IX...Transfering Energy from the Sun to the Earth

Introduction:

What is the solar wind? Because the surface of the sun is very active, gases are constantly being ejected into space. This "wind" rushes out from the surface at nearly a million miles per hour and travels to the orbit of Pluto and beyond. The amount of gas expelled in this wind is so small that fewer than 30 atoms per cubic inch are present as it speeds out from the solar surface and crosses the orbit of the Earth. Yet, this wind is more than enough to affect the tails of comets and to upset the magnetic field of the earth causing powerful storms in space and aurora. Students will make a model of the solar wind. They will use both individual and group activities to explore the solar wind.

Objectives:

- The students will explore a model of the solar wind.
- The students will communicate their findings to classmates.

Materials:

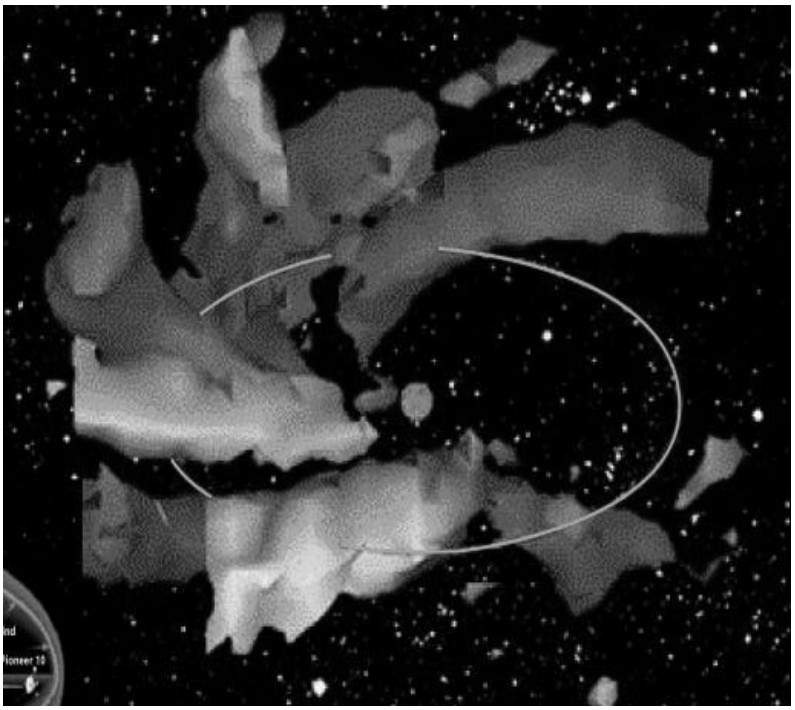
Puffed rice cereal

Students

Large non-windy area

There are many visual aids for the Solar Wind at The University of Michigan's "Windows to the Universe" Site - (access basic facts from this site)

http://windows.engin.umich.edu/spaceweather/



The pin wheel arms of the solar wind fill much of the solar system. This view shows the arms as they cross the Earth's orbit indicated by the green circle. The Sun is the red disk at the center.

Procedure:

- The surface of the sun is very active and "boils" like a pot of water as heat rises from deep inside to the surface. This activity causes a flow of gas, containing charged particles, into space called the solar wind. Each student will become a convection cell on the sun's surface. Each student should blow the puffed rice cereal off their hand and observe what happens. This represents what happens when one convection cell bursts at the surface of the sun.
- Students will need to form concentric circles facing out. Children will blow the puffed rice cereal off their hands at the same time. They should observe that some of the cereal will join into larger concentrations and that there is a much stronger flow. This example represents what happens when many convection cells burst at the surface of the sun.
- Have students record their findings in their learning logs.

Conclusions:

The students will gain an understanding of how the solar wind is formed. The constant explosive activity on the Sun's surface ejects gas into space. This activity is driven by the powerful, and ever-changing, magnetic fields on its surface which short-circuit and heat the gases to millions of degrees. Not even the Sun, with its powerful gravity can hold onto these hot gases for very long.

The Sun is a stormy star that constantly throws out gases from its surface. Some of these continue on into the solar system to become the solar wind.