FLAT EARTH THEORY VS. JAMES VAN ALLEN

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Flat Earth Theory Supporters And Imaginary Dome, False Claim the Apollo Astronauts Never Went To The Moon Due To Van Allen Radiation Belts, I Reject Both Flat Earth Theory And Hollow Earth Theory, Discovery Of Van Allen Belts, Definition Of The Magnetosphere, Description Of The Van Allen Radiation Belts, A Safe Zone, Real Radiation Danger Exists For Astronauts And Electronic Equipment, Deficiency Of Geiger Counters, James Van Allen Concluded Belts Could Be Traversed By Shielding, Speed And Angle Of Trajectory, NASA Carefully Plans Apollo Missions, Apollo Astronauts Were Exposed To Minimal Amount Of Radiation, Construction Of Apollo Command Module Provided More Protection From Radiation, Gemini 10 Mission Goal, July 1969 Apollo Moon Landing, Nine Apollo Flights Passed Safely Through Van Allen Radiation Belts, Spacecraft Continue To Traverse The Van Allen Belts, NASA And Artemis Program Goals, Problems With Elon Musk And SpaceX Delays, Closing Remarks, BBB Suggested Reading List

As some of my readers will know, supporters of the Flat Earth Theory erroneously believe that our planet -- which they are convinced is an imaginary, half-hemisphere Flat Earth -- is covered by a thick, hard, crystalline dome. This dome supposedly consists of frozen oxygen or perhaps some other substance. There really seems to be no general consensus amongst the adherents of the theory, and it can sometimes be difficult to know exactly what they actually believe.

Directly related to this belief is the long-held claim made by Moon landing debunkers -- including the Flat Earth Theory adherents themselves -- that one of the primary reasons why humanity -- namely America's space agency NASA (or National Aeronautics and Space Administration) -- has never been able to send human astronauts to the Moon, is because the various layers and regions of the Van Allen radiation belts act as an impenetrable, lethal barrier which prevents humanity from ever reaching such a lofty objective. Personally, I myself first heard about this belief about three decades ago, and I

have sometimes wondered about it since that time. However, I never took any time to investigate the claim further until today.

So exactly what is the truth regarding these matters? If you have read any of my other Bill's Bible Basics articles, then you will already know that I personally fully reject the Flat Earth Theory in its entirety, just as I likewise reject its sister theory, the Hollow Earth Theory. I don't believe that either theory has any merit, and I view them both as nonsense dreamed up by some misguided Christians and New Age advocates. Rather than taking the time in this current article to rehash my various reasons for rejecting these two theories -- yes, they are theories at best -- please refer to some of my other articles which are listed at the end of this same article. Simply click or tap on the links to be taken to them.

But in my opinion, in contrast, the Van Allen radiation belts claim is something altogether different, and it is an issue which needs to be addressed seriously. This I will now do in this current article. Perhaps I should begin by explaining to my readers exactly what the Van Allen radiation belts are in the simplest of terms possible, based on easily available online information. I'll keep my explanation basic, not only because I personally do not possess a strong background in the sciences, but also because I suspect that a lot of my readers may not either.

The Van Allen radiation belts received their name from James Van Allen, who was a 20th century American space physicist. Van Allen was very instrumental in establishing the field of magnetospheric research in space, particularly in the Earth's own atmosphere. The magnetosphere is defined as that region surrounding the Earth in which its magnetic field is the most predominant effective magnetic field. This field consists of charged particles and is created by the Earth's own active interior dynamo. That is to say, the Earth's own core. It is in fact the magnetosphere which helps to mitigate and block solar radiation and cosmic radiation as well. Otherwise, we would all be fried, and the Earth would probably be a dead planet, perhaps similar to Mars.

In short, we can describe the Earth as basically being like a dipole -- two-pole -- magnet, having a north magnetic pole, as well as a south magnetic pole. Please note that these are NOT the same as the physical poles which are geographically shown on maps of the planet. The magnetic poles can and in fact do

fluctuate in their precise locations.

It was during the Explorer 1, Explorer 3 and Pioneer 3 space missions in 1958 that Van Allen made his discoveries using Geiger–Müller tube instruments -- or Geiger counters -- which were attached to the first satellites. The purpose of these early missions was to actually study the intensity of cosmic rays above the Earth's atmosphere, and to likewise measure fluctuations in their activity. However, a byproduct of the missions was the discovery of the Van Allen radiation belts in the inner region of the Earth's magnetosphere.

There are actually two main belts which consist of energetic charged particles -- most of which originate from the solar wind, and some from cosmic rays -- which are captured by and held by the Earth's magnetosphere. These particles are for the most part energetic electrons and protons, but there are also less prevalent nuclei such as alpha particles.

The Van Allen radiation belts extend from approximately 400 to 36,040 miles above the surface of the Earth. However, the radiation levels in this vast region do vary, which in fact was very instrumental in making space flight possible. The inner Van Allen radiation belt extends from an altitude of about 620 miles to 7,500 miles above the Earth. However, at times when solar activity is stronger, or in geographical areas such as the South Atlantic Anomaly, the inner boundary may decline to only about 124 miles. The inner belt consists of both electrons and protons.

In contrast to the inner belt, the outer Van Allen radiation belt consists primarily of high-energy electrons which are captured and held by the magnetosphere, as I explained to you earlier. It extends from an altitude of approximately 8,100 miles above the Earth, to some 37,300 miles above the Earth's surface, making it considerably larger than the inner belt. The nature, construction and behavior of the outer belt is likewise more variable than the inner belt, being as it is more easily influenced by solar activity. For example, its population of particles varies constantly.

There is something very interesting about these two belts. In 2014, it was discovered that the inner edge of the outer belt is characterized by a very sharp transition or gap, and that highly relativistic electrons -- that is to say, electrons which move at speeds which are extremely close to the speed of light -- cannot penetrate below it. The reason for this

shield-like behavior is not currently well understood. This gap that is located between the inner and outer Van Allen radiation belts is sometimes referred to as the "safe zone" or the "safe slot". This is in fact the location of medium Earth orbits. Certain planetary scientists believe that this gap may be caused by VLF -- or Very Low Frequency -- radio waves. As to the source of the radio waves, while it is still a source of debate, some scientists believe that they may the byproduct of lightning in the Earth's atmosphere.

Now that we've covered a basic description of the Van Allen radiation belts without delving too much into the heavier science behind it all, it's time for us to address our main question: If the various Apollo missions did in fact land on the Moon multiple times, exactly how did they accomplish it? Please note that what Flat Earth Theory adherents and other Moon landing debunkers say is partially true. The belts do pose a danger to both astronauts and electronic equipment. However, it is their own fears and lack of understanding -- and probably their desire to try to validate their wayward, ridiculous theories -- that have resulted in the long-held myths which claim that it is totally impossible for humans to travel beyond the Earth.

To be clear, spacecraft traveling beyond low Earth orbit are in fact forced to pass through the Van Allen radiation belts. Furthermore, beyond the two belts and the magnetosphere, they face additional serious hazards as well from cosmic rays and solar events. Likewise, it is already a well-established fact that sensitive equipment -- including solar cells, integrated circuits, sensors, etc. -- can be damaged by radiation within the belts, and by geomagnetic storms which occasionally damage electronic components aboard spacecraft.

To make matters worse, in this modern age of the exploration of Outer Space, both the miniaturization and the digitization of electronics and logic circuits have made satellites more vulnerable to radiation, being as the total electric charge in these circuits is now small enough so as to be comparable with the charge of incoming ions. As a result, electronics on the satellites must be hardened against radiation to operate reliably. The Chandra Space Telescope has its sensors turned off when passing through the Van Allen belts. The INTEGRAL space telescope was placed in an orbit designed to avoid time within the Van Allen radiation belts altogether.

Earlier, I mentioned that Van Allen made his discoveries using

Geiger–Müller tube instruments, or Geiger counters. What I did not mention is the fact that the instruments were only capable of counting the number of particles. They were not very good when it came to determining the strength -- or energy level -- of the radiation, and the type of precise particles of which the radiation consisted. As a result, the early measurements -- upon which the Flat Earth Theory supporters and other Moon landing debunkers seem to base their erroneous claims -- only determined that there was a lot of radiation in the Van Allen radiation belts. However, those early measurements were NOT capable of determining exactly how strong of an effect the radiation would have on any human astronauts.

Well, it may interest some of you to know that following his discovery of the radiation belts, Van Allen himself arrived at the conclusion that a sufficiently shielded spacecraft on the right trajectory, could safely pass through the various layers of the Van Allen radiation belts with minimal exposure to the spacecraft's occupants. The trick was to fly through the weaker and thinner regions of the outer radiation belt at just the right angle, and as quickly as possible, and to also bypass the inner belt completely -- except for Apollo 14 -- to minimize the astronauts' exposure to radiation.

Thus, in the years leading up to the famous Apollo missions, Van Allen provided data he had acquired from the instruments which were aboard Explorer 1 and the subsequent missions, to NASA, so that they could plan the Apollo missions in such a fashion that each spacecrafts' trajectory would quickly and safely pass through the least intense regions of the two Van Allen radiation belts, particularly over the night side of the Earth. In fact, according to what I have read, all of the Apollo spacecrafts traveled at such a high rate of speed that exposure time to radiation was about an hour or less each way of the missions. As a result, the Apollo astronauts received radiation doses well below the lethal threshold, and even below annual occupational limits for nuclear workers during that time period.

Of course, in addition to the speed and carefully-planned-out trajectory of each Apollo mission, the astronauts' exposure to harmful radiation was further limited by the construction of the spacecrafts themselves. While due to their large size, alpha particles can easily be shielded against -- even being stopped by a single sheet of paper -- to address the protons, electrons and other particles, the hull of the Apollo command module consisted of multiple layers of a bonded honeycomb

steel outer shell, and likewise a honeycomb aluminum inner pressure container, and last of all, plastic.

According to the online research I conducted, the first human space mission to penetrate significantly into the Van Allen radiation belts was the Gemini 10 mission, which occurred in July of 1966. During this particular mission, the astronauts raised their orbit to an altitude of over four hundred miles above the Earth, and they remained within the lower regions of the Van Allen radiation belts for about the same period of time as the Apollo missions to the Moon would require later to traverse the belts in the coming years. Of course, as many of my older readers will already know, the well-known Apollo 11 mission to the Moon occurred in July of 1969. I can still recall watching the 1969 Moon landing on our black and white television set as a 15-year-old boy. By that time, I had already been captivated by the sciences, particularly by natural science such as biology, and astronomy as well.

Collectively-speaking, the historical record indicates that NASA's astronauts have already safely passed through the Van Allen radiation belts during a total of nine different space missions. That is to say Apollo 8, 10, 11, 12, 13, 14, 15, 16 and 17, which concluded in 1972. While human space flight that goes beyond the Earth's own atmosphere has ceased since that year, spacecraft with very sensitive electronics aboard continue to traverse the Van Allen radiation belts without suffering any significant damage. Furthermore, after more than five decades of unexplainable delays, NASA has again set its sights on the stars. Thus, the Artemis Program is intended to reestablish a human presence on the Moon, with a stated long-term goal to establish a permanent base on the Moon, which will likewise facilitate eventual human missions to Mars as well.

As I write this in November of 2025, the crewed Artemis II launch is scheduled for April 2026. This will be followed by the Artemis III crewed lunar landing no earlier than midway in 2027. After that will come the Artemis IV docking with the Lunar Gateway in late 2028. As a matter of explanation, according to the Wikipedia website, the Lunar Gateway -- or simply Gateway -- is a planned space station which is to be assembled in orbit around the Moon. The Gateway is intended to serve as a communication hub, science laboratory, and as a habitation module for astronauts as a part of the Artemis Program. The Lunar Gateway is a multinational collaborative project which involves NASA, ESA -- European Space Agency --

JAXA -- Japan Aerospace Exploration Agency -- CSA --Canadian Space Agency -- and finally, MBRSC -- Mohammed Bin Rashid Space Centre. Unlike the ISS -- International Space Station -- the Gateway is planned to be the first space station to be constructed beyond low Earth orbit.

Furthermore, the Artemis V docking with the European Space Agency's ESPRIT -- a refueling and communications module of the aforementioned Lunar Gateway -- Canada's Canadarm3 -- a pair of robotic remote manipulator arms -- and NASA's Lunar Terrain Vehicle are all planned for early 2030. Lastly, the Artemis VI docking which is expected to integrate the Crew and Science Airlock with the Lunar Gateway station is also planned for early 2031. After Artemis VI, NASA plans yearly landings on the Moon from then on.

As some of my readers will know, Elon Musk and SpaceX have been quite focused on helping NASA to accomplish its goals. Thus, it comes as little surprise that SpaceX was awarded a contract in 2021 to provide the HLS -- Human Landing System -- for Artemis III, which will be used to transport NASA's astronauts from lunar orbit to the lunar surface and back. This will in fact be a Starship rocket. However, in recent years, SpaceX has experienced several launch failures with its Starship vehicle and has fallen behind in its timeline.

Add to this the fact that there is now bad blood between President Trump and Elon Musk -- you can google it -- and it explains why Sean Duffy -- NASA's current interim chief -- has opened new contracts for the Artemis Program. This means that other space companies -- such as Blue Origin -- can now compete against SpaceX. According to Mr. Duffy, the main US concern is that China may beat the USA back to the Moon. The president and Mr. Duffy are obviously not prepared to allow the failures of one company -- SpaceX -- to cause them to lose the Moon landing race against China. It is a matter of national pride. If you would like to read a more in-depth commentary regarding the problems which have plagued SpaceX, check out the link below. I cannot guarantee that it will still be accessible at the time that you read this article:

https://theconversation.com/whats-gone-wrong-between-nasa-and-elon-musks-spacex-268577

In conclusion, the bogus assertions which have been made by the Flat Earth Theory crowd and other Moon landing debunkers, which claim that the Van Allen radiation belts are some kind

of impenetrable "force field of death", is a myth which has not only been debunked by James Van Allen's own findings, but also by the success of the very Apollo missions themselves. So, you the reader have a choice to make. You can choose to continue to believe that human astronauts would fry like an egg, or explode like a rabbit in a microwave, if they dare to try to travel through the Van Allen radiation belts. You can also choose to believe that there is an imaginary dome which covers a Flat Earth. Or, if you are smart, you can accept the basic scientific information and evidence I have shared with you in this article. The choice is yours to make.

With these thoughts, I will bring this article to a close. It is my hope that you've found it informative and enlightening, and I pray that it has been a blessing in your life as well. If you have an account with Facebook, Twitter, Tumblr or with any other social network, I would really appreciate if you'd take the time to click or tap on the corresponding link that is found on this page. Thanks so much, and may God bless you abundantly!

For additional information and further study, you may want to refer to the list of reading resources below which were either mentioned in this article, or which contain topics which are related to this article. All of these articles are likewise located on the Bill's Bible Basics web server. To read these articles, simply click or tap on any link you see below.

Admiral Richard E. Byrd and the Hollow Earth Theory
An Imaginary Ice Wall, or Rock, Sand and Gravity?
Flat Earth Theory: Another Refutation
Greeks, Planets and Wandering Stars
Other Planets and the Flat Earth Theory
The Case for or Against Flat Earth Adherents

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