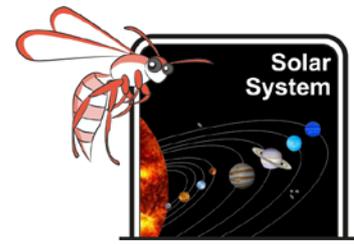


Earth's Lifeguards – Student Activity



Earth's magnetosphere extends beyond the atmosphere and is the first of two shields that protect life on Earth. The magnetosphere shields our home planet from radiation from our sun and from other stars. The magnetosphere also protects our atmosphere from erosion by solar wind. We can use the lines of magnetic force and a compass to find our way about the Earth. The magnetosphere is produced by the liquid outer core of the Earth, which is made of mostly nickel and iron.

Task 1: Making the invisible magnetic field visible

Materials

- 1 bar magnet (preferably wrapped in Cling wrap plastic)
- Iron filings
- A sheet of white A4 paper

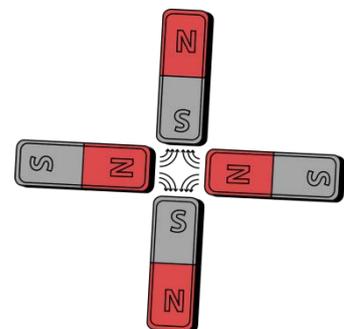
Method

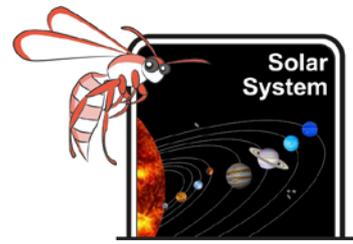
1. Place the magnet on the desk and cover with the paper. The magnet should be centrally placed under the paper.
2. Gently shake the filings over the general area of the magnet.
3. Note the pattern formed by the filings under the influence of the magnetic field. This represents the magnetic field around Earth
4. Sketch this in the space provided below.
5. Return the filings to their container.



Observations

Sketch the pattern of the iron filings made by the magnet below:





Earth's Lifeguards – Student Activity

Discussion

Can you see the magnetic field?

Earth has a force field round it just like the magnet.

Task 2: Earth's magnetic field diverts incoming radiation from the Sun

Materials

- Two bar magnets.
- A sheet of white A4 paper.
- Iron filings.

Method

1. Align the magnets with their north poles facing each other.
2. Sprinkle the iron filings over the magnets.
3. Note the effect of the magnetic field of the magnets on each other.
4. Sketch this in the space provided below.

Observations

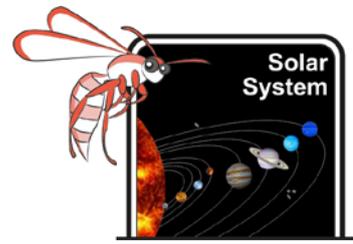
Sketch the pattern of the iron filings made by the magnets below:

Discussion

Can we see the magnetic fields?

What effect did the opposing magnetic fields have on the iron filings?

Earth's magnetic field repels most of the solar wind round the planet and off into space.



Earth's Lifeguards – Student Activity

Spectacular science: the Aurora Borealis and the Aurora Australis

Tourists travel towards the north and south poles during winter to see amazing natural light shows in the night sky. Near Earth's magnetic poles, the magnetosphere is weaker, and lets ionized particles enter the upper atmosphere, which produces spectacular light displays. The displays are a bit like watching a huge gas fire, as sheets of blue, green and yellow colours pass across the sky like billowing curtains. The Aurora Australis is occasionally visible from the southern half of Western Australia.



The ozone layer: Earth's atmosphere as a shield

Our upper atmosphere has a layer of ionized oxygen (O_3) that repels some of the ultraviolet radiation emitted by the Sun. This radiation can cause cancers and other mutations in living things. UV radiation penetration increases towards the magnetic poles where ozone is thinnest. In the late 20th century, CFCs (chlorofluorocarbons) synthetically made by people for use in refrigerators and aerosols damaged the ozone layer. A global reduction and ban on the use of CFCs in refrigerants and aerosol propellants has slowly reduced the size of the hole in the ozone layer.

