
GRACE Mission - "Make an Aquifer"

Background:

Project GRACE is capable of measuring small changes in the Earth's mass. The gravitational pull of Earth varies slightly from place to place because of subsurface water and rocks, which have different densities. GRACE is very sensitive to small changes in aquifers. With this powerful satellite, scientists will investigate yearly changes in subsurface waters, such as those located beneath many of the deserts. In this activity, students learn about their own aquifers by constructing a model aquifer.

Objective:

By constructing models students will develop an understanding of underground lakes and rivers (aquifers) which are located in subsurface rocks and sediment layers.

Standards:

Science: unifying concepts & processes; science as inquiry, physical science, earth and space science

Vocabulary:

aquifer aquitard permeable impermeable
lithosphere porous non-porous sediment

Materials:

Small Plexiglas tanks (30 cm by 40 cm by 5 cm wide)
These may be constructed or you could substitute 2 liter clear pop bottles.
Each container needs to have a small drainage hole near the bottom

Small river rock
Aquarium rock
Sand
Sheets of Styrofoam packing materials
Food coloring
Straws

Procedure:

1. Teachers will discuss with students the various types of rock and sediment layers which make up the subsurface of the Earth's lithosphere. They will identify rock materials as being porous and permeable, and those that are non-porous and impermeable. Students will look at maps of various large aquifers in the United States.
2. Students will take their Plexiglas containers and begin to layer various rock materials. They will include impermeable layers of Styrofoam in short strips which do not cover the entire length of the container.
3. Students will pour water onto the top of the model and use a felt-tipped pen to trace the flow of the water on the side of the model. Some of the water will follow a path through the permeable rock material and exit through the drain hole at the bottom.
4. Other water will pool above the Styrofoam aquitards and create aquifers. Students will take different colored felt-tipped pens and outline their underground aquifers. Students can carefully insert their straws to see how wells are drilled to tap into drinking water sources.

Extensions:

- Research aquifers in your area.
- Why are aquifers important? Write a report.
- What can be done to protect aquifers? Write to a legislative agency for information.

References / Resources:

<http://www.beg.utexas.edu/education/aquitank/tank01.htm>

<http://allison.sri.com/projects/worldwatcher/gcv/ModelingAquifer.htm>
