

# Marvellous Are Thy Works

(Psalm 139:14)

*Works We Take for Granted*



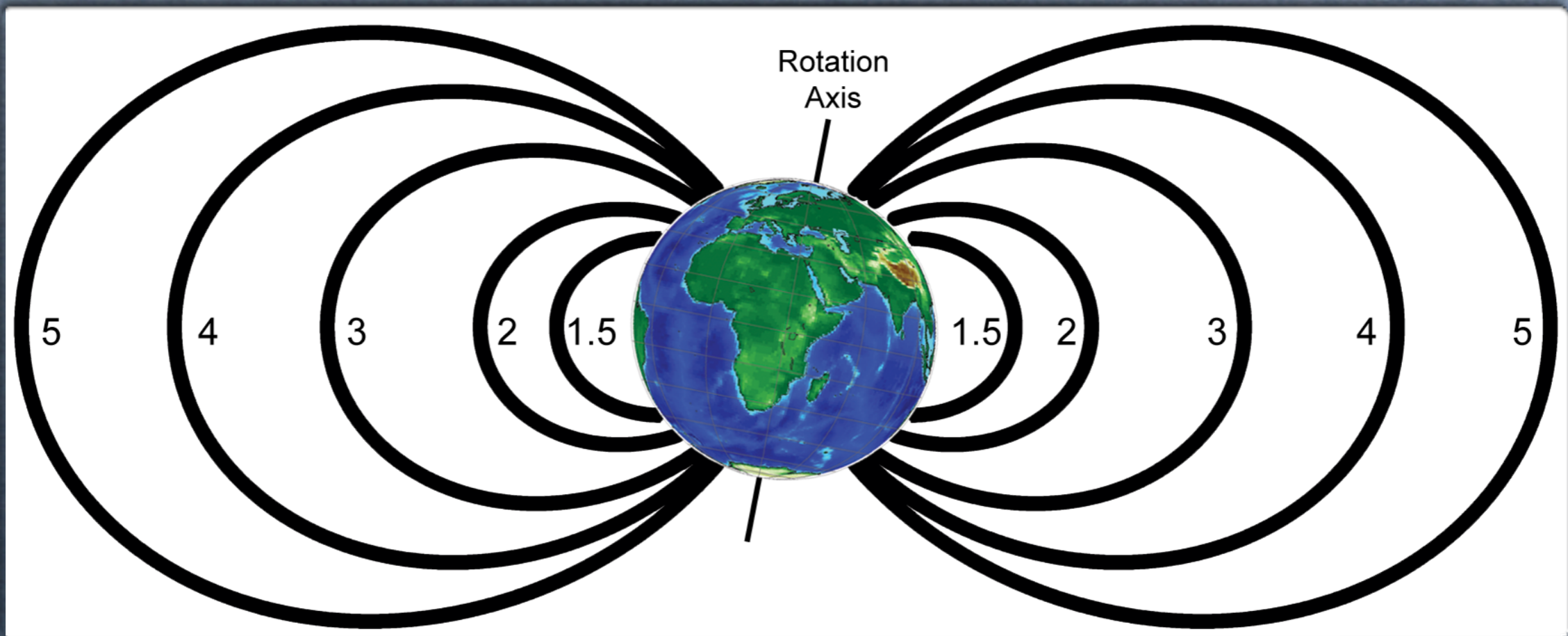
brgfx

**92.298 million miles,  
150 million km**



Vyacheslav Argenberg

# Himalayas in Nepal



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# Earth's Magnetic Field



# Compasses Wouldn't Work



Ken Billington

# Bird Migrations Could Stop

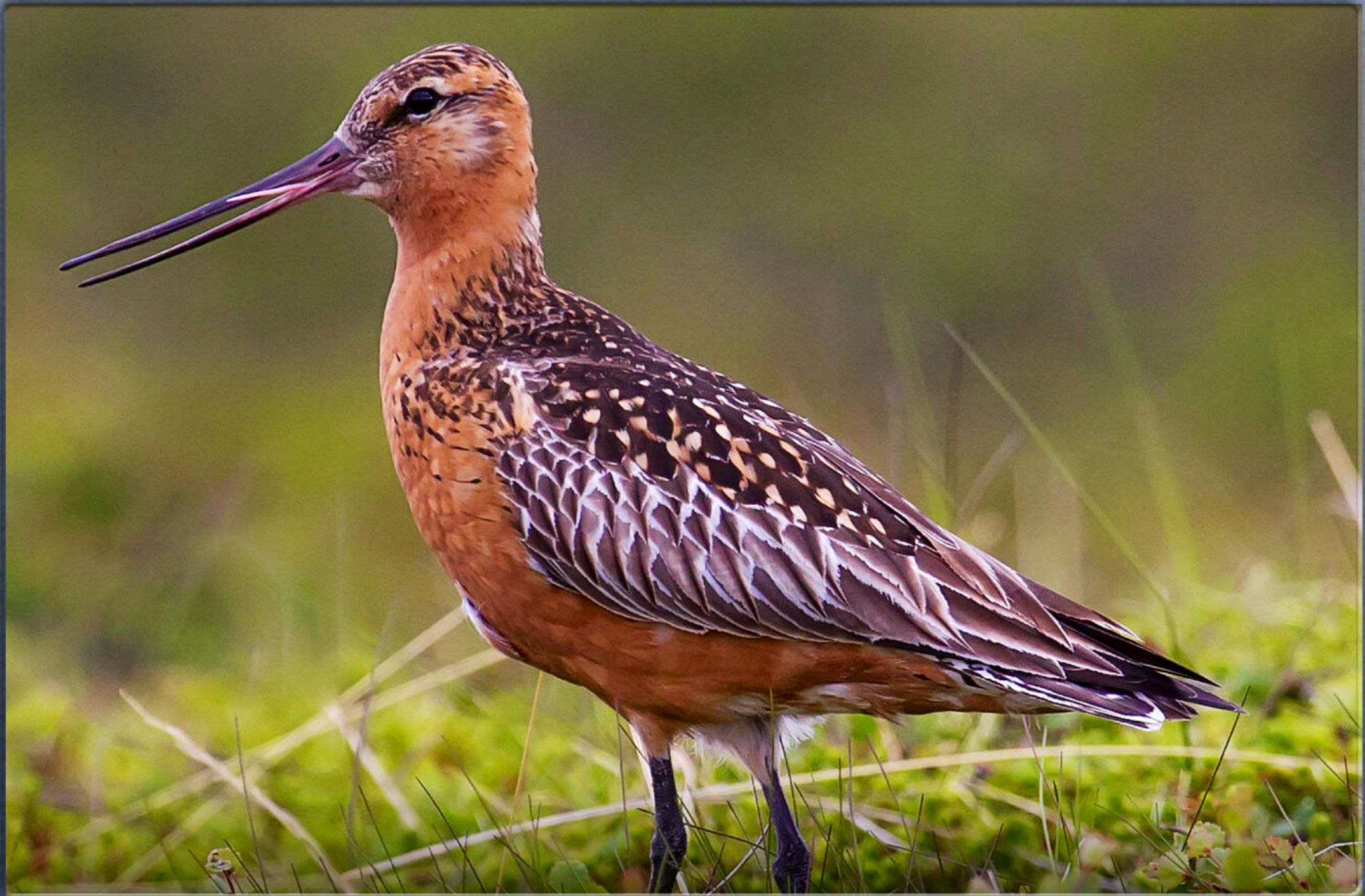


Ben\_flickr

# Bar-tailed godwit

**Bar-tailed godwits breed on Arctic coasts and tundra from Scandinavia to Alaska, and overwinter on coasts in regions of Australia and New Zealand. As the days become shorter they embark on one of the most impressive migrations—a nonstop flight that crosses the equator and lasts at least seven days and nights across the Pacific Ocean to New Zealand. Every year tens of thousands of bar-tailed godwits complete this journey successfully, and billions of other birds set out on dangerous migrations every spring, navigating the night skies without any help from more experienced birds.**







Ian Kirk



Ian Kirk

**Migrating birds use celestial cues to navigate, as sailors have used the sun and stars to guide them, but birds also detect the Earth's magnetic field and use it to determine their position and direction. Birds appear to be able to “see” Earth's magnetic field lines and use that information to chart a course between their breeding and wintering grounds.**



**Auroras Would Change**

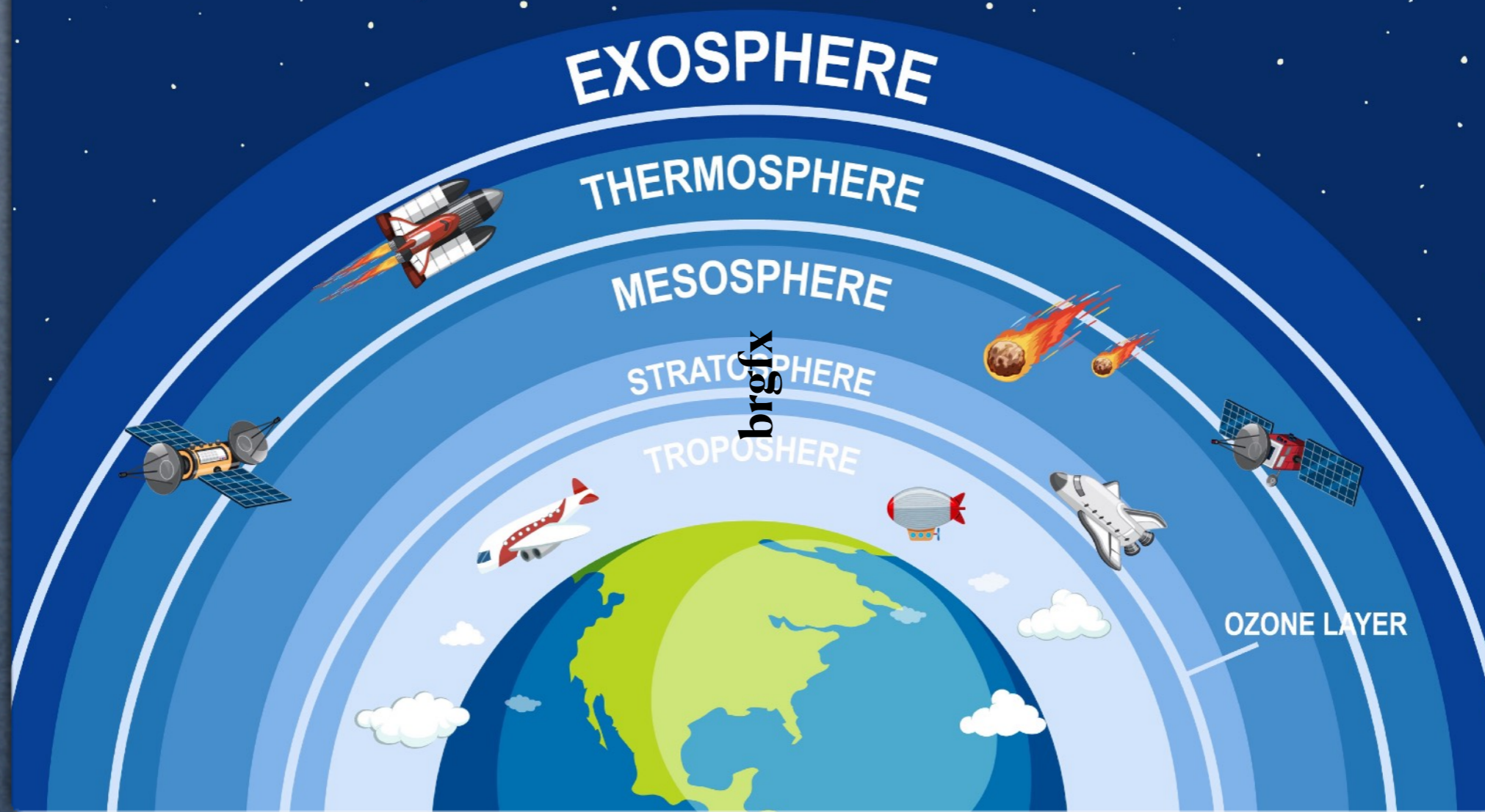
**The northern and southern lights would be visible from lower latitudes because they are the result of the interaction between charged particles hurled from the sun in the solar wind and Earth's magnetosphere.**

**Currently, these auroras appear near the poles, following Earth's largely North-South magnetic field lines, but a weaker field would allow the particles to penetrate Earth's atmosphere, lighting up the sky closer to the equator.**

**Enveloping our planet and protecting us from the fury of the Sun is a giant bubble of magnetism called the magnetosphere. It deflects most of the solar material sweeping towards us from the sun at 1 million miles per hour or more.**

**Without the magnetosphere, the relentless action of these solar particles could strip the Earth of its protective atmospheric layers, which shield us from the Sun's ultraviolet radiation and house the gases we breathe.**

# ATMOSPHERE



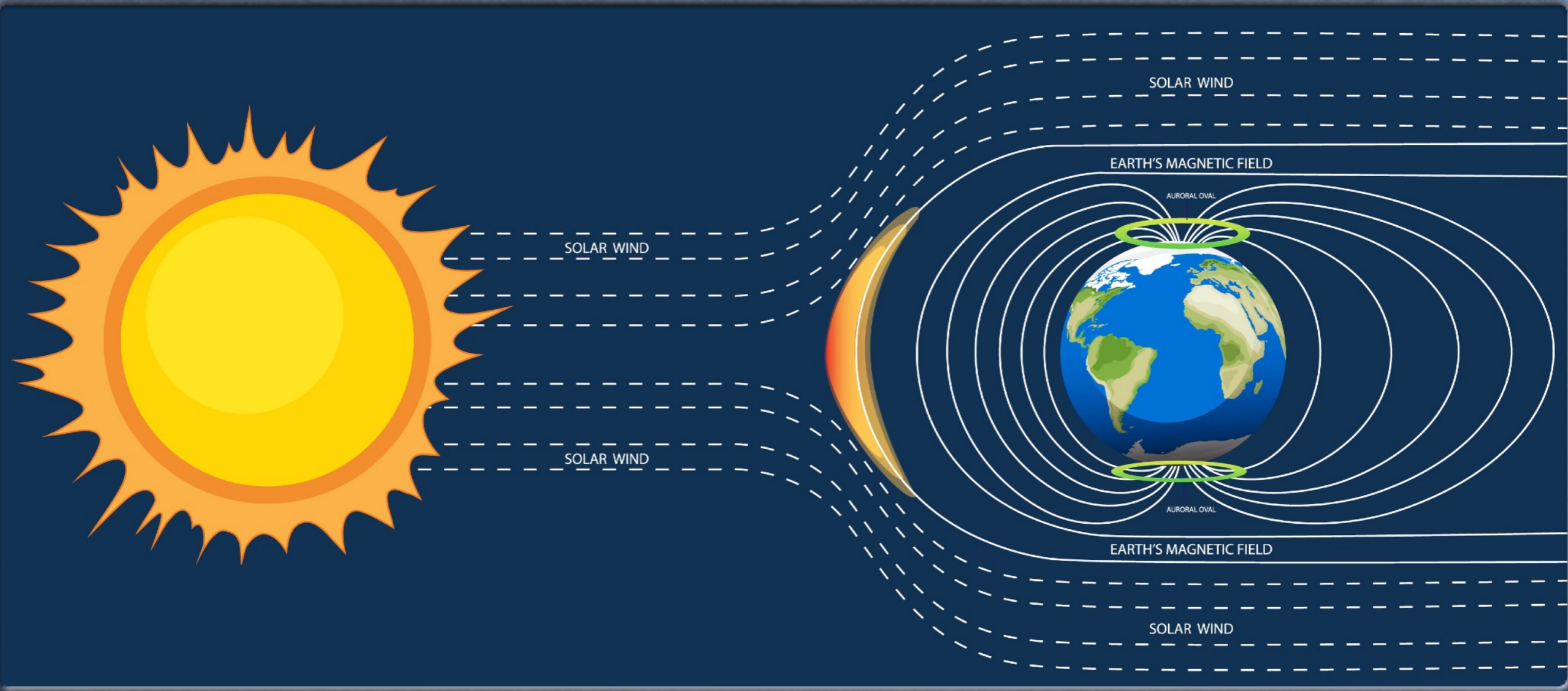
Solar winds could strip the gases out of atmosphere.

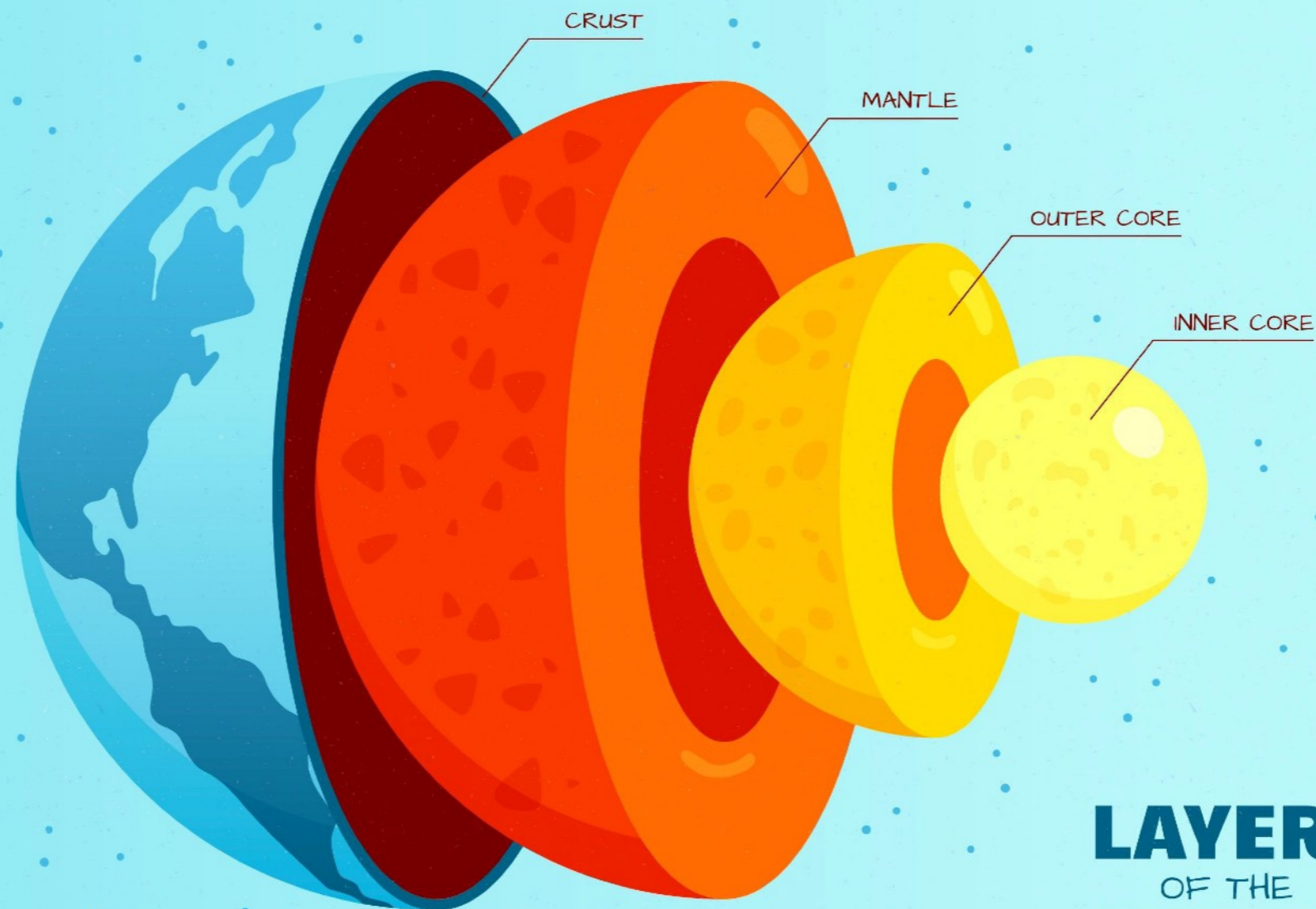


**Eftyhia Zesta of the Geospace Physics  
Laboratory at the Goddard Space Flight Center  
said that if there were no magnetic field, we  
might have a very different atmosphere left  
without life as we know it.**

# Earth's Magnetic Field

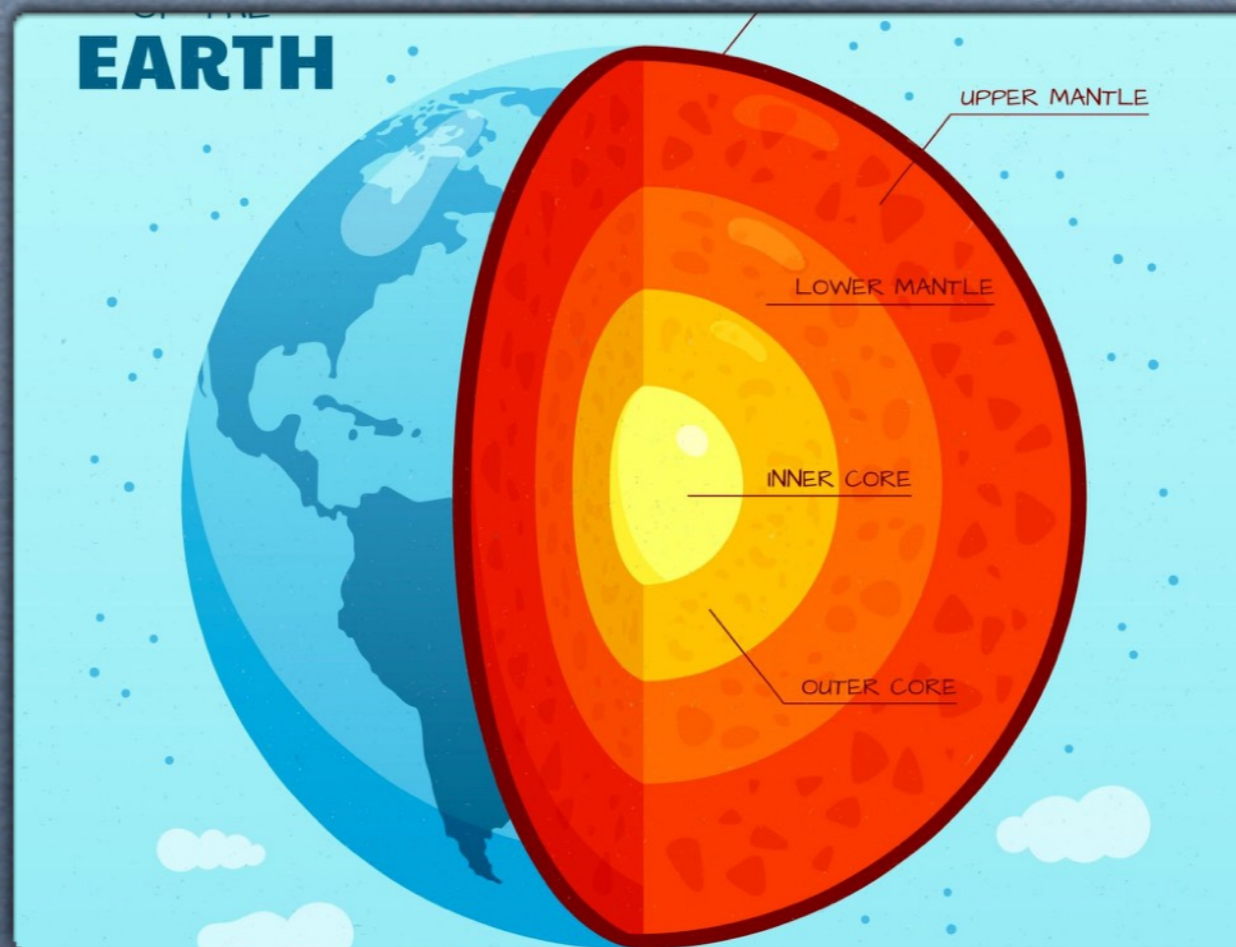
- ❑ Crucial to bird migration
- ❑ Creates the magnetosphere, which is crucial to protecting us from the solar wind storms that could destroy our layered atmosphere, strip us of the gases we need for respiration, and expose us to extremely high levels of ultraviolet radiation.
- ❑ The magnetosphere is not the same as the Van Allen belts.





## LAYERS OF THE EARTH

Outer core—The core of the Earth is like a ball of very hot metals. (4000 degrees F. to 9000 degrees F.) The *outer core* is so hot that the metals in it are all in the liquid state. The outer core is located about 1800 miles beneath the crust and is about 1400 miles thick. The outer core is composed of the melted metals nickel and iron.



The Earth's outer core is in a state of turbulent convection as the result of heat and chemical differentiation. This sets up a process that is a bit like a naturally occurring electrical generator, where the convective kinetic energy is converted to electrical and magnetic energy. Basically, the motion of the electrically conducting iron in the presence of the Earth's magnetic field induces electric currents. Those electric currents generate their own magnetic field, and as the result of this internal feedback, the process is self-sustaining so long as there is an energy source sufficient to maintain convection.

# Do humans have magnetism?

- ❑ Science is studying measurement of the extremely weak magnetic fields emanating from organs such as the heart, brain and lungs in hopes to find new methods diagnosing abnormal conditions.



# Mesmerism

In France, around 1780, many Parisians believed in curing their illnesses by magnetism. To perform this cure, they sat in a group around a tub containing “mesmerized” water and iron filings; this was part of the cult introduced to Paris by Dr Franz Mesmer. He proclaimed that animal magnetism of the human body controlled the flow of a universal fluid through the body and that illness resulted when there was an obstacle to that flow. The illness would be cured by magnetically redirecting the fluid with arrangements such as the filings and water.