

PASSENGER 26: IRON IN SOILS

GLOBE		Associated SDG	Type of Activity
Sphere	Protocols		
Pedosphere	Soil Characterization	4 (Quality education) 12 (Responsible Consumption and Production)	Research

Overview:

Iron is the 26th element in the Periodic System of the elements, the fourth most abundant element in nature; it is said to be part of the Earth's core, to be found in mineral deposits and in our blood as part of the hemoglobin that carries oxygen in the blood, to be the metal used in the production of tools and structural equipment of domestic life, etc. This particular metal possesses magnetic properties (which are also attributable to nickel and cobalt to a lesser extent) and is present in some soil compounds in which it is involved. In this activity we will determine the presence of the magnetic property of some iron compounds in the soil, infer some relationships among the soil composition properties, their agricultural use and the use possibilities as indicators in pedogenetic processes by which the soil is created, whose other aspects of study include the soil morphology, their soil classification (taxonomy), and their natural distribution, present and past (soil geography and paleopedology).

Time:

6 hours

Prerequisites: (K-6 - K-8)

None

School level

Primary

Purpose:

To learn the association of the magnetic physical phenomenon with particles present in soils and its importance in the associated processes

Student Outcomes

- o To learn a way to measure magnetism qualitatively
- o To relate magnetism to other soil characteristics
- o To compare values associated with their measurement by making inferences

Introduction - Background.

On the one hand, Iron oxides are found in all soils in varying amounts and are used as indicators of processes associated with soil origins, indicating soil formation environments. On the other hand, these components affect the soil properties and functions because they influence color, aggregation, cation exchange capacity and phosphorus retention in the soil. A characteristic of iron oxides is the formation of ferromagnetic minerals; due to this, and through the use of magnetic techniques, some pedogenetic processes can be identified. The objective of this activity is to give a first approach to the description of the soil magnetic properties and their potential applications in soil classification.

Guiding Research Questions:

- o Does the concept of soil magnetism pertain to all its components?
- o How does magnetism contribute to soil characterization?
- o Is it possible to predict how runoff will occur in a rainy period?

Scientific Concepts

- o Concepts of magnetism, paramagnetism
- o Magnet functioning
- o Iron and its main soil compounds

Materials and Tools

- 4 to 5 magnets of the highest possible power
- A weight scale
- Tools such as a small shovel and a rake
- Sample bags
- Plastic pieces of 50x50 cms
- Tape measure
- A GPS

What to Do and How to Do It

● ***Beginning***

At a selected study site intended for your soil measurements, choose 10 sampling points, ideally with some kind of difference among them, and geoposition them (record GPS coordinates). Provide a description and start an anecdotal record.

● ***Development:***

At each selected point: collect soil samples with the shovel and place them on plastic, then remove stones and rocks, take a portion of about 500 g. and examine it with a magnet, collecting the particles that are attracted to it in a sample bag. Then, label and mash its contents.

● ***Ending***

After taking the measurements at all the selected points and recording the data, organize them systematically using tables and/or graphs. Make a discussion on the data you obtained and the inferences you made.

As a complement, concurrently initiate a bibliographic research where you discover evidence that the soil magnetic properties allow identifying, quantifying magnetic minerals and relating them to pedogenetic processes, thus making possible the development of soil maps, the identification of pedogenetic processes and the improvement of soil classification.

Finally, make a presentation for your immediate community.

Frequently Asked Questions:

Are there other ways to measure soil magnetism?

Yes, there are instruments of varied technologies that are not usually accessible to schools.

Suggested Resources:

Soil investigation at (www.globe.gov)

Bibliography

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