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Santa Studies: The Aurora



In loving memory of Sanjay and Farah.



**High in the atmosphere is where you would find
Santa busy at work tonight.**



He had been patiently waiting all day to take his new sleigh out for a test flight.



While cruising above the clouds, Santa noticed an amazing bright green glow.



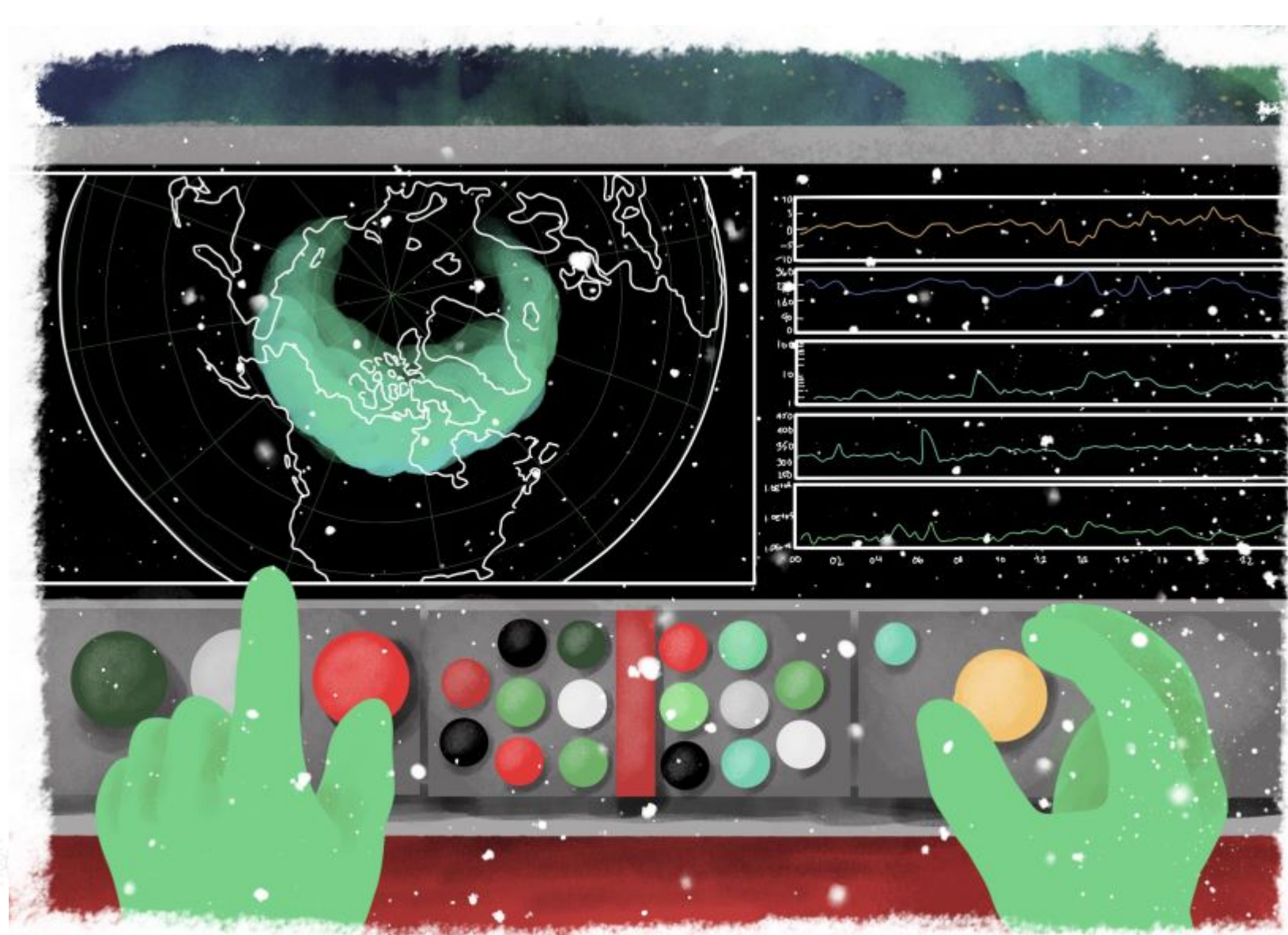
**He knew right away that it was the aurora borealis,
nature's best light show.**



Santa parked his sleigh and watched the ribbons of light dancing in the sky.



Since he was a scientist, Santa really wanted to observe them to learn why!



He formed a hypothesis, then took measurements to study back at the North Pole.



Santa always felt that making new discoveries was an extremely important goal.



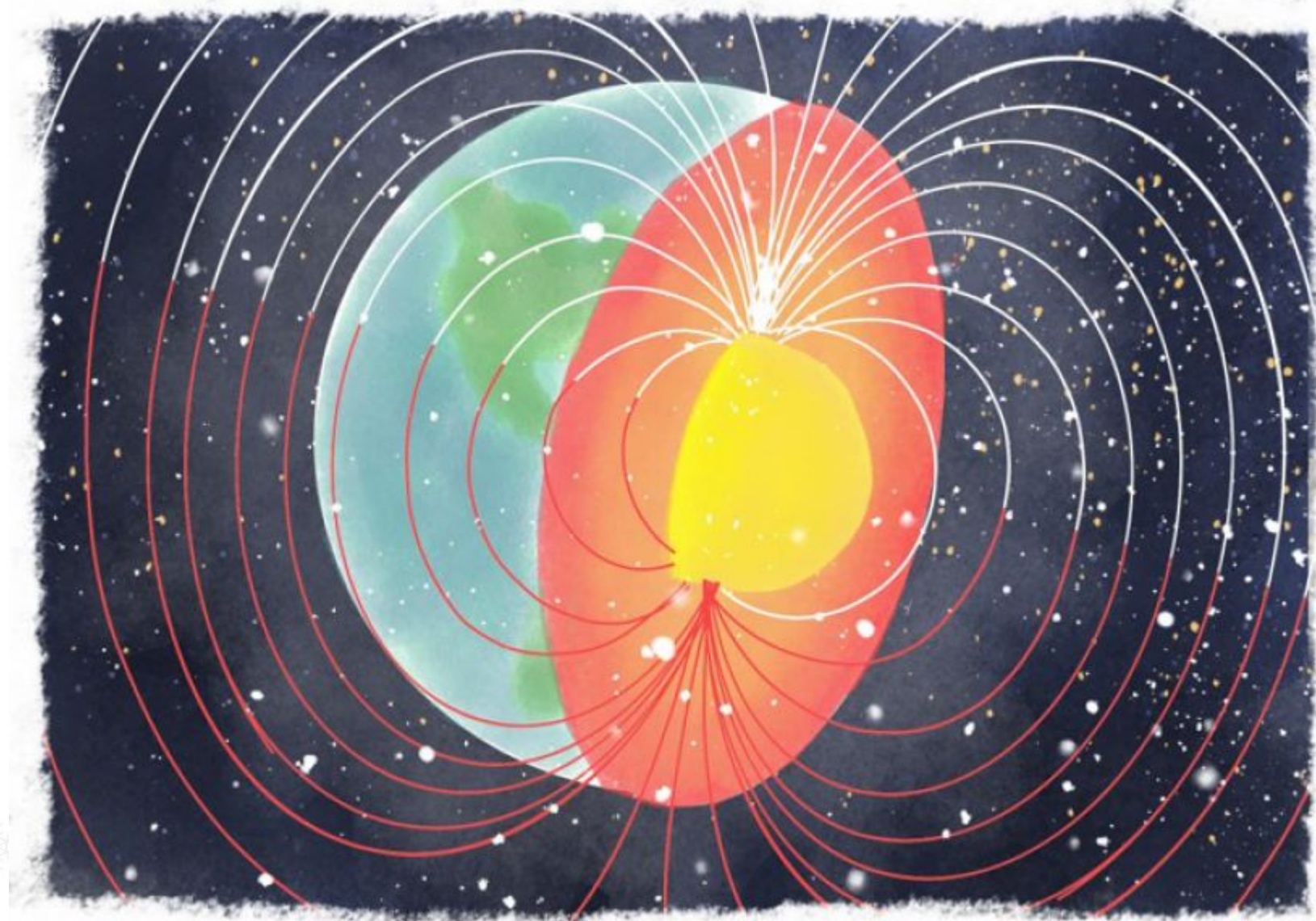
Santa carefully analyzed and tested all of the data until he reached a conclusion.



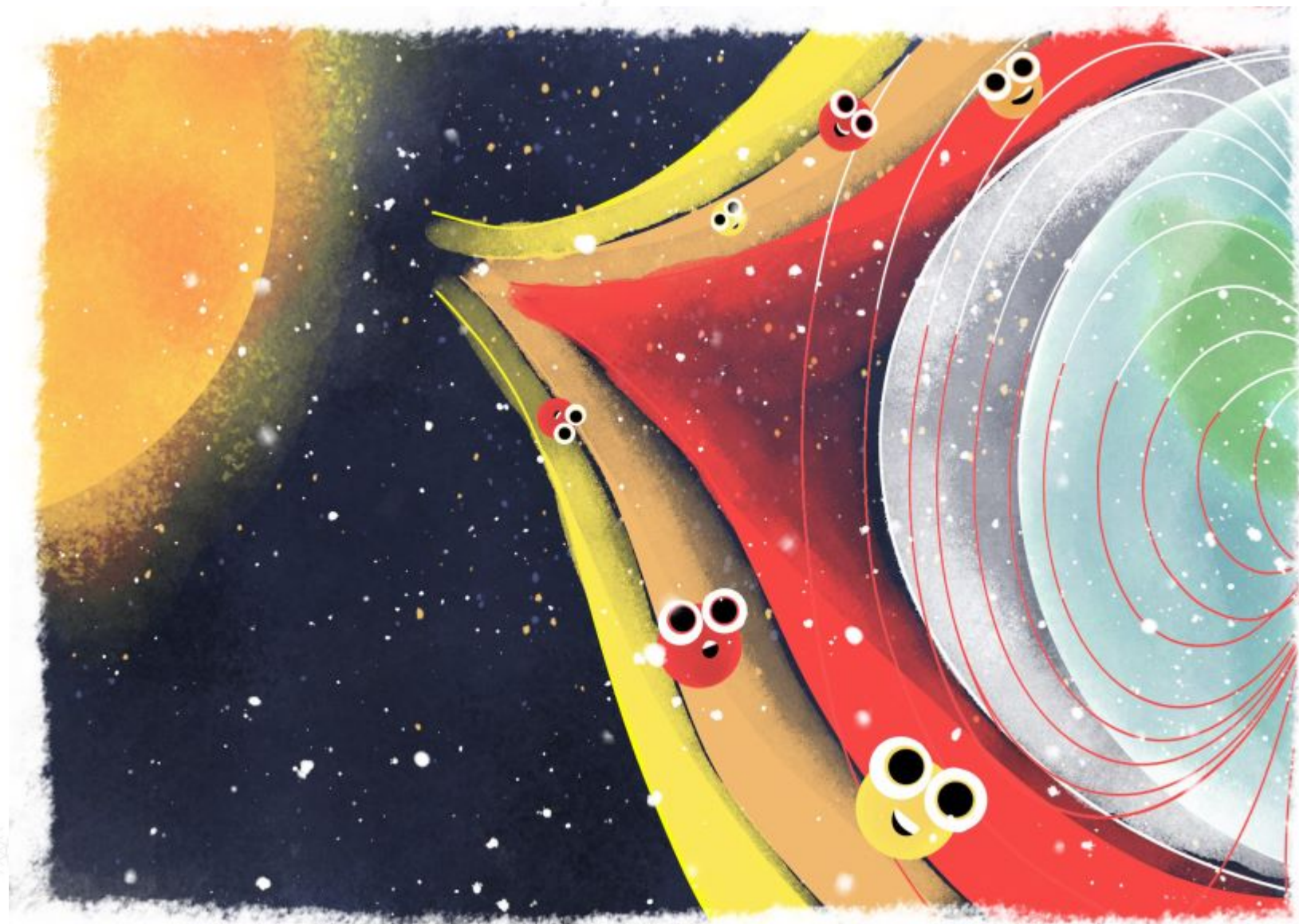
Then, he made sure to check it with his scientific elves to avoid any confusion.



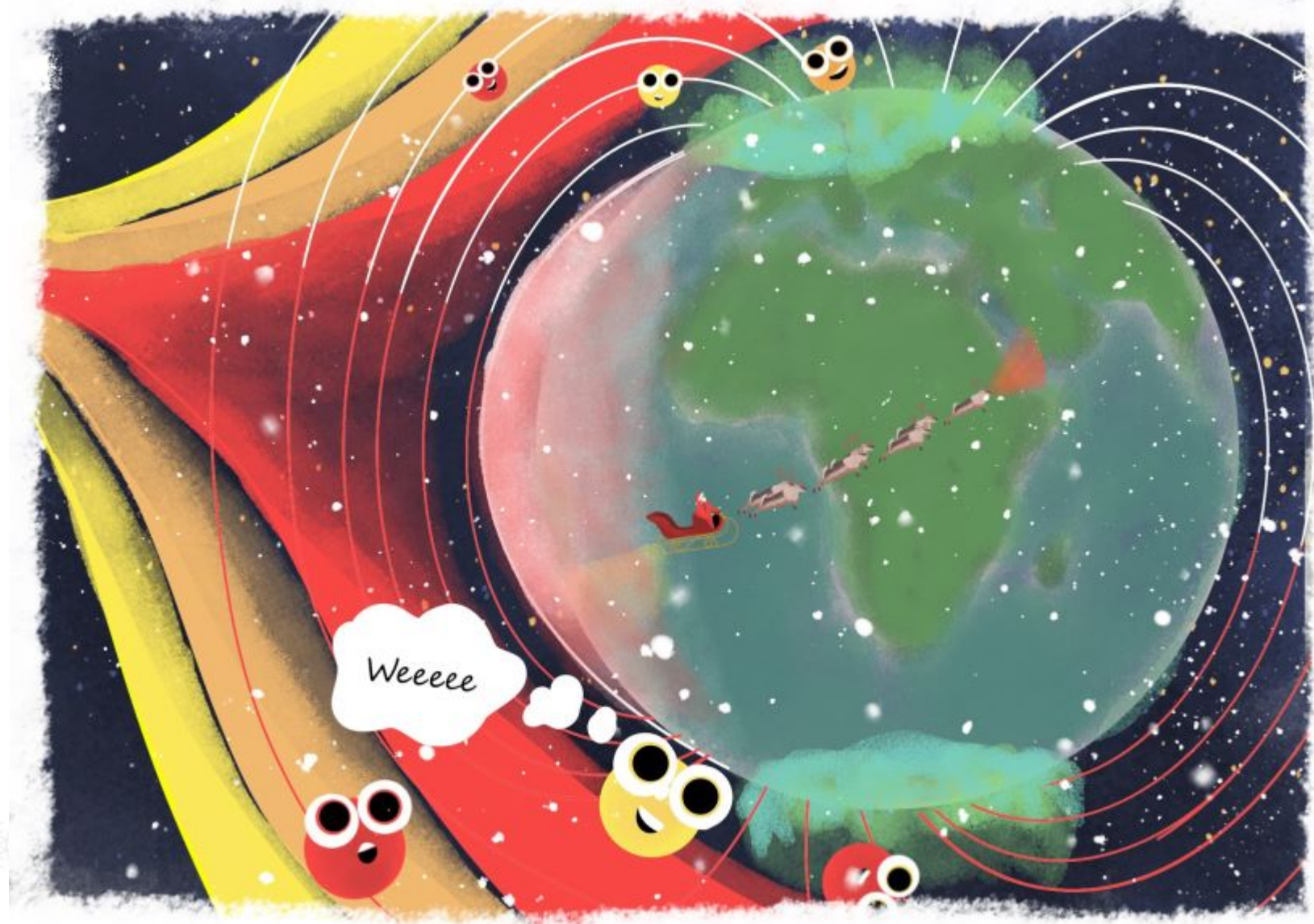
Both Santa and his elves were excited and amazed by the conclusion he found.



**The aurora needs the magnetic field of the Earth,
generated deep in the ground.**



This field protects our surface from many of the particles that are shot out from the sun.



It guides them quickly to Earth's two poles as they reach our atmosphere by the ton.



There, Santa noticed that those particles interacted with the gases up in our air...



bringing them packages of energy so that they could create colours everywhere.



Satisfied with his findings, Santa knew that the aurora was a very special sight.



**If you look north, you just might get lucky and see
it on a dark and clear night!**



The End!

Fun Fact #1:

Earth's atmosphere is made up of 5 main layers, like a very big cake! There is the troposphere, stratosphere, mesosphere, thermosphere, and exosphere. Each layer has different properties like temperature and mixture of gasses. The aurora happens mainly in the thermosphere.

Fun Fact #2:

The aurora occurs at both the North and South Poles of our planet. At the North pole it is called the aurora borealis, named in 1619 by the famous astronomer Galileo Galilei. At the South pole it is called the aurora australis. Other planets like Jupiter and Saturn can have the aurora too!

Fun Fact #3:

The aurora has brought wonder to humans since the dawn of time. It has been thought to be caused by spirits, gods, foxes, and even fire! The earliest known written records of the aurora are from 2600 B.C. China. There are cave drawings that may depict the aurora, which are even older. The aurora is an important part of rich mythologies and beliefs for cultures across the planet, especially those from the North, where the aurora can be seen most often!

Fun Fact #4:

In order to predict if an aurora will happen, scientists study space weather. They measure things like the number of solar storms on the surface of the sun, and the magnetic field of the sun that reaches near the Earth. You can find apps or sign up for alerts online to notify you when there is a good chance of seeing an aurora.

Fun Fact #5:

The scientific method is one of the most important parts of research. It is a set of steps that scientists follow to learn something new. The first step is to make an observation (seeing the aurora), then ask a question about it (what causes it?). The next step is to make a hypothesis, or educated guess, about why it is happening, then do experiments to test the hypothesis. Finally, the results and conclusions are shared so that others can also test the hypothesis to confirm if it is a reasonable explanation.

Fun Fact #6:

Earth's magnetic field is created from electric currents flowing in the planet's core. These currents are created from the motion of the molten metals (iron and nickel) that are deep inside our planet. The magnetic field is very weak - a fridge magnet's field is over 100 times stronger than Earth's field!

Fun Fact #7:

Earth's magnetic field acts like a giant shield, protecting all of us from dangerous space radiation! Without this field, all of this radiation would be able to reach the ground and harm life on the planet. Our closest neighbour, the moon, has no magnetic field!

Fun Fact #8:

The aurora can have many different colours because the gases in our atmosphere all glow in different ways when hit with radiation. The most common colour, green, is from oxygen, which can also glow red when the aurora is very intense. The aurora can glow pink because of the nitrogen in our air, and shades of blue because of the small amount of hydrogen and helium in our atmosphere.

Fun Fact #9:

The aurora can happen at any time during the year, but we can only see the aurora when the skies are dark! The best time to look for the aurora is late at night during the winter in the northern sky. The aurora mostly happens in the far north (near Santa), but when it is very strong it can be seen much farther south.

Fun Fact #10:

The aurora can be enjoyed and studied by anyone! For example: in 2016, members of an online group in Alberta, Canada posted pictures of an unknown purple and green ribbon of light that they observed during an aurora (which they later named Steve). Scientists were actually able to use these pictures to help discover new aurora physics! The name STEVE was even adopted by NASA to stand for Strong Thermal Emission Velocity Enhancement.

Santa is back and ready to learn!

The aurora is a truly beautiful and mysterious sight. Have you ever seen it or dreamed about seeing it? Have you ever wondered what causes the brilliant light show? Join Santa in this story as he learns all about the science behind the aurora!

To learn more about this project or to download a free copy of this eBook visit:

roshanachal.com/aurora

