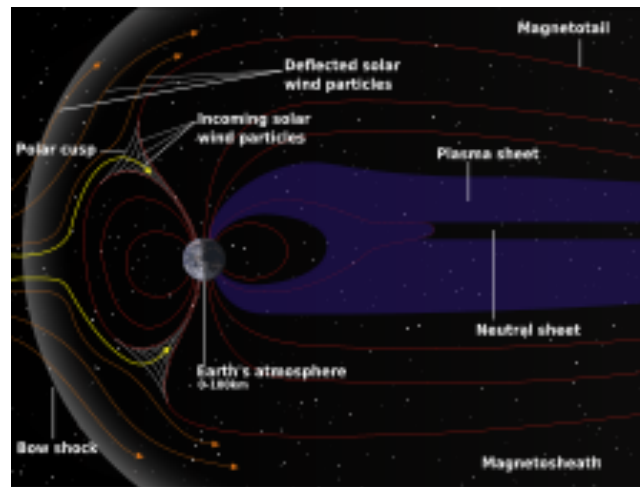


The Earth's Magnetosphere

The Earth's magnetosphere is the region of space around the Earth where charged particles or **ions**, specifically **electrons** (negatively charged particles) and **protons** (positively charged particles),

are controlled by the Earth's magnetic field. The magnetic field extends from the Earth's interior, tens of thousands of kilometers into space. The magnetic field is generated from the mixing of iron alloys in its molten or melted state. Iron is at a

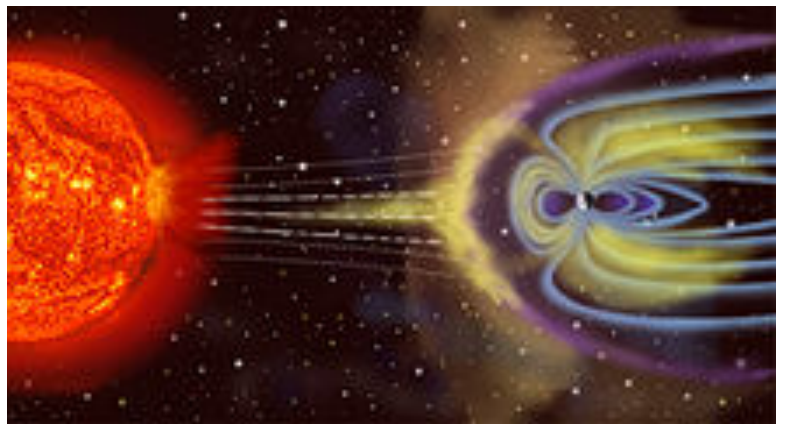
very high temperature when it is in a molten state. At these temperatures, charged particles are stripped away from the iron atoms forming a plasma, and flow freely into the atmosphere and out into space.



The magnetic field of the Earth is **dipole** or has two poles: a North Pole and a South Pole. A **compass** is a tool that can be used to detect in which direction the magnetic North pole is. The magnetic North pole can change its position due to the movement of the iron alloys within the core of the Earth. The magnetic poles will sometimes “**reverse**” or switch position. When this occurs, the North pole becomes the south pole and the South pole becomes

the North pole. Evidence of this reversal has been found in the Atlantic Ocean. The metallic debris within the molten rock that is constantly filling in the the mid-ocean ridge points in the direction of the North Pole. Scientists have found a record of different alignments of this debris over time and have found that they correspond to the past magnetic reversals of the Earth.

The Earth's magnetosphere acts as a shield for the solar wind. The **solar wind**, or ionosphere, is a stream of **plasma** or charged particles that is released from the sun. The magnetosphere protects the Earth from the harmful effects of these charged particles. These charged particles strip away the ozone layer which



protects us from the sun's ultraviolet radiation. The magnetosphere also protects the integrity of the Earth's atmosphere. It keeps the gases in the atmosphere from dissipating into space and causing the loss of our atmosphere. Scientists believe that this is what occurred with the atmosphere of the planet Mars.

Knowledge and Comprehension

Words to Know:

Ions:

Electrons:

Protons:

Dipole:

Compass

Reverse:

Solar Wind:

Plasma:

1. Describe the word “magnetosphere” in your own words.
2. What are ions? What are some examples of ions.

Application, Analysis, Evaluation and Synthesis

3. Explain how the magnetosphere is created.

4. How are ions related to the magnetic field of the Earth?

5. How does the magnetosphere protect the Earth.
Support your answer with evidence from the text.