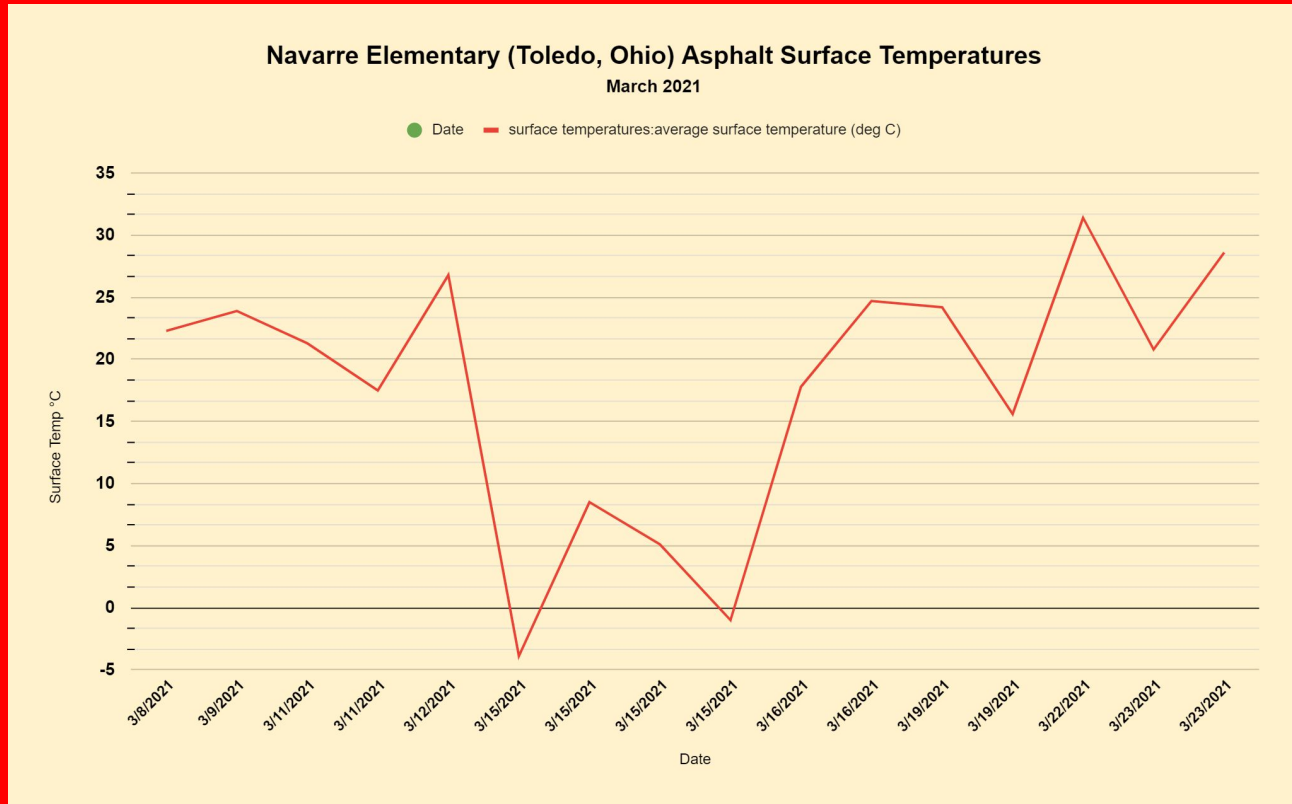
Data Table: Navarre, Toledo, Ohio: Concrete

site_name	latitude	longitude	elevation	Date	Surface temperature °C
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/8/2021	22.1
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/9/2021	21.8
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/11/2021	20.2
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/11/2021	17
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/12/2021	19.5
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/15/2021	1.2
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/15/2021	7.4
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/16/2021	19.4
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/16/2021	21.2
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/19/2021	16
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/22/2021	39.4
Navarre Cement area in front of / East of School	41.63493	-83.5242	186	3/23/2021	5.1

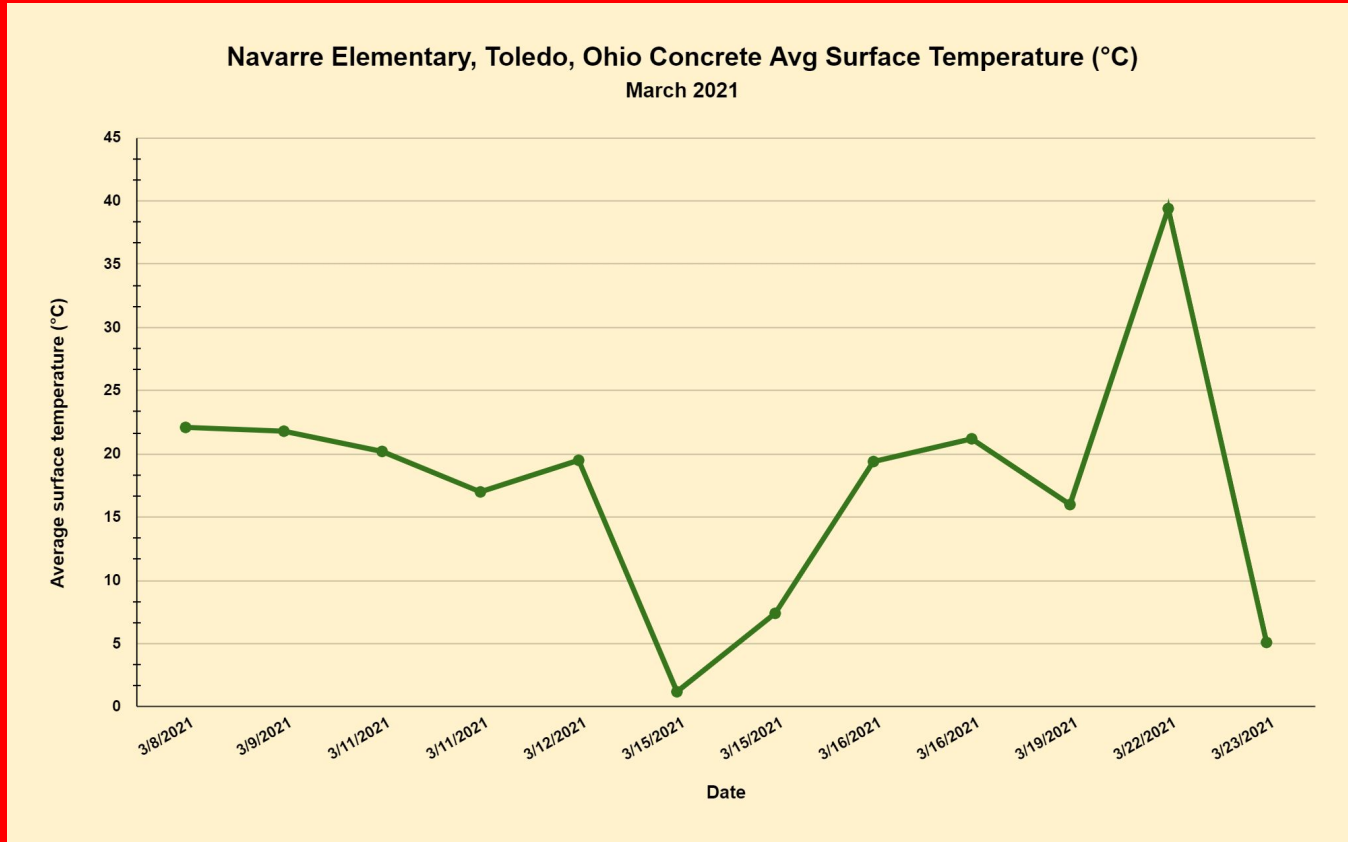
Graph: Brazil Pavement Surface Temperatures



Graphs: Navarre Asphalt Surface Temperatures



Graphs: Navarre Concrete Surface Temperatures



Data Analysis

Brazil Pavement

- Brazil pavement range: 21°C - 41°C
- the average temperature for Brazil: 32°C

Navarre Concrete

- The range for Navarre concrete temperature is 1.2°C to 21°C
- The avg concrete temp is 17.5°C

Navarre asphalt

- Navarres Asphalt range is: -3°C to 31°C
 - Navarres Asphalt avg temp.: 18°C
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- Average Temperatures: Globe Brazil school pavement is hotter than Navarre Elementary surfaces
 - Lowest temperature: Globe Brazil school pavement is hotter than Navarre Elementary surfaces
 - Highest temperature: Globe Brazil school pavement is hotter than Navarre Elementary surfaces

Limitations / Sources of Error

Data may have been taken/or entered incorrectly into the Globe website

The Brazils schools may have taken temperatures at different time than Navarre.

Examples:

Globe data shows Navarre temps were taken between 12:00 and 19:45 at six different times.

Brazil took majority of temps at 14:45 [10] but some where taken at 10:45 [5] or as late as 20:00 [2]

Conclusions

Our hypothesis was that Brazil was going to be hotter than Navarre, since they are closer to the equator. Brazil clearly had warmer temperatures than Navarre. They are closer to the equator and are warmer for most of the year than Toledo. The data did support our hypothesis. Our hypothesis was valid.

Abstract

The purpose of was to compare the different temperatures in a cold climate to a warm climate. Our hypothesis was that Brazil's pavement surface temperatures are warmer because it is closer to the equator. We took nine surface temperatures for concrete and asphalt. Then we researched GLOBE for Brazil's school's. The average temperature for Navarre asphalt was 18 degrees celsius and Brazil's pavement average was 31 degrees celsius. Brazil's pavement is way hotter. An error was the Brazil's school took different time than Navarre Elementary. Another error was that the data may be incorrectly posted. Our hypothesis did support our data. Our hypothesis was valid.

Works Cited

Globe.gov

Google Earth

