

## The Earth's Magnetic Field – Teacher Sheet

To have a true understanding of space weather, students must have a reasonable grasp of the Earth's magnetic field and its ability to shield us from the sun's behaviors. Students will likely be familiar with some basic magnetism, and there are a variety of ways that a teacher can build on this:

- Using a standard D battery and a wire, run an electric current through the wire. Move a compass near the wire and show the deflection in the compass caused by the magnetic field of the wire.
- Use a bar magnet to create a magnetic field on your overhead projector. Place an overhead transparency down on the projector screen. Place the bar magnet on top of that, in a vertical direction. Place another transparency sheet on top of that. Now sprinkle iron filings on top of that, and they will align nicely to the magnet's magnetic field.
- A magnetic field observation box will do the same thing, without the potential mess of the iron filings. They are available from Arbor Scientific Co. for \$99 at [www.arborsci.com](http://www.arborsci.com)
- If you are doing an entire unit in magnetism, there are many great activities to be found on line, including a unit developed by the IMAGE Satellite division of NASA. They can be found at <http://image.gsfc.nasa.gov/poetry/NASADocs/magbook2002.pdf>

Here are some key points that you would want to be sure to include:

- Both the Sun and the Earth have magnetic fields, and the way that they act determines much of the space weather we experience on Earth.
- Earth's magnetic field (magnetosphere) is caused by moving iron in the outer core as the Earth rotates.
- Sun's magnetic field is caused by sun's rotation and movement of plasma.
- The Sun's magnetic field is "carried" to Earth by the solar wind. This is called the Interplanetary Magnetic Field (IMF).
- The IMF can be oriented either North or South. If the IMF is South during a solar storm, the Earth is at a much greater risk for impacts from the sun.

A more detailed explanation can be found at:

<http://spaceweather.com/glossary/imf.html>

and

[http://science.nasa.gov/headlines/y2001/ast15feb\\_1.htm](http://science.nasa.gov/headlines/y2001/ast15feb_1.htm)