مدرسة الملك عبد الله الثاني للتميّز – إربـد

King Abdullah the Second School for Excellence – IRBID

GLOBE PROGRAMM

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Research Report

SOIL (Pedosphere) Investigations.

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Research Questions:

- What are the soils' characteristics (such as the soil's moisture, soil's pH, the amount of roots and rocks, soil's structure and soil's consistence) roles in causing cracks in buildings' walls, ceilings and floors?
- What factors should be studied to indicate whether the land is suitable to build on or not?

Terms:

- Soil moisture
- SMAP
- pH
- Soil structure
- Soil consistence

Introduction:

- Our main priority was to identify why do the buildings start to crack after several years of existing, and the need to diagnose the reasons behind the cracks, and how effective it is to study the soils' nature before building in order to have safe buildings that can remain constant for several years, so we began our researches contacting some engineers that insured us that the soils' nature plays a big role in the wellbeing of the buildings and informed us of the main characteristics that matters, and depending on the soil protocols we had studied from the GLOBE website we gathered information from a specific site that had buildings with cracks and investigated whether the soil was the problem there or not.

Investigation plan:

- We brought samples from different locations around the site we're working on.
- We observed the soil's structure and consistence while gathering the samples
- We determined the geographical location of the building we took the samples from or nearby it.

Laboratory work:

- We observed the amount of rocks and roots that the soil contained.
- We cleared the soil samples from all impurities such as rocks and roots.
- We used vinegar and sprayed it on parts of our samples and observed the formation of bubbles to figure if the soil had carbonates.

Investigation plan:

- **Soil Moisture Data Sheet – SMAP Block Pattern**

1- We cleared the samples from all impurities such as roots and rocks.

2- We measured the weight of four containers and divided our samples equally in the containers.

3- We measured the weight of our samples that are in containers before heating and we recorded the results.

4- We heated our samples sequentially for 15 minutes each.

5- We weighed the samples after the heating and recorded the results.

6- We calculated the difference between our records before and after heating to indicate the water weight which shows the rate of soil's moisture.

- **Soil pH Data Sheet.**

1- We measured the pH of 3 Buffer solutions (pH = 4, 7, 10) to make sure that the pH meter is working correctly.

2- We measured the pH of the water.

3- We mixed the water with the first sample and measured the pH we repeated the measurements 3 times every 3 minutes for the same sample, we did the same for more samples and wrote the results.

Variables:

- **Soil samples weights**
- **Soil sample sites**
- **The time (season, time of the day, etc.) by which the soil samples were taken.**

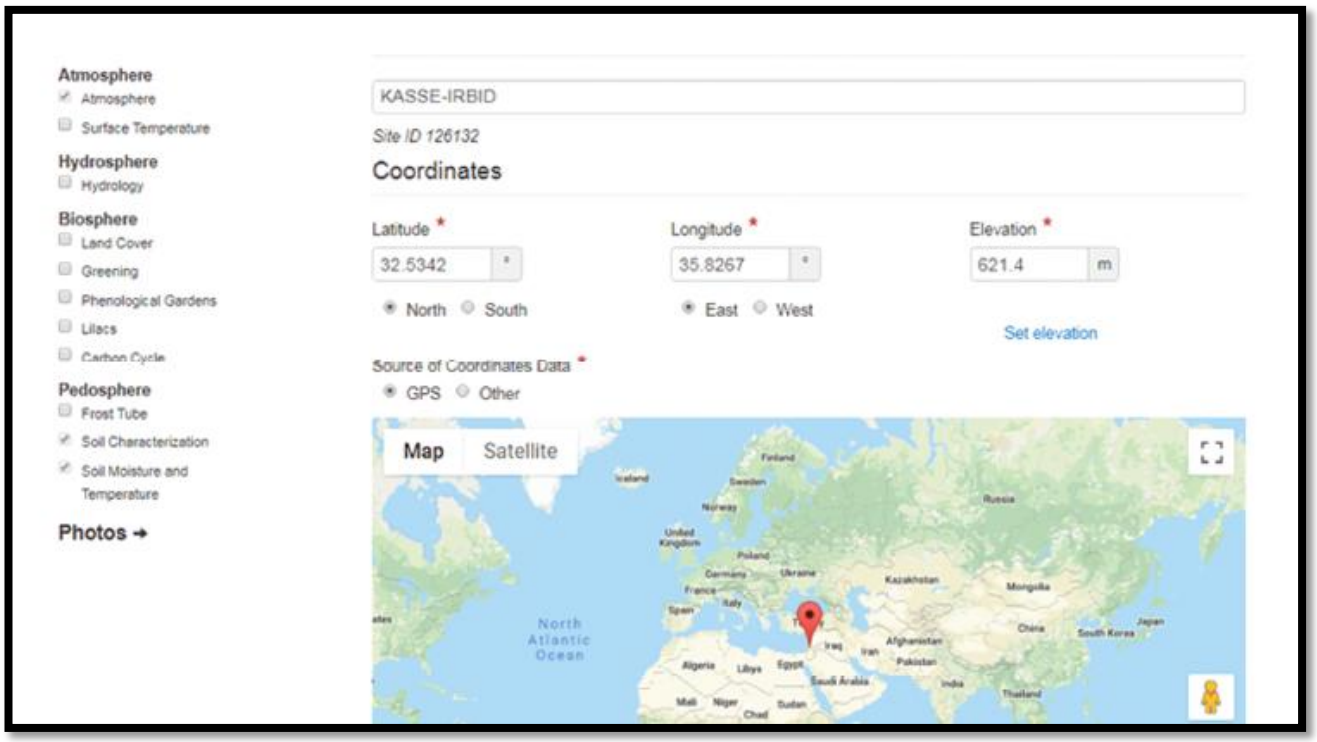
Research results:

Sample	Mass of wet soil and container (A)	Mass of dry soil and container (B)	Water weight (C)	Mass of empty container (D)	Mass of dry soil (E) (B-D)
1	87	82	5	49	33
2	87	79	8	49	30
3	89	84	5	51	33
4	89	82	7	51	31

Soil moisture observations:

We found that the difference between our measurements before heating and after varies scientifically which indicates that the water moisture is high in the site of investigation, and according to our researches that's the main reason that causes the cracks in buildings and the one of the reasons behind the high water humidity is that the soil is clayey which has materials and that absorb large amount of water and that leads to soil expansions and that causes landslides and rises that and that explains why cracks in the building were found.

Site Definition:



We would like to thank Engineer Qassem Abu Kassab, from the Faculty of Civil Engineering, Jordan University of Science and Technology, for his efforts in completing this research.

Sources of Errors :

The time of gathering the samples (season).

The heating time.

Measuring errors.

References:

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