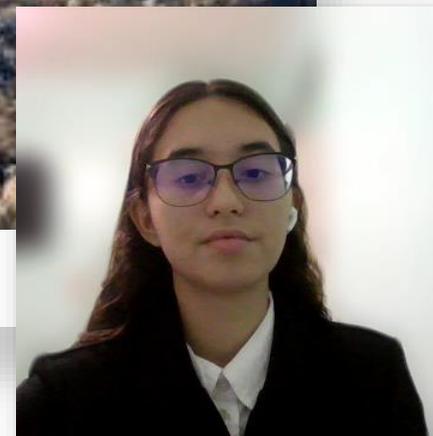
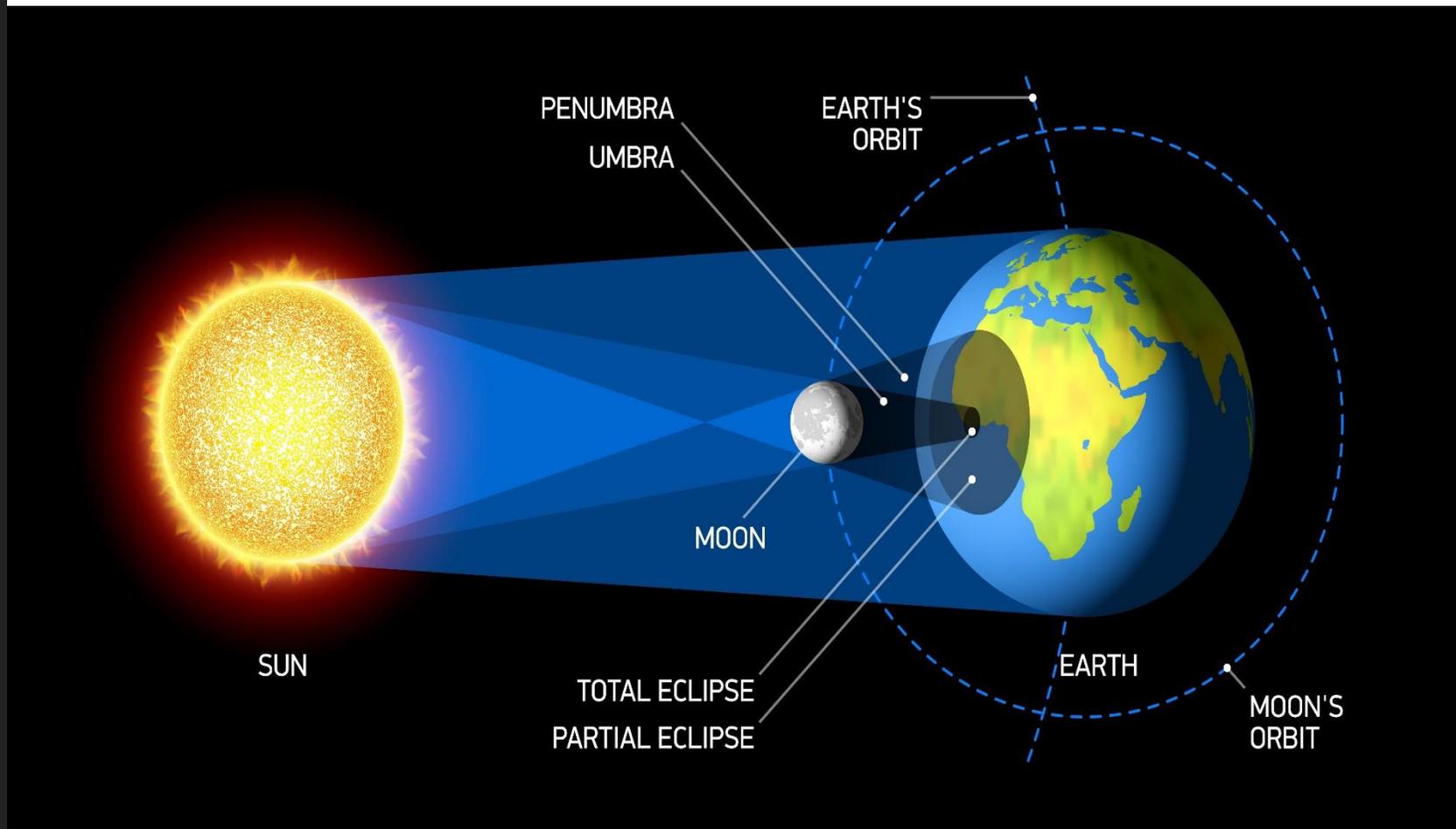


Solar Eclipse Impacts on Air Temperature and Sky Visibility

Kaelyn Cervantes
Isabella Akinbinu



Background

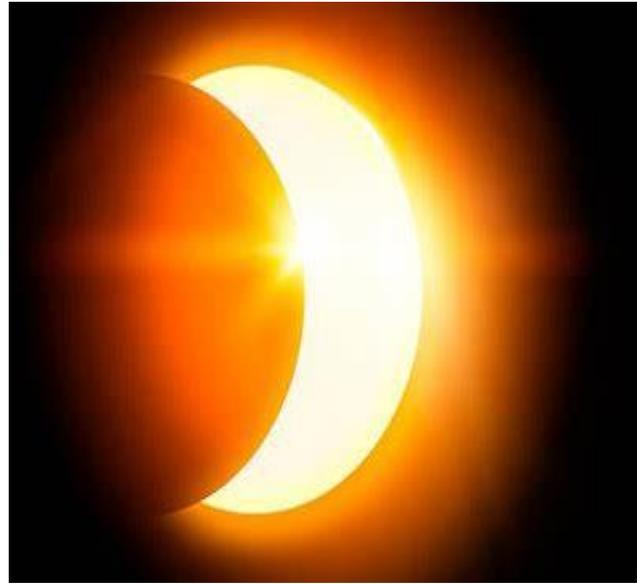


Goals

Our goal is to study the impact of the April 8th, 2024, eclipse on two counties: one experiencing a total eclipse and the other a partial eclipse. By comparing these locations, we aim to understand how the eclipse influenced air temperature and sky visibility in each county. Researching these protocols can provide valuable insights into the atmospheric changes during solar eclipses, enhance our understanding of local climate responses to such events, and help improve prediction models for future eclipses.

Location

Partial



**Baltimore,
Maryland**

Total



Dallas, Texas



Data Analysis Tools



ArcGIS

We utilized ArcGIS online to create a map of the data obtained from Globe Observer

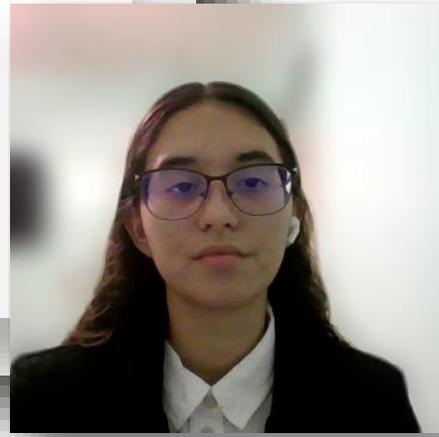


GLOBE

We downloaded data from Globe Observer for our research

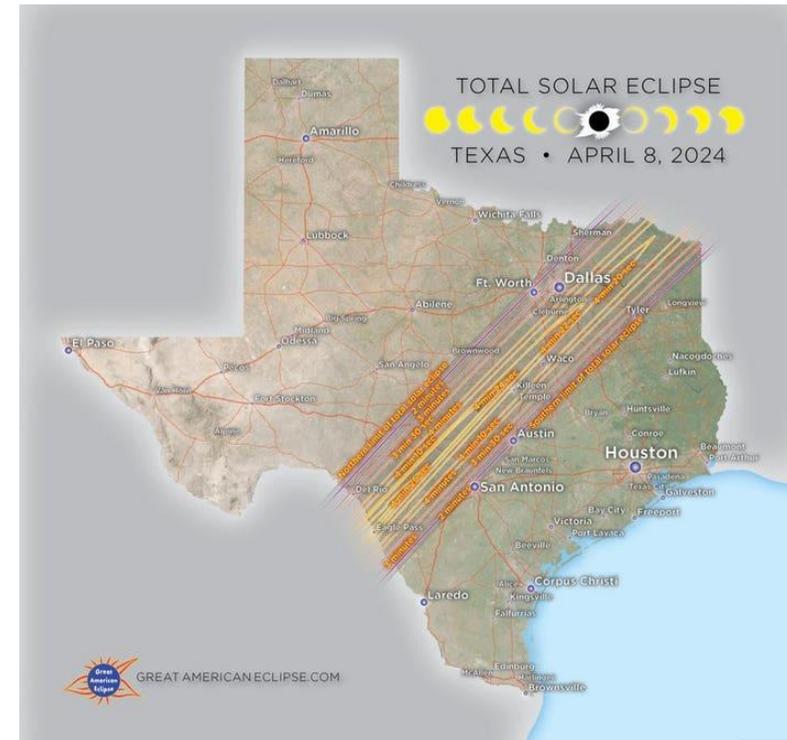


We used Excel to process the data from Globe Observer and made graphs out of the data



Hypothesis

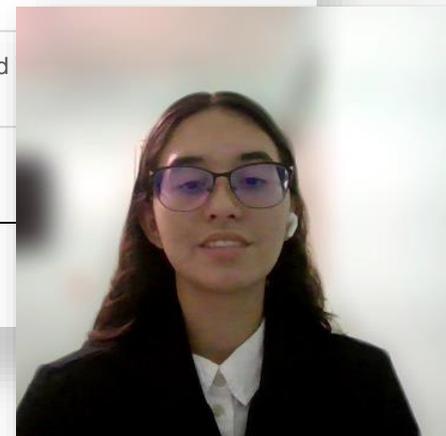
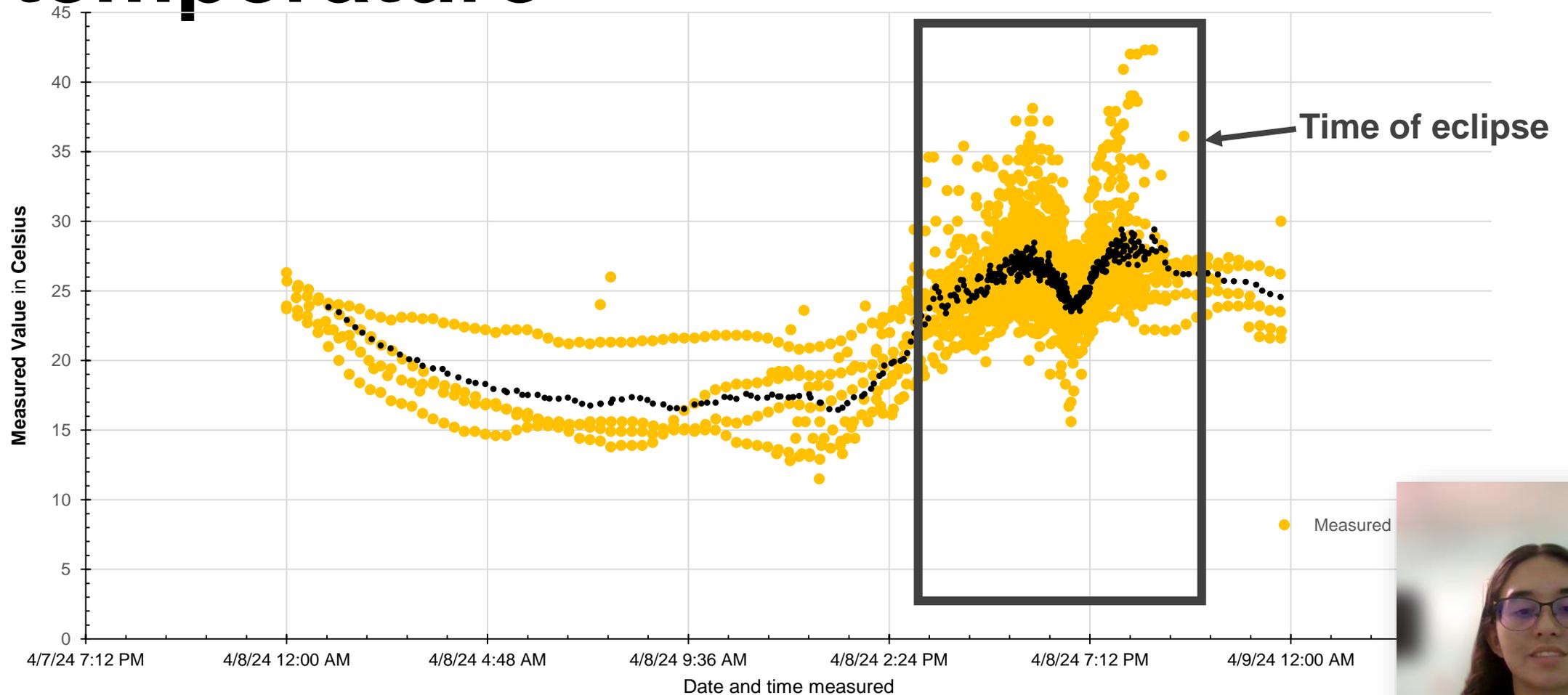
- During a solar eclipse, the extent of the eclipse will impact **air temperature and sky visibility**. In the case of a total eclipse, it is expected that the air temperature will decrease more dramatically compared to a partial eclipse.
- Sky visibility will decrease to the point where stars may become visible. In contrast, during a partial solar eclipse, although the sky will dim noticeably, it will not become dark enough.



Total Solar Eclipse Air

temperature

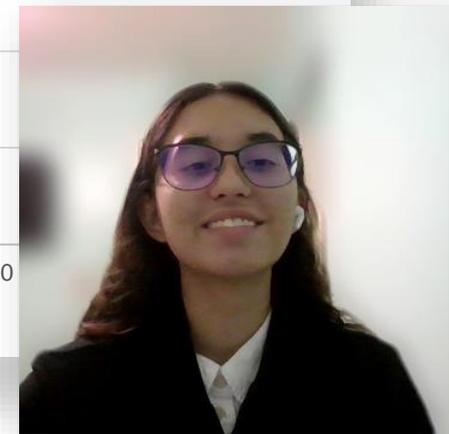
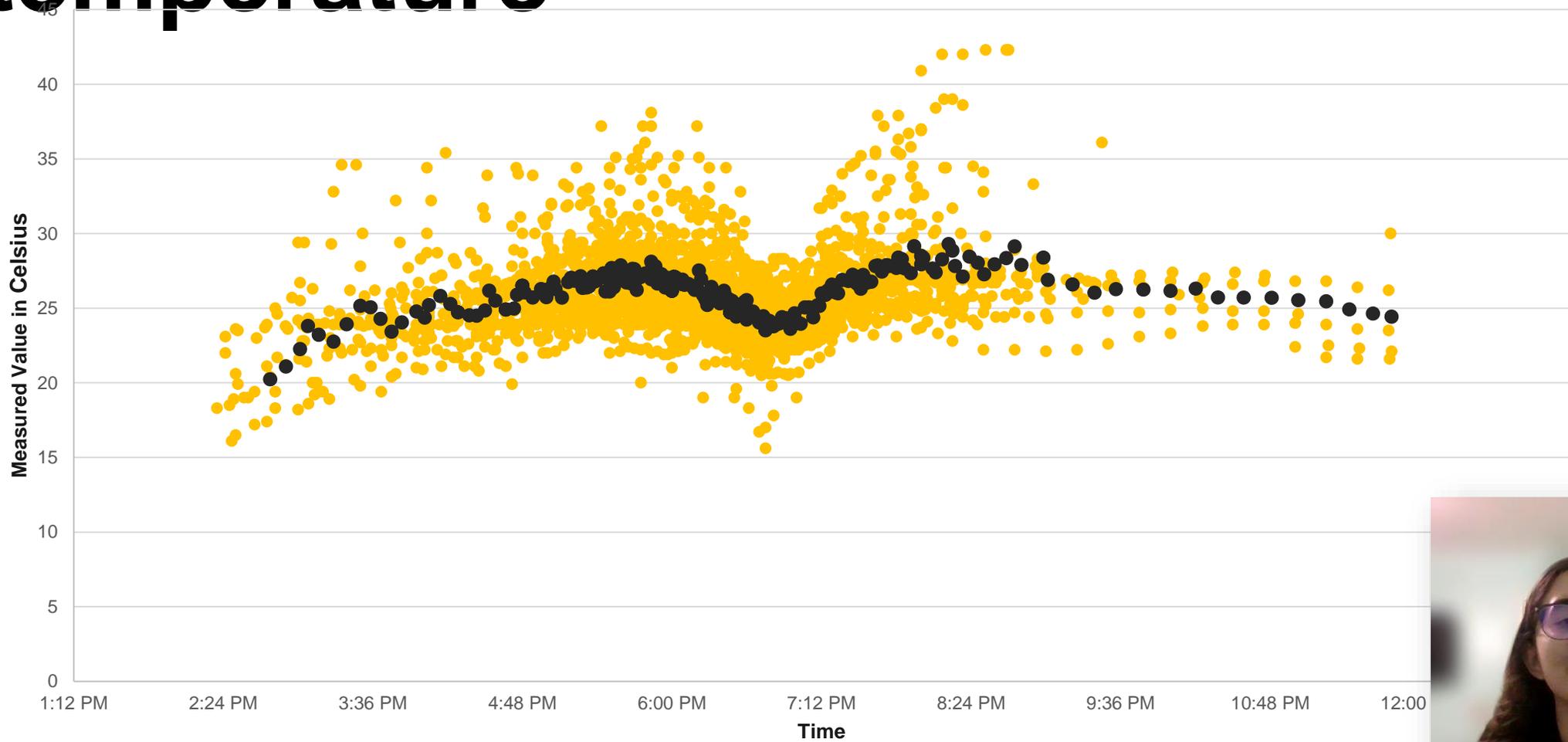
Measured Air Temperature in Dallas, Texas on April 8th 2024



Total Solar Eclipse Air

temperature

Measured Air Temperature in Dallas, Texas on April 8th 2024

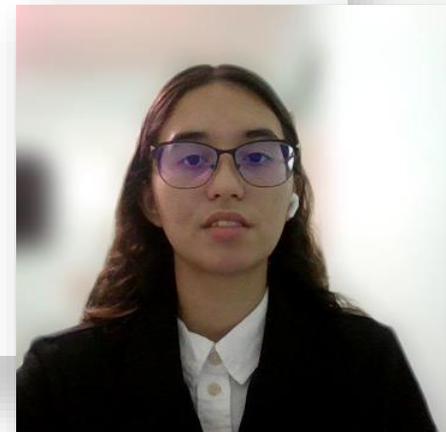


Total Solar Eclipse Air

temperature

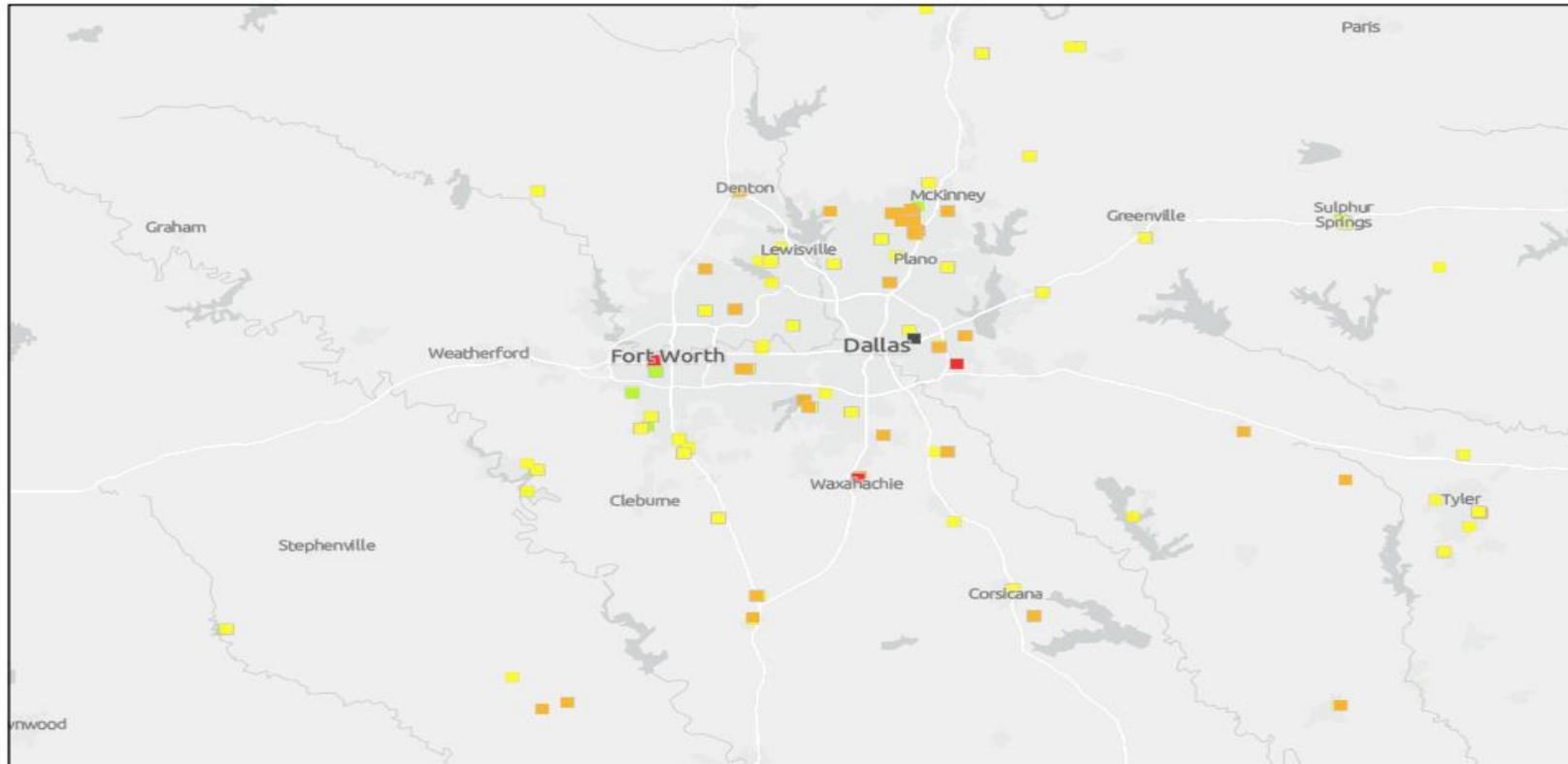
The Total Solar Eclipse in Dallas, Texas happened at 12:23pm and its maximum was at 1:42pm

- **Lowest** temperature during eclipse: **24 degrees C**
- **Highest** temperature during eclipse: **28 degrees C**
- **Average** temperature during eclipse: **18 degrees C**
- All data used in our research is from Globe Observer



ArcGIS

Measured Air Temp Dallas, Texas on April 8th, 2024



7/16/2024

Dallas, Texas Air temp

■ 11.4 – 16.6

■ > 16.6 – 21.7

■ > 21.7 – 26.8

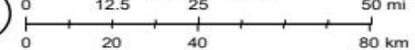
■ > 26.8 – 32

■ > 32 – 37.1

■ > 37.1 – 42.2



1:1,768,043

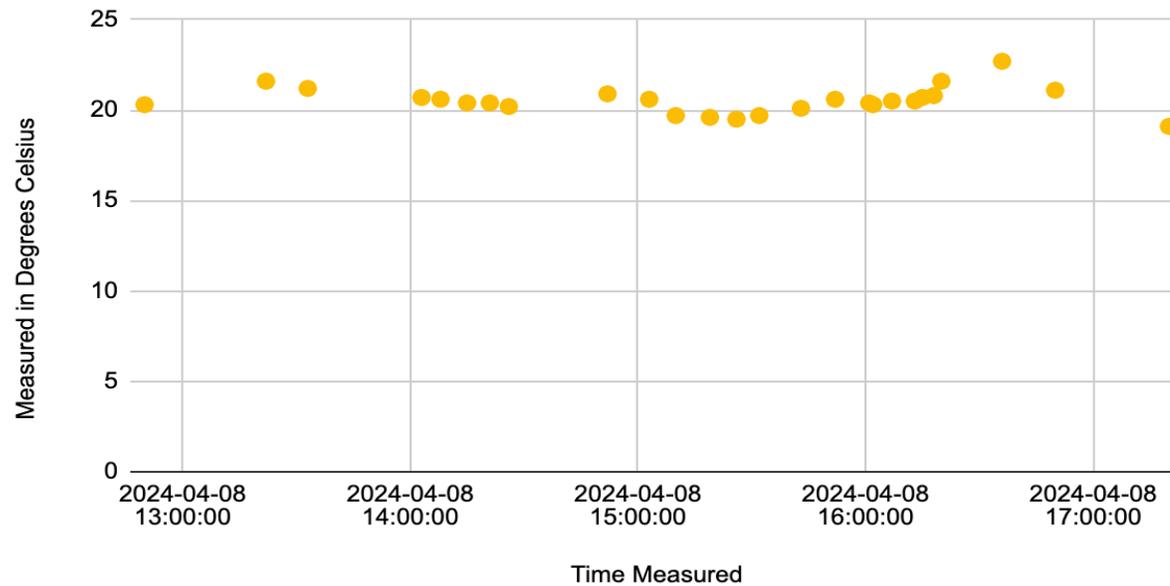


Texas Parks & Wildlife, CONANP, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

Partial Solar Eclipse- Air temperature

Partial Solar Eclipse Visibility: 2:05 pm-4:33 pm

Air Temperature in Baltimore, Maryland April 8th, 2024



air temps:solar mea	air temps:current te
2024-04-08 12:5	20.3
2024-04-08 13:1	21.7
2024-04-08 13:2	19.8
2024-04-08 13:3	17
2024-04-09 13:4	15
2024-04-08 14:0	20.7
2024-04-08 14:0	20.6
2024-04-08 14:1	20.4
2024-04-08 14:2	20.2
2024-04-08 14:2	20.4
2024-04-08 14:5	20.9
2024-04-09 14:5	20.6
2024-04-08 15:1	19.7
2024-04-08 15:1	19.6
2024-04-08 15:2	19.5
2024-04-08 15:3	19.7
2024-04-08 15:4	20.1
2024-04-08 15:5	20.6
2024-04-08 16:0	20.4
2024-04-08 16:0	20.3
2024-04-08 16:0	20.5
2024-04-08 16:1	20.5
2024-04-08 16:1	20.7
2024-04-08 16:1	
2024-04-08 16:2	
2024-04-08 16:3	
2024-04-08 16:5	

Data provided from GLOBE Visualization System in Baltimore, Mar

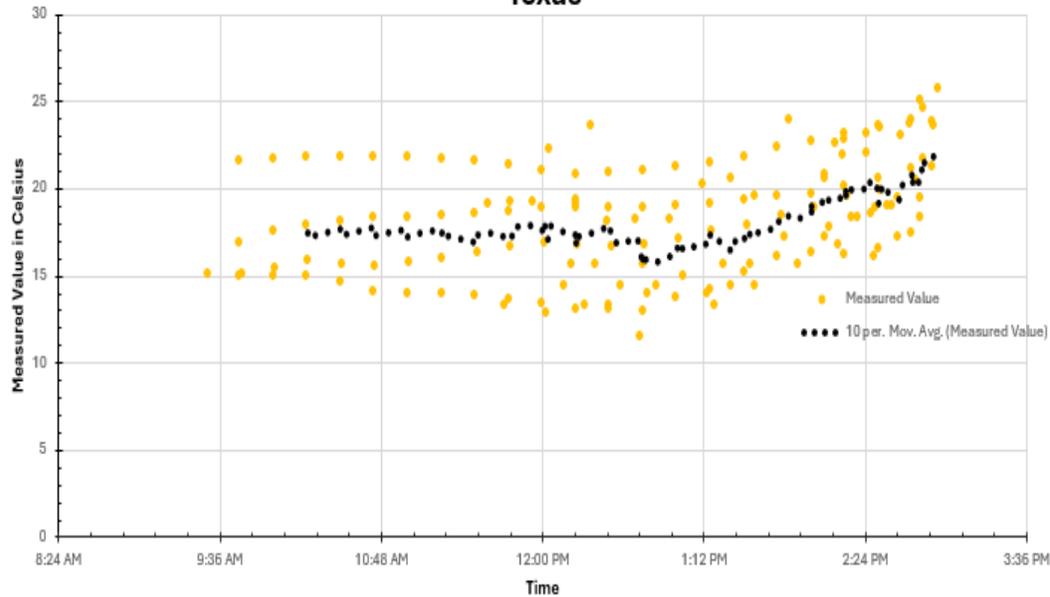
Partial Solar Eclipse Air

temperature Analysis

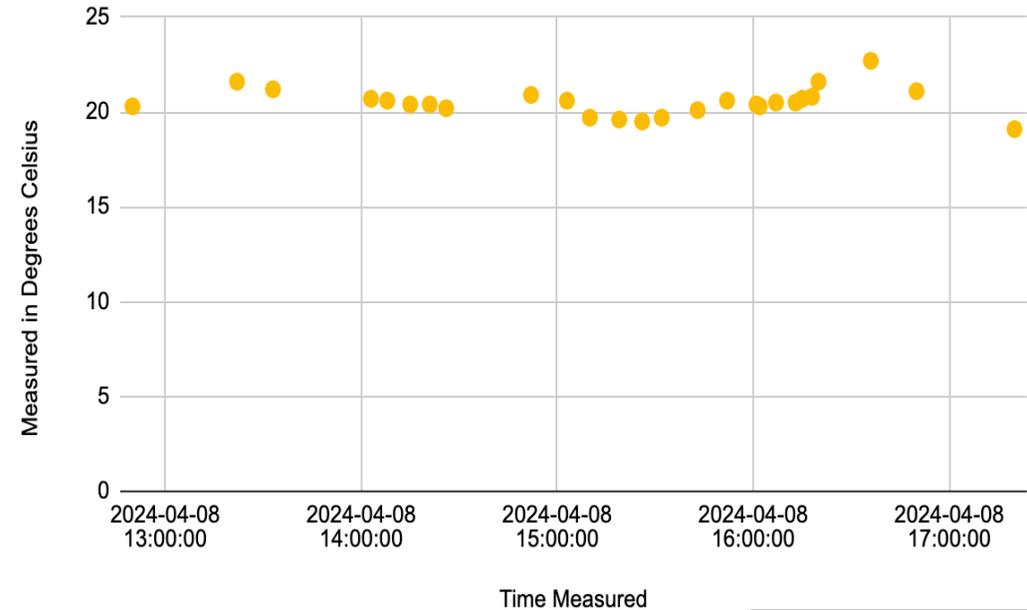
- Time of Eclipse: 2:05 pm-4:33 pm with the maximum being at 3:21 pm
- Air temperature lowest during eclipse- **15 degrees Celsius @ 2:46 pm.**
- Air temperature highest during eclipse- **21.6 degrees Celsius @ 4:20 pm**
- Baltimore Maryland eclipse had an average degree of **20.2** degrees Celsius throughout its eclipse
- Overall, in terms of air temperature Baltimore, Maryland did not have a major drop or rise in temperature and stayed at a steady temperature.
- The largest drop recorded from **Globe Observer** data was from **2:33 pm- 2:46 pm** when the air temperature dropped from degrees Celsius to 15 degrees Celsius.

Air temperature comparison

Measured Air Temperature in during the eclipse in Dallas, Texas

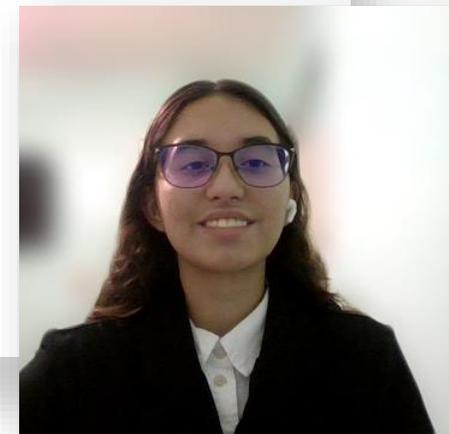
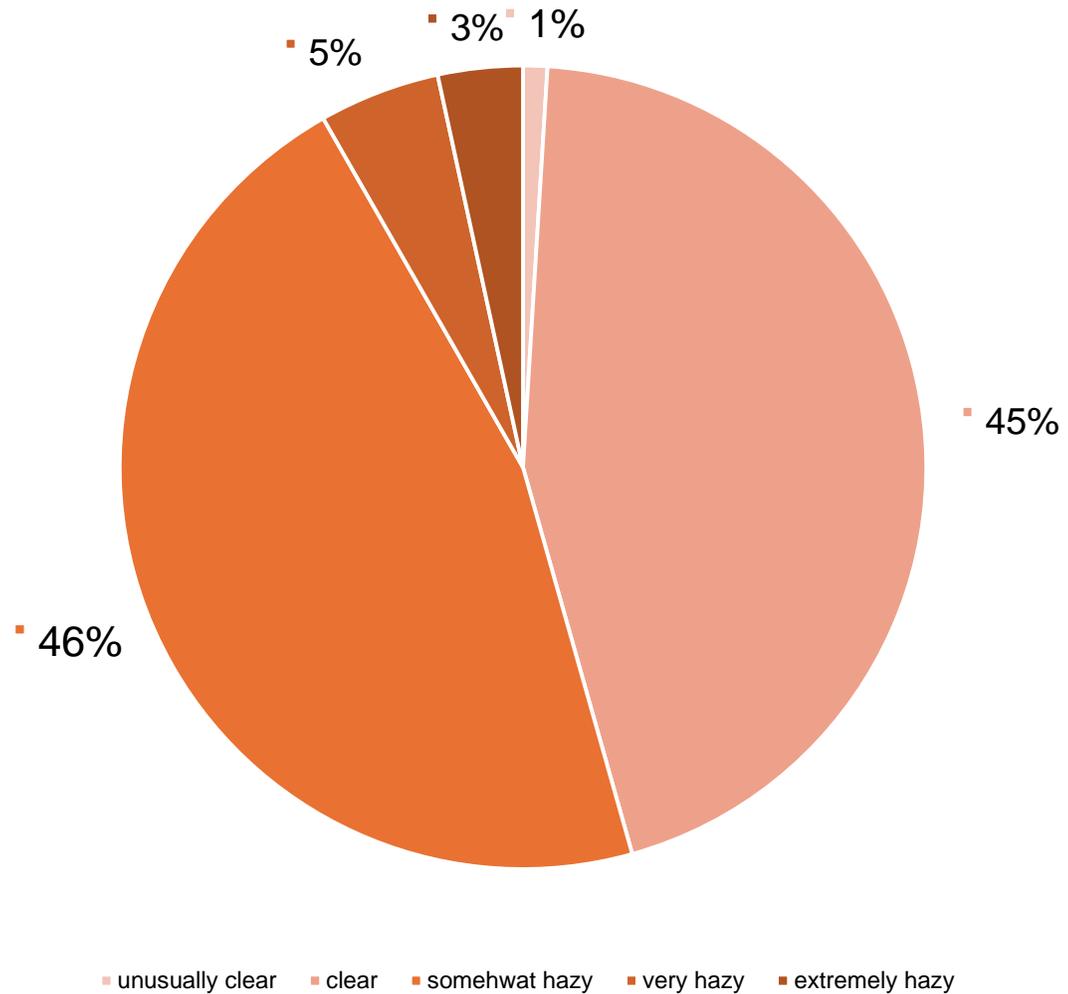


Air Temperature in Baltimore, Maryland April 8th, 2024



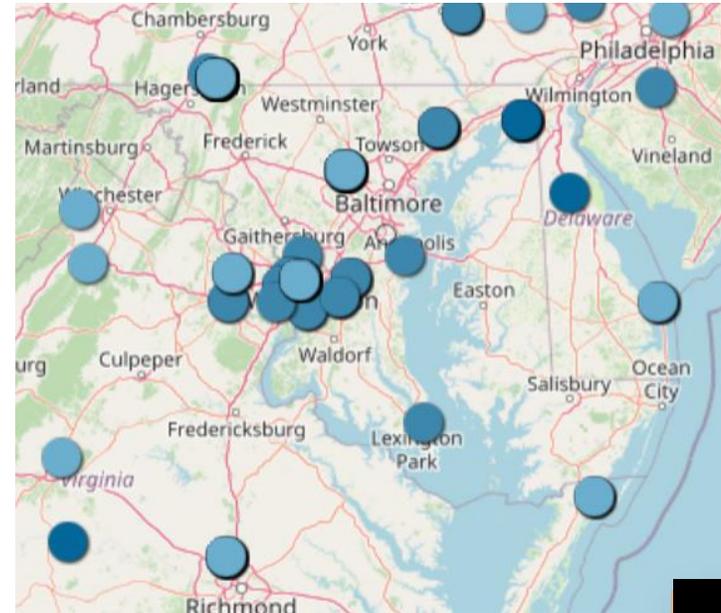
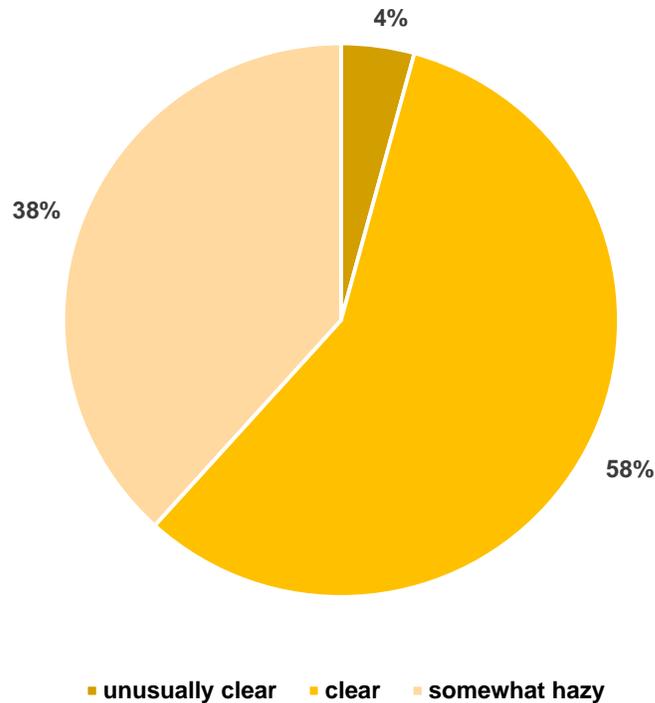
Total Solar Eclipse- Sky Visibility

Sky Visibility during the Total Solar Eclipse



Partial Solar Eclipse- Sky Visibility

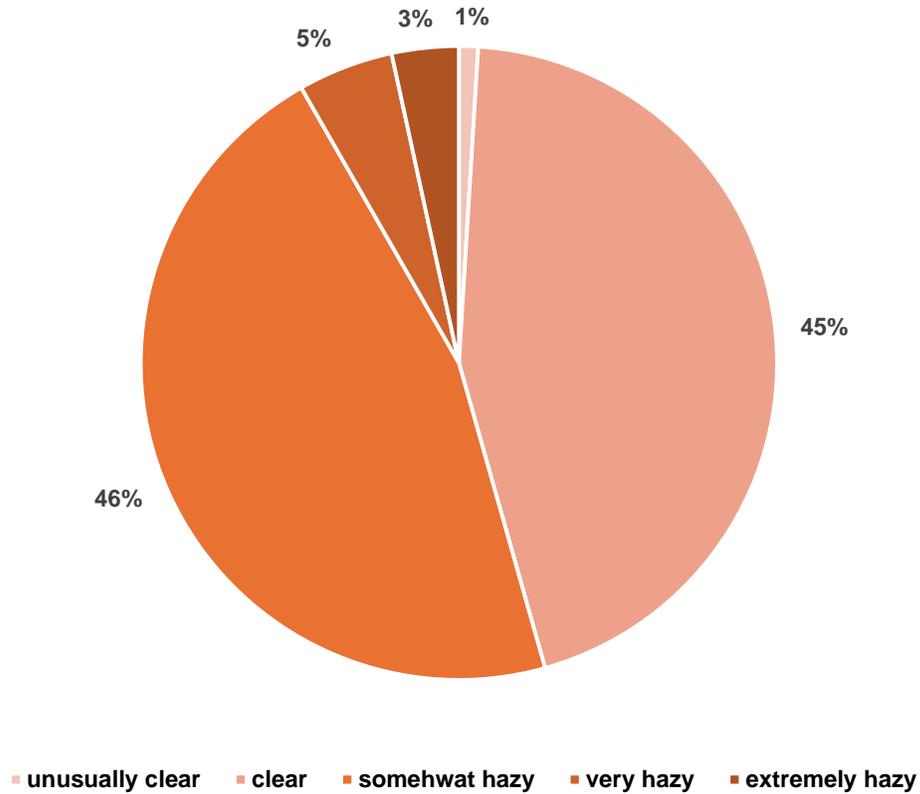
Sky Visibility during Partial Solar Eclipse



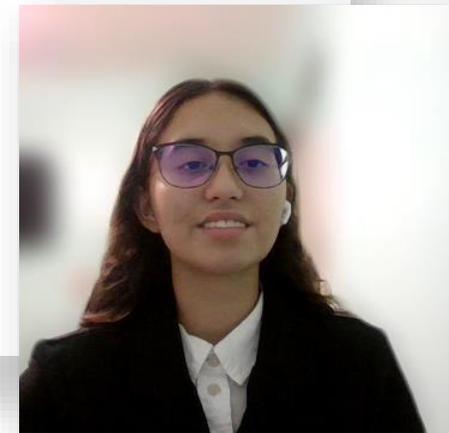
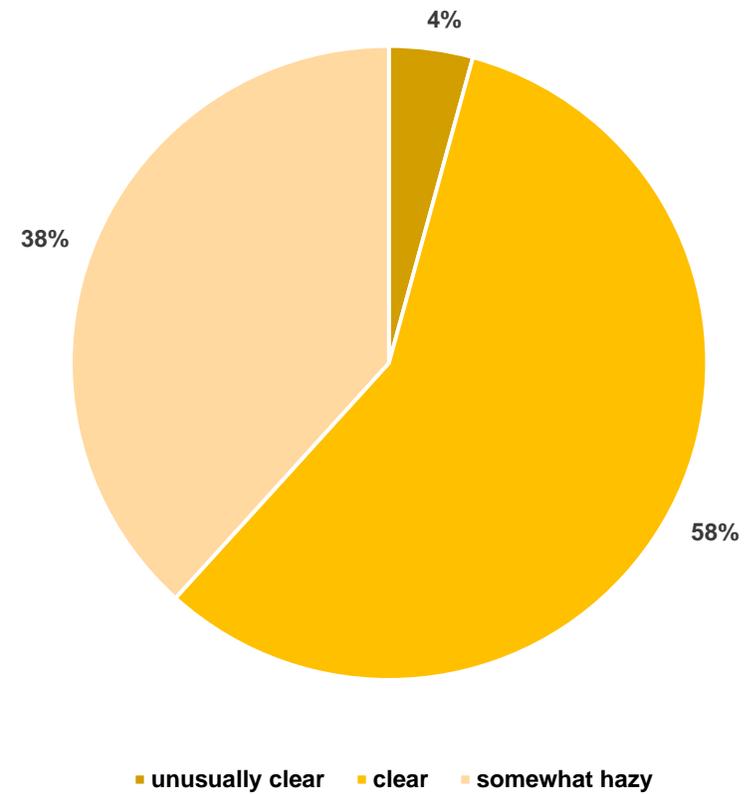
For sky visibility, there was not sufficient data in Baltimore, Maryland so everything within a radius of **99.3km** was used for measuring the sky visibility

Sky Visibility comparison

Sky Visibility during the Total Solar Eclipse



Sky Visibility during Partial Solar Eclipse



Conclusion

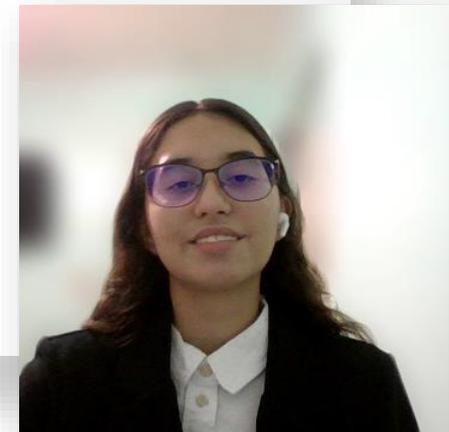
These findings suggest that the partial eclipse in Baltimore resulted in more moderate temperatures overall, whereas the total eclipse in Dallas did not lead to as dramatic a decrease in temperature as hypothesized. Overall, the hypothesis that a total eclipse would cause a more pronounced drop in air temperature is not supported by the data. However, this discrepancy could also be explained by the different weather conditions in these counties. On April 8th, the highest temperature in Dallas County was 83°F (28°C), while Baltimore's was only 73°F (23°C). (according to [accuweather.com](https://www.accuweather.com))

Upon comparing our findings, we discovered that the sky is approximately 16% clearer during a partial eclipse than during a total solar eclipse. This observation confirms our hypothesis, as we initially predicted that sky visibility would be clearer during a partial eclipse. The sky is hazier during a total solar eclipse because the temperature drop can lead to a cooling effect that causes water vapor.

Retrospect/

Highlights

- Having the opportunity to conduct our research project and coming up with a topic
- Being introduced to vital data tools such as Globe Observer and ArcGIS and using it to create data sets
- Working with business professionals who helped guide research and expand understanding of Solar Eclipses
- The opportunity to collaborate in a small group to develop a project together



Individual Reflections

Isabella Akinbinu, Ellicott City, Maryland, Long Reach High School- Participating in SEES has enhanced my research skills and deepened my understanding of solar eclipses. Through hands-on projects, such as this, I have gained valuable experience in data collection, analysis, and interpretation. Learning to use advanced tools like Globe Observer and ArcGIS has equipped me with practical skills that are essential for scientific research. This internship has not only enriched my knowledge in earth science but also enhanced my confidence in conducting independent research.

Kaelyn Cervantes-

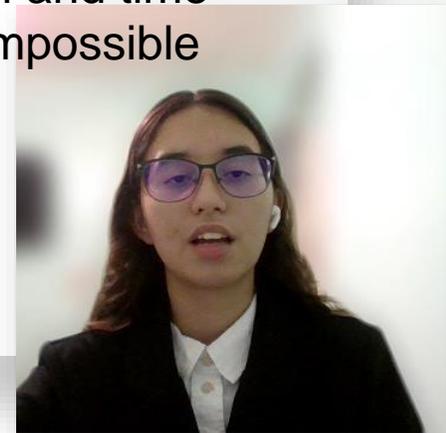
SEES helped me gain a deeper insight into Earth and space science. I truly enjoyed getting to learn more about climate change, solar eclipses, satellites, and Earth science. Being able to speak with real NASA scientists made the experience even more interesting. I was able to apply the soft skills that I had learned before this internship, like communication and time management, to this experience. This internship helped me realize that no matter how impossible something might seem, there will always be a way to figure it out.

Individual Reflections

Isabella Akinbinu, Long Reach High School, Ellicott City, Maryland,-- Participating in SEES has enhanced my research skills and deepened my understanding of solar eclipses. Through hands-on projects, such as this, I have gained valuable experience in data collection, analysis, and interpretation. Learning to use advanced tools like Globe Observer and ArcGIS has equipped me with practical skills that are essential for scientific research. This internship has not only enriched my knowledge in earth science but also enhanced my confidence in conducting independent research.

Kaelyn Cervantes, Peoria High School, Peoria Arizona

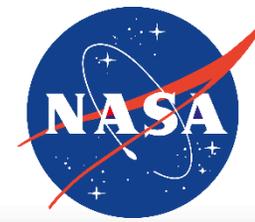
I truly enjoyed getting to learn more about climate change, solar eclipses, satellites, and Earth science. Being able to speak with real NASA scientists made the experience even more interesting. I was able to apply the skills that I had learned before this internship, like communication and time management, to this experience. This internship helped me realize that no matter how impossible something might seem, there will always be a way to figure it out.



Thank you to our SEIW mentors and the CSR SEES staff

SEIW Mentors: Oluwafemi Olawale, Kevin Czajkowi, and Grant Wilson

We would like to thank our **SEIW mentors** for their mentorship during this internship. Your assistance during our research presentation was instrumental, and we greatly appreciate the resources you provided, which significantly enhanced our work. Your continuous feedback and encouragement were vital in refining our work.



Thank you

Are there any Questions?