Investigating Rainfall in Sunny Malta

Organisation: St. Clare College San Gwann Primary School

Students: All students in Year 6.1

Grade Level: Grades 3-5 Upper Primary, ages 8-11

GLOBE teacher: Marouska Azzopardi Duca

Report type: International Virtual Science Symposium Report

Protocols: Atmosphere – Rainfall

Optional Badges: I am a Problem Solver, I am a STEM Collaborator, I am a Data Scientist

Summary

Malta is known for its sunny weather, but this means that it can struggle with water shortages, especially during dry periods. This lack of rainfall can affect agriculture, water resources, and the environment, making it important to understand rainfall patterns to manage these challenges effectively. Through this project we wanted to study the frequency, intensity, and variability of rainfall throughout the month of January which is supposed to be a month of rain. Unfortunately, January 2024 turned out to be an almost rainless month. This poses several problems for Malta.

Research Questions

Researching rainfall patterns in Malta involves several key questions. Firstly, understanding how rainfall is changing over time in Malta is crucial for assessing the impacts of climate change on the island's environment and people. Additionally, exploring any connections between rainfall patterns and human activities, like urban development or land use changes, can help us identify ways to mitigate negative impacts. Malta’s rainfall patterns have changed a lot over the past several decades.

We could clearly see it during our data collection in the month of January 2024. Meteorological Officer Mr. Andrea Muscat, during an online meeting with our class, told us how this was one of the driest January's ever recorded and how negatively this could impact our environment. When analysing the graphs kindly sent to us by NASA officer Dr. Dorian Janney, we could clearly notice the difference in rainfall throughout the years. We believe that all this has made a huge impact on our ecosystems, agriculture, and water resources, affecting ecosystems, including biodiversity, vegetation dynamics, and soil moisture levels, and impacting agriculture and water resources, including groundwater recharge, reservoir levels, and the availability of freshwater.

This brought us to our next question: How do urbanization and land-use changes in Malta influence local rainfall patterns? Urbanization and land-use changes in Malta is influencing local rainfall patterns in several ways. As cities expand and more surfaces become covered with concrete and buildings, they create urban heat islands and raising temperatures. Moreover, the replacement of natural vegetation with impermeable surfaces reduces the land's ability to absorb rainfall, leading to increased runoff and the risk of flooding (a problem that occurs a lot in the main road area where the school is situated).

Consequently, we then discussed what adaptation strategies can be carried out to moderate the effects of changing precipitation designs in Malta and improve resilience to water-related challenges. These included promoting water conservation measures such as rainwater harvesting to reduce reliance on traditional water sources and creating more soil patches around the school to create more permeable surfaces.

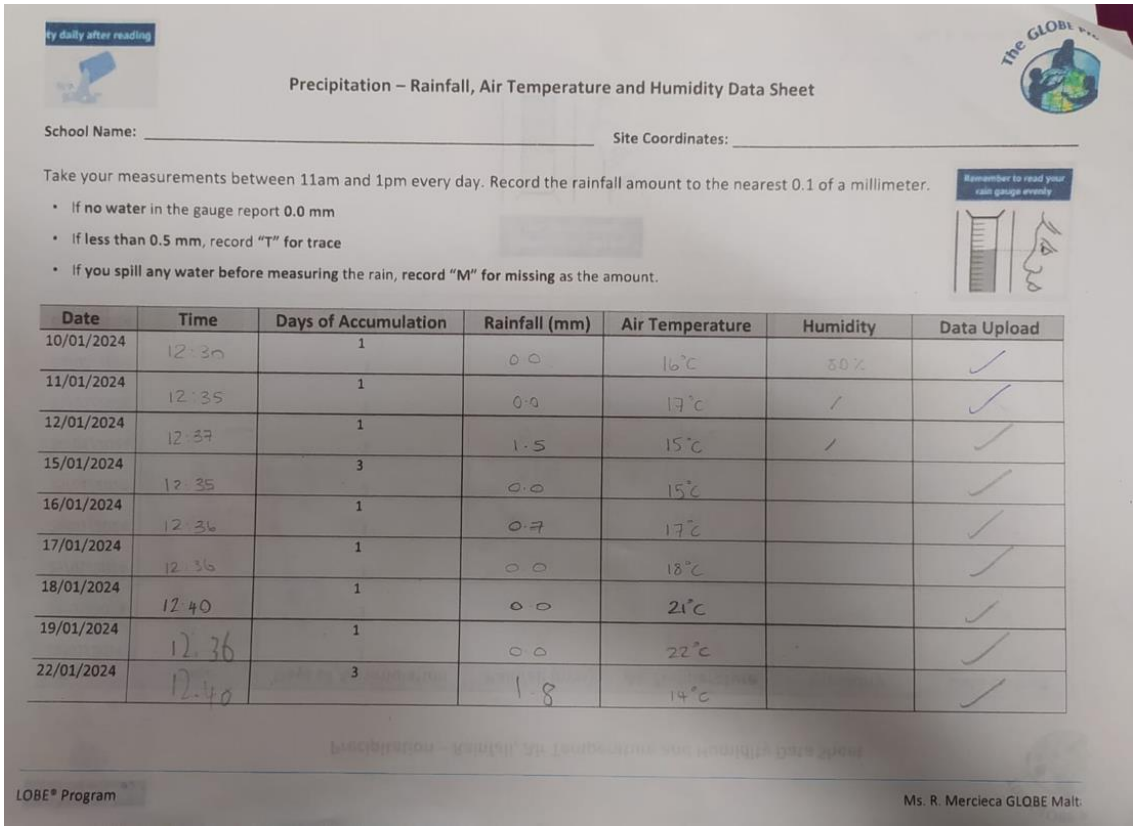
Research Methods

Investigating rainfall in Malta at San Gwann Primary School required employing collecting data on precipitation patterns in the region. San Gwann Primary School is located in the central part of Malta. Our school is situated on a very busy road at the heart of San Gwann. However, the rain gauge is set up in an open yard at the back of the school (Figure 1).

Figure 1 Aerial view of our school. Red circle marks the location of the rain gauge.

To collect data on rainfall, GLOBE protocols were utilized, which include standardized methods for measuring rainfall using a rain gauge (Figure 2). The students visited the study site on a daily basis to collect rainfall data from the previous day. The data was noted using the GLOBE Rainfall Data Sheet (Figure 3). All data collected was then logged onto the GLOBE website as per screenshot, Figure 4.

Figure 2 Rain gauge placed in an open space.



pty daily after reading

Precipitation – Rainfall, Air Temperature and Humidity Data Sheet

School Name: _____ Site Coordinates: _____

Take your measurements between 11am and 1pm every day. Record the rainfall amount to the nearest 0.1 of a millimeter.

- If **no water** in the gauge report **0.0 mm**
- If **less than 0.5 mm**, record **"T" for trace**
- If **you spill any water before measuring** the rain, **record "M" for missing** as the amount.

Remember to read your rain gauge evenly

Date	Time	Days of Accumulation	Rainfall (mm)	Air Temperature	Humidity	Data Upload
10/01/2024	12:30	1	0.0	16°C	80%	✓
11/01/2024	12:35	1	0.0	17°C	/	✓
12/01/2024	12:37	1	1.5	15°C	/	✓
15/01/2024	12:35	3	0.0	15°C		✓
16/01/2024	12:36	1	0.7	17°C		✓
17/01/2024	12:36	1	0.0	18°C		✓
18/01/2024	12:40	1	0.0	21°C		✓
19/01/2024	12.36	1	0.0	22°C		✓
22/01/2024	12.40	3	1.8	14°C		✓

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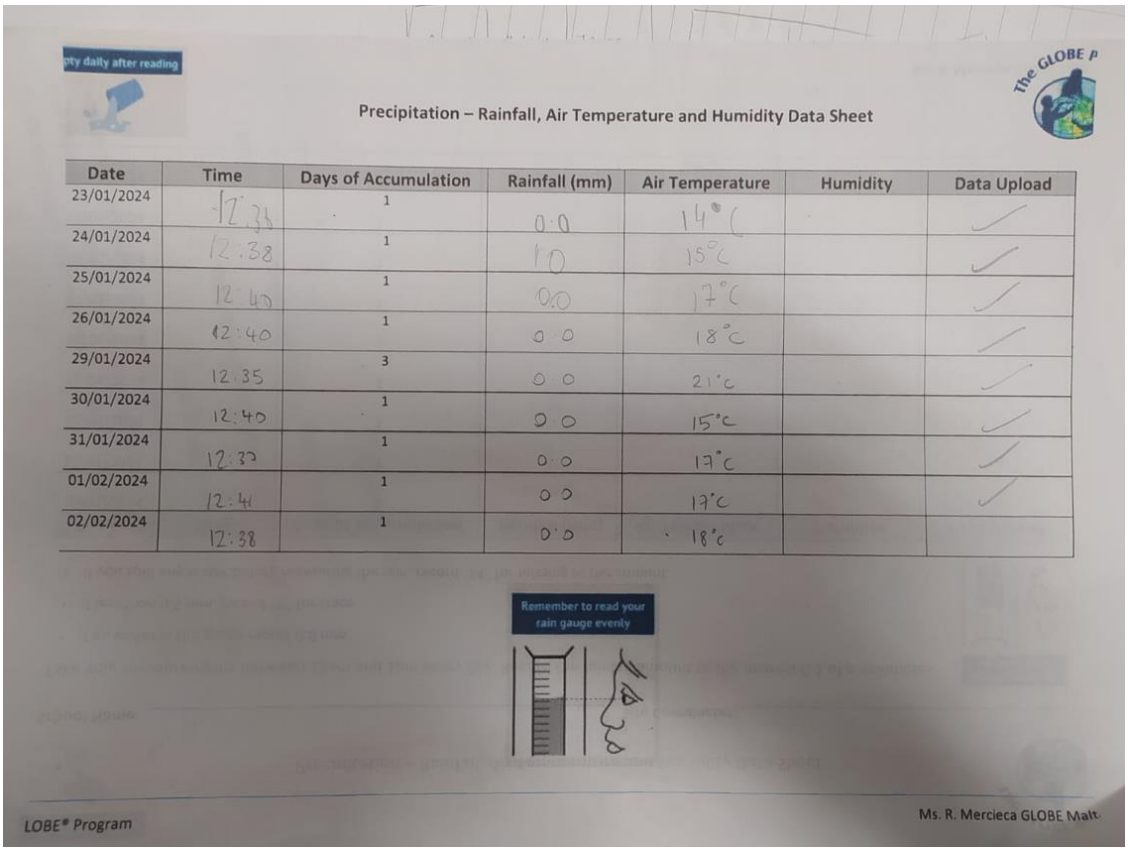

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Precipitation – Rainfall, Air Temperature and Humidity Data Sheet

Date	Time	Days of Accumulation	Rainfall (mm)	Air Temperature	Humidity	Data Upload
23/01/2024	12:35	1	0.0	14°C		✓
24/01/2024	12:38	1	1.0	15°C		✓
25/01/2024	12:40	1	0.0	17°C		✓
26/01/2024	12:40	1	0.0	18°C		✓
29/01/2024	12:35	3	0.0	21°C		✓
30/01/2024	12:40	1	0.0	15°C		✓
31/01/2024	12:30	1	0.0	17°C		✓
01/02/2024	12:41	1	0.0	17°C		✓
02/02/2024	12:38	1	0.0	18°C		

Remember to read your rain gauge evenly

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Figure 3 Rainfall datasheet

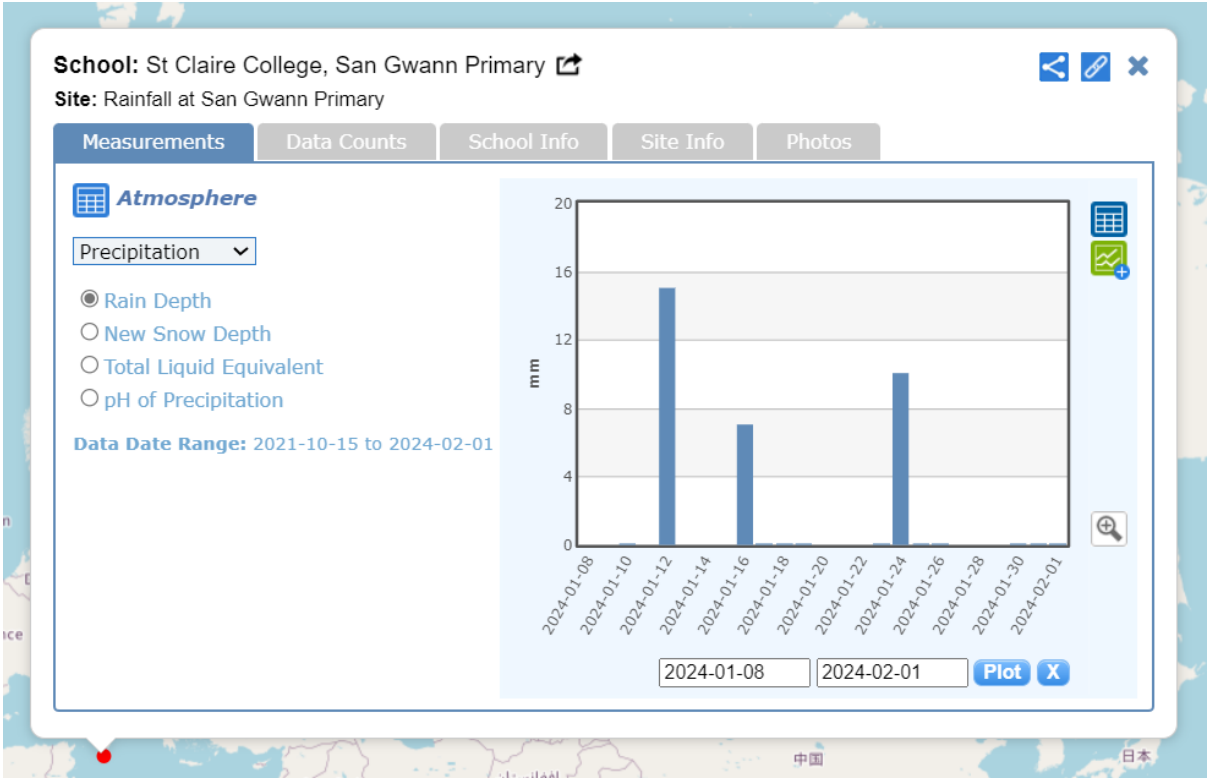


Figure 4 Rainfall plot of VIZ GLOBE

Conclusion

The fact that rainfall was only recorded on 3 days in January clearly shows the significance of understanding and monitoring precipitation patterns. Such information is crucial for various sectors, including agriculture, water resource management, and urban planning, as it helps anticipate and adapt to changing weather conditions and water availability. Furthermore, the low rainfall frequency observed in January highlights the vulnerability of the region to water scarcity and underscores the importance of implementing sustainable water management practices, such as rainwater harvesting and greywater recycling, to enhance resilience to droughts and mitigate the impacts of climate change.

For this reason, our school has been working on adopting several water saving methods like collecting rainwater by installing a rain harvester that captures rainwater for outdoor irrigation; regularly checking faucets, pipes, and toilets for leaks and repairing them promptly to prevent water wastage; and educating and raising awareness to the community by promoting water conservation practices through

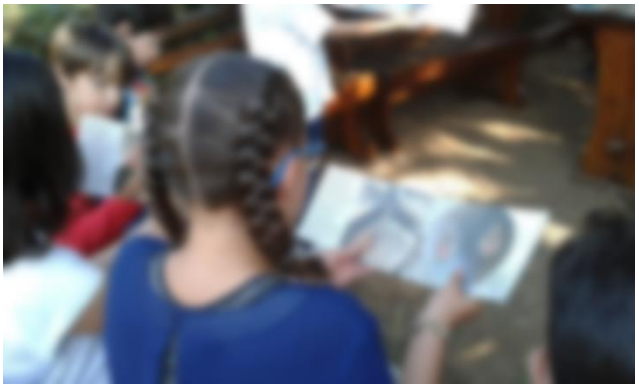
educational campaigns and outreach efforts to encourage students and their families to reduce water waste.

By implementing these water-saving methods, individuals, households, and communities can contribute to sustainable water management and ensure the availability of water resources for future generations.

Badge Descriptions:

I am a Problem Solver

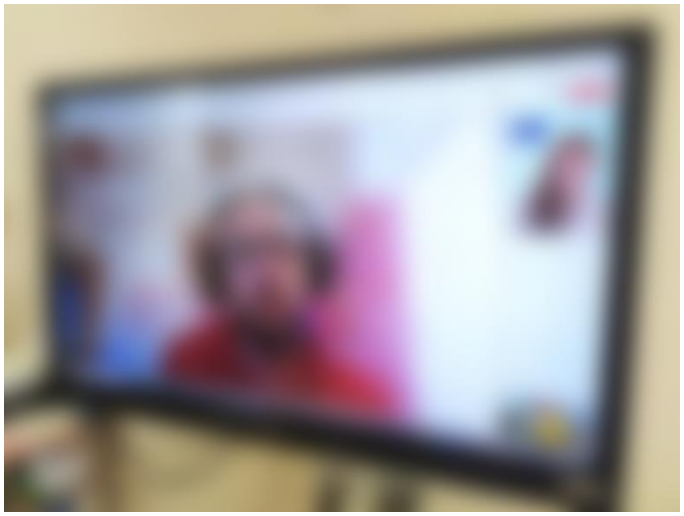
As a school we have been working on collecting rainwater for the past few years. We set up a rainwater harvester to collect rainwater in the school main yard. This water is then used to water the trees in the school yard and to wash the floors by the cleaners. We also bought more trees such as five blackberry trees, a fig tree and four olive trees to populate a new garden area in construction within the school with trees, other plants and soil. We also celebrated a Save Water Day within the school to teach students about the importance of water.

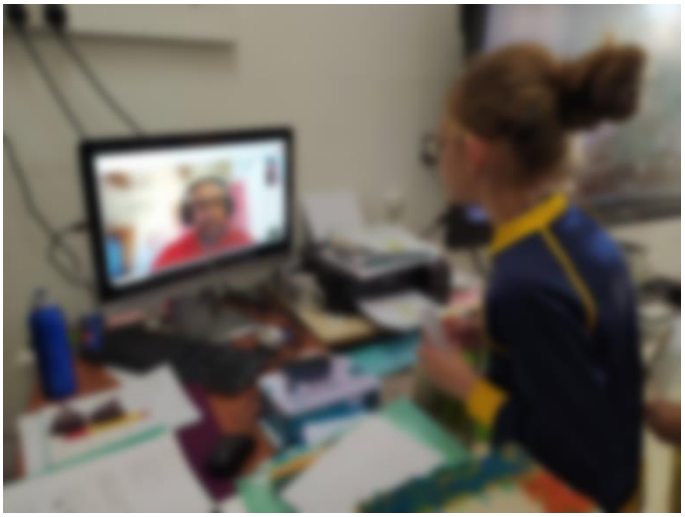


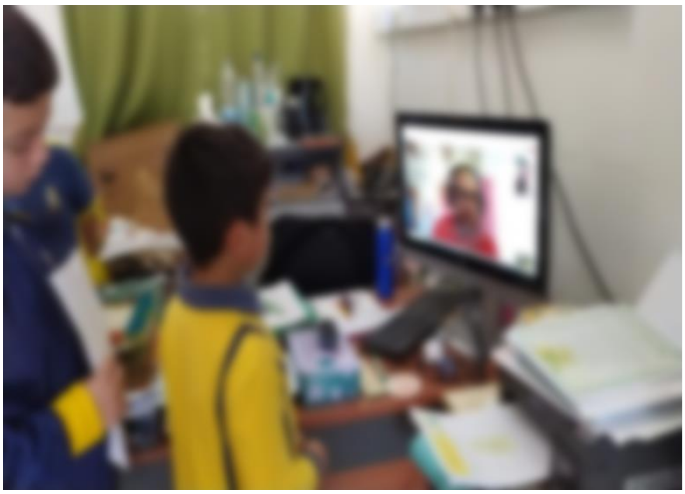

Conserving Water
SAVE WATER

I am a STEM Professional

We had the opportunity to meet a Meteorological Officer, Mr. Andrea Muscat. During the meeting, we showed him photos from our project. We had the chance to ask him questions about his job as a meteorologist and the challenges it brings, as well as questions about the lack of rainfall in our Islands, and how it is affecting us. It was quiet inspiring, and we learned a lot from this session. He also explained to us some data graphs which NASA officer Dr. Dorian Janney kindly sent us. These graphs showed the average amount of rainfall we had mainly from 2001 to 2022. We must say the lack of rain has always been a problem for our Islands.

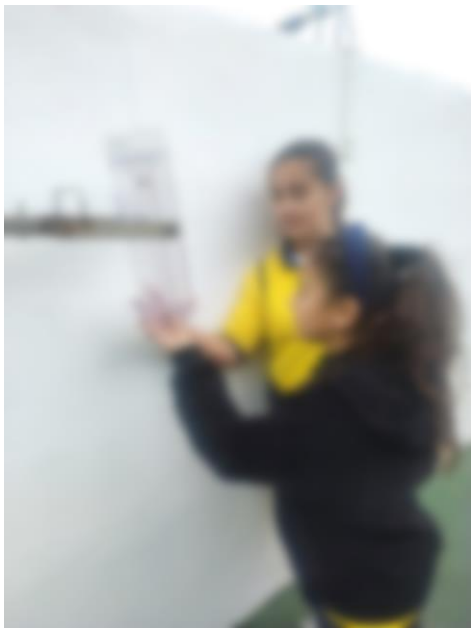


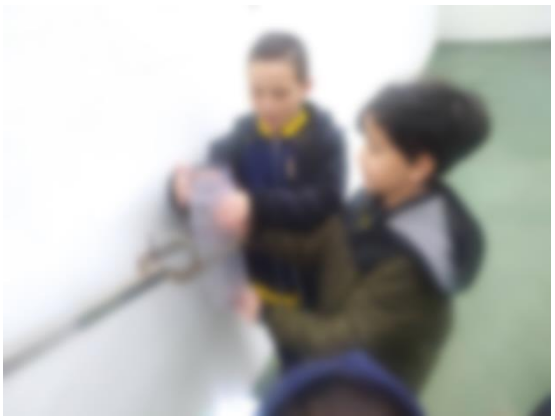


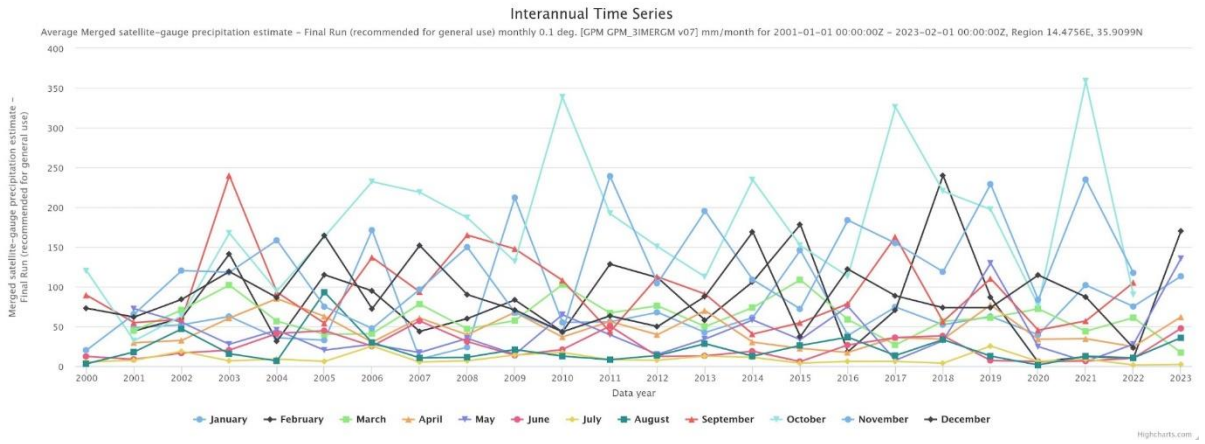


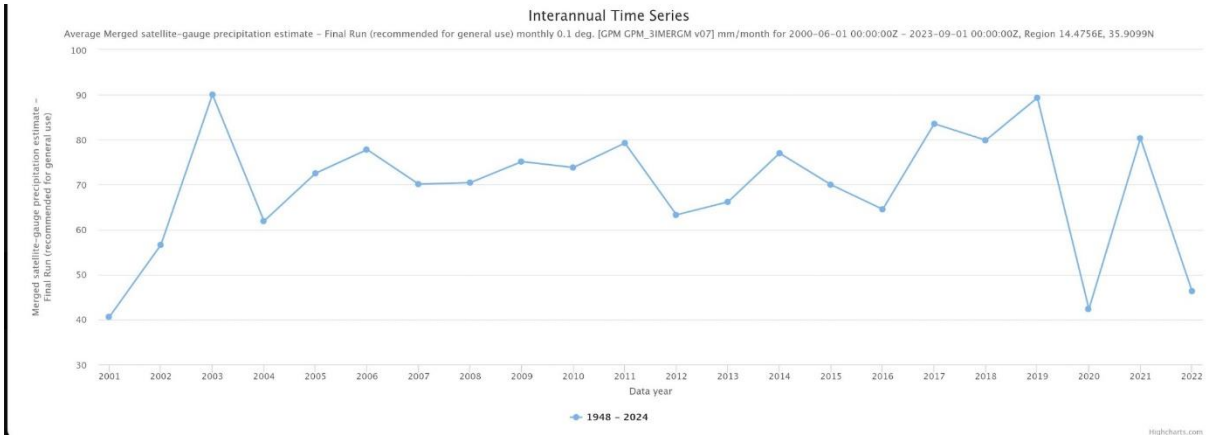
I am a Data Scientist

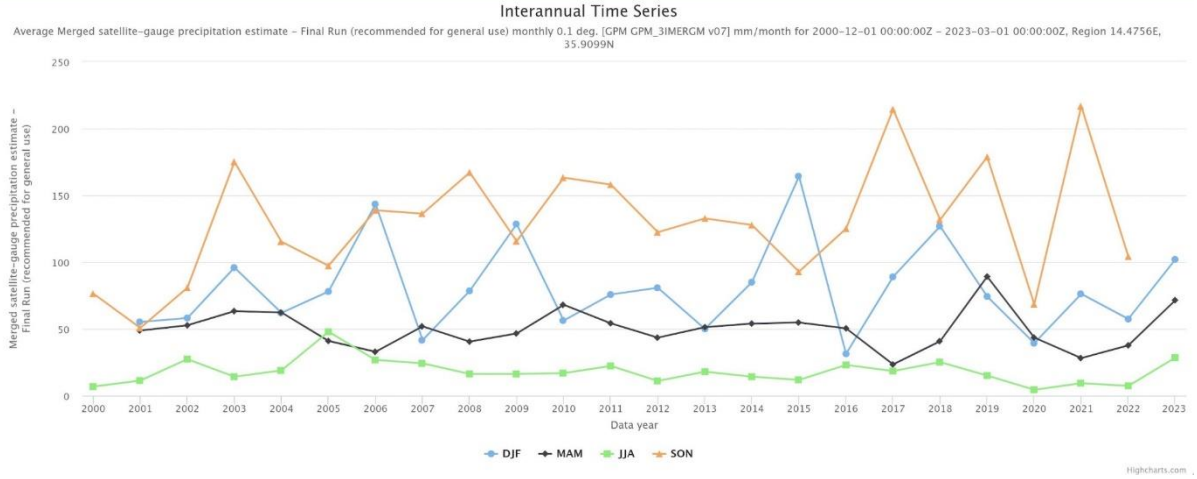
The students regularly went to check the raingauge, measured the water, wrote everything on the data sheet and then entered the data on the GLOBE website themselves. They analysed their own data (from their measurements). NASA officer Dr. Dorian Janney kindly sent us some data graphs showing the average amount of rainfall we had mainly from 2001 to 2022 which Meteorological Officer Mr. Andrea Muscat explained to us.






Interannual Time Series
Average Merged satellite-gauge precipitation estimate - Final Run (recommended for general use) monthly 0.1 deg. [GPM GPM_3IMERGM v07] mm/month for 2001-01-01 00:00:00Z - 2023-02-01 00:00:00Z, Region 14.4756E, 35.9099N
Merged satellite-gauge precipitation estimate - Final Run (recommended for general use)
Data year
January
February
March
April
May
June
July
August
September
October
November
December
Highcharts.com


Interannual Time Series
Average Merged satellite-gauge precipitation estimate - Final Run (recommended for general use) monthly 0.1 deg. [GPM GPM_3IMERGM v07] mm/month for 2000-06-01 00:00:00Z - 2023-09-01 00:00:00Z, Region 14.4756E, 35.9099N
Merged satellite-gauge precipitation estimate - Final Run (recommended for general use)
Data year
1948 - 2024
Highcharts.com


Interannual Time Series
Average Merged satellite-gauge precipitation estimate - Final Run (recommended for general use) monthly 0.1 deg. [GPM GPM_3IMERGM v07] mm/month for 2000-12-01 00:00:00Z - 2023-03-01 00:00:00Z, Region 14.4756E, 35.9099N
Merged satellite-gauge precipitation estimate - Final Run (recommended for general use)
Data year
DJF
MAM
JJA
SON
Highcharts.com