ALTERMAN MIDDLE SCHOOL-HERZLIYA

THE GLOBE PROGRAM
Global Learning and Observations to Benefit the Environment

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Abstract

Soil moisture plays a crucial role in environmental sustainability, agriculture, and water resource management. This study investigates the relationship between soil type and relative humidity in various geographic regions of Israel, utilizing the SMAP protocol from the global GLOBE program for systematic data collection. The research examines soil samples from four locations—Dimona, Dir Hanna, Rosh HaAyin, and Herzliya—analyzing their moisture retention capacity and the impact of climate variables such as precipitation, cloud cover, and topography.

Research Question

How different Soil Type influences Relative Humidity in Four Regions of Israel?

Introduction

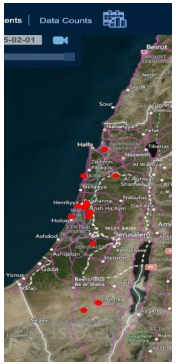
Understanding the connection between **soil type and relative humidity** is essential for **sustainable water management and agriculture**. Soil properties affect **water retention, evaporation, and plant growth**, influencing local ecosystems. This study examines **four regions in Israel—Dimona, Dir Hanna, Rosh HaAyin, and Herzliya**—using the **GLOBE SMAP protocol** to analyze **soil moisture retention and climatic factors**.

Findings show that **clay soils** retain the most moisture, **sandy soils** dry quickly, **loamy soils** balance absorption and drainage, and **coastal soils** fluctuate due to sea influence. This study also fostered **collaborative learning between Jewish and Arab schools**, promoting **scientific literacy and environmental awareness**.

The research contributes to **global climate studies** and supports **local applications in agriculture, irrigation planning, and water conservation**, bridging the gap between **scientific research and real-world environmental challenges**.

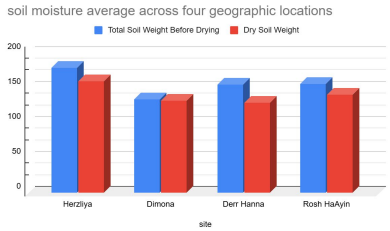
Research Methods

Soil moisture and climatic data were collected from **four regions in Israel**—Dimona, Dir Hanna, Rosh HaAyin, and Herzliya—using the **GLOBE SMAP protocol** for standardized and globally comparable data collection.
Soil Sampling: Multiple samples were taken from **each site** at a **5 cm depth**, classified by **texture (clay, sand, loam, mixed)**.
Moisture Measurement: Soil was weighed **before and after drying** using a **precision digital scale**, with drying conducted under a **heat lamp** for uniform evaporation. **Air temperature and humidity** were recorded using the **LABDISC ENVIRO multi-sensor device**.
Precipitation was measured using a **standard GLOBE rain gauge**.
Cloud cover and type were documented using the **GLOBE Cloud Observation Protocol and classification charts**.
Students from four schools across Israel conducted monitoring **on the same dates and times** to ensure consistency.



Data was collected simultaneously, allowing for accurate comparisons across regions. All recorded data was **entered into the official GLOBE database**, contributing to global environmental research.
Collaboration: This study was carried out as a **joint learning initiative between Jewish and Arab students**, promoting **scientific cooperation, environmental awareness, and cross-cultural collaboration**. This structured methodology ensured **high accuracy, reliability, and alignment with international climate studies** while fostering **scientific engagement among students**.

Results



Soil moisture retention varied across **four geographic locations in Israel**, reflecting differences in **soil type and climate**:

- **Herzliya (Coastal - Mixed Sandy-Clay Soil)** retained **moderate moisture**, influenced by **sea humidity**.
- **Dimona (Arid Desert - Sandy Soil)** had **the lowest moisture retention**, due to **rapid drainage and high evaporation**.
- **Dir Hanna (Mediterranean - Loamy Soil)** showed **balanced retention**, ideal for **agriculture**.
- **Rosh HaAyin (Transition Zone - Clay Soil)** retained **the most moisture**, due to **high water absorption capacity**.

These findings confirm that **clay soils hold the most moisture**, **sandy soils drain quickly**, and **coastal soils fluctuate** based on **humidity levels**, reinforcing the **importance of soil type in water conservation and land management**.

Discussion

The results confirm that **soil type significantly influences moisture retention**, impacting **agriculture, water conservation, and climate interactions**. **Clay soils** (Rosh HaAyin) retained the most moisture due to **high water absorption**, making them ideal for **water-dependent crops**. **Sandy soils** (Dimona) exhibited **low retention**, requiring **efficient irrigation strategies** in arid regions. **Loamy soils** (Dir Hanna) provided **balanced absorption and drainage**, making them **optimal for farming**. **Coastal soils** (Herzliya) showed **fluctuating moisture levels**, influenced by **humidity and sea proximity**.
These findings highlight the **importance of soil characteristics in environmental planning**. Understanding **soil-moisture interactions** can help optimize **irrigation, prevent land degradation, and support sustainable agriculture**. Future research should explore **seasonal variations, vegetation impact, and long-term climate trends** to refine soil-water management strategies.

Conclusions

Clay soils (Rosh HaAyin) retain the most moisture, making them suitable for **water-intensive agriculture**. **Sandy soils (Dimona)** drain quickly, requiring **efficient irrigation** in arid regions.
Loamy soils (Dir Hanna) provide **balanced retention**, ideal for **farming**.
sandy soils (Herzliya) show **fluctuating moisture** due to **sea humidity**. These findings highlight the **crucial role of soil type in water retention**, supporting **better irrigation planning, sustainable agriculture, and environmental management**.

Bibliography

GLOBE Program. (2025). *SMAP Soil Moisture Protocol*. Retrieved from www.globe.gov
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