

## **The miracle of lightning passage: from the perspective of science and Prophetic Hadith**

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### **Abstract**

It is worth noting that lightning, is one of the oldest observed natural phenomena on earth. It is the occurrence of a natural electrical discharge of very short duration and high voltage between a cloud and the ground or within a cloud, accompanied by a bright flash and typically also thunder. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges builds up enough, this insulating capacity of the air breaks down and there is a rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again.

Novel experiments have shown that any flash of lightning is not continuous as we see it; it is composed from different phases. The most important phases are: the downward phase, in which the beam passes through the clouds towards the earth, and the upward phase, in which the spark returns towards the cloud. This means, the lightning beam passes and returns during a time that cannot be detected by the naked eye. This time is typically estimated in a range of a millisecond. The identical description about this phenomenon is stated by the Holy Prophet (P.U.H) more than 1400 years ago. The Prophetic Hadith about the straightway (Sirrat) in Day of Resurrection is considered to be one of the scientific miracles in the Prophetic Sunnah. In this Hadith the Holy Prophet says: "don't you see that the lightning comes and go back in an eye blink" (Sahih Muslim Vol. 1, Book 1, Hadith 380).

Thus, to our best knowledge, this Hadith involves a scientific miracle where the full correspondence between the Prophet's speech and the recent revelations of complicated and accurate processes occur in the lightning flash. Therefore, in this study we will see that the Great Prophet (P.U.H) mentioned the phases of lightning with astonishing accuracy. The scientific miracle about this Holy Hadith is very clear, especially if we know that scientists use the same word that has been used, very carefully, by the Holy Prophet (P.U.H), by expressing the downward and upward phases, and these two phases take a period of time which is equal to the necessary time of an eye blink.

The time needed for each lightning phase is estimated to be in milliseconds, and of course the eye cannot analyze the information coming to it during such a time, and this proves that the Holy Prophet (P.U.H) tells us about things we could only see with sophisticated cameras that capture more than thousand images in every second. These descriptions, of course, prove the sincerity of the message of our Prophet (P.U.H) and he is a messenger of Allah (S.W.T), and he came with theses precise information that required the discovery of scientists for a long time

## موعجزه‌ی تپه‌ربوونی هه‌وره بروسکه له‌روانگه‌ی زانستی و فه‌رمووده‌یه‌ی پیغه‌مبه‌ر (دروودی خوی له‌سه‌ر بێت) پوخته

جیگای ئاماژه‌ پێ کردنه، هه‌وره بروسکه، یه‌کیکه له‌دیارده هه‌ره‌کۆنه‌کانی سروشت که له‌سه‌ر زه‌ویه‌وه تپینی ده‌کریت و بریتییه له‌کرداری خالیبوونه‌وه‌ی بارگه‌ی کارهبایی له‌کاتیکی که‌م و فۆلتیپه‌ی به‌رزدا رووده‌دات له‌نیوان هه‌ورو زه‌وی یان هه‌ور و هه‌وردا. له‌ئه‌نجامدا رووناکی یه‌کی زۆر به‌هیز و ده‌نگیکی زۆر به‌رزای لێ په‌یدا نه‌بێت. له‌سه‌ره‌تادا هه‌وای نیوان زه‌وی و هه‌وره‌که ده‌وری نه‌گه‌یه‌نهر ده‌بینیت له‌نیوان بارگه‌ی کارهبایی موجه‌ب و سالب واته له‌نیوان زه‌وی و هه‌وردا، ئه‌گه‌ر هه‌یزي دووبارگه جیاوازه‌که گه‌یشه‌ ئاستی پتووست ئه‌وا فراوانی نه‌گه‌یاندن که‌م ده‌بێت و هه‌وره بروسکه په‌یداده‌بێت. له‌ئه‌نجام دا خالی بوونه‌وه رووده‌دات تا ئه‌و کاته‌ی دووباره بارگه پێچه‌وانه‌کان دروست ده‌بنه‌وه.

تاقیکردنه‌وه‌کان ئه‌وه‌یان سه‌لماندوه هه‌وره بروسکه یه‌ک پارچه‌ نیه وه‌ک ئیمه ده‌بینین به‌لکو له‌چه‌ند ره‌وگه‌یه‌ک پێک ده‌یت. له‌هه‌موو ره‌وگه‌یه‌ک گرنگتر ره‌وگه‌ی به‌ره‌و خوار و ره‌وگه‌ی به‌ره‌و سهرن واته لێدانی بروسکه له‌زه‌وی و گه‌رانه‌وه‌ی بروسکه‌که‌یه بو سه‌ره‌وه. واته کاتی بروسکه لێدان و گه‌رانه‌وه به‌ئهن‌دازه‌یه‌ک کورته‌که‌چاوی مروف هه‌ستی پێناکات. ئه‌م کاته‌ش خه‌ملێناوه له‌سنووری چه‌ند به‌شێک له‌هه‌زار به‌شی چرکه‌یه‌که. وه‌سفێکی هاوشیوه‌ی ئه‌م دیاردیه له‌لایه‌ن پیغه‌مبه‌ری خودا موحه‌ممهد (دروودی خوی له‌سه‌ر بێت) به‌ر له‌زیاتر له‌ ۱۴۰۰ سال باسی لیکراوه. له‌فه‌رمووده‌یه‌ک دا که‌باسی پردی سیرات(صراط) ده‌کات ده‌فه‌رمووی «الم تروا الی البرق کیف یمرو یرجع فی طرفه‌ عین؟» واته نابین کاتیکی بروسکه دیت و ده‌گه‌ریته‌وه له‌چاوتروکانیکدا؟ له‌ئه‌مه‌شدا راستییه‌کی زۆر روون و ئاشکرای زانستی حاشا هه‌لنه‌گر به‌دی ئه‌کریت.

بۆیه، به‌تێرمانیکی وورد له‌فه‌رمووده‌که‌ی پیغه‌مبه‌ری خودا (دروودی خوی لێ بێت) وه‌ به‌راوردکردنی له‌گه‌ل ئه‌و راستییه‌ی که‌ئێستا زاناکان پێی گه‌یشه‌توون، بۆمان ده‌رده‌که‌وێ که‌ فه‌رمووده‌که‌ موعجزه‌یه‌کی ئاشکرایه و به‌ته‌واوی یه‌کده‌گریته‌وه له‌گه‌ل خیرایی و رویشتن و گه‌رانه‌وه‌ی هه‌وره بروسکه به‌به‌راورد له‌گه‌ل تپه‌ربوونی هه‌ندیک له‌مروغه‌کان له‌پوژی دواي له‌سه‌ر پردی سیراتدا، که‌ئه‌مه‌ش هه‌مان ئه‌و وه‌سفه زانستییه‌که زاناکانی ئه‌م سه‌رده‌مه باسی لێوه ده‌که‌ن.

هه‌رچه‌نده پیغه‌مبه‌ری خودا (دروودی خوی له‌سه‌ر بێت) به‌دۆنیاییه‌وه ئه‌فه‌رمووی ئایا نابین که‌چۆن هه‌وره بروسکه تپه‌په‌ریت و ده‌گه‌ریته‌وه له‌چاوتروکانیک دا، که‌ئه‌مه‌ش بۆخۆی وه‌ک ئاماژه‌یه‌ک وایه که‌ پیغه‌مبه‌ری خودا (دروودی خوی له‌سه‌ر بێت) له‌شتانیک ئاگادارمان ده‌کاته‌وه که‌ به‌چاوی سه‌ر نابینریت، چونکه‌ کاته‌که‌ی زۆر کورته و له‌مه‌ودای یه‌ک له‌سه‌ره‌زاری چرکه‌یه، ته‌نها به‌ کامیرای زۆر پێش که‌وتوو ده‌توانریت وینه‌ی بگیریت که‌ده‌توانیت هه‌زار وینه‌ی بگریت له‌چرکه‌یه‌کدا. له‌راستیدا، ئه‌و وه‌سفه روون و ئاشکرایه‌ی پیغه‌مبه‌ری خودا (دروودی خوی له‌سه‌ر بێت) ته‌نها به‌لگه‌یه‌ بۆ راست و درووستی په‌یامی ئه‌و چونکه‌ زانست کاتیکی زۆری پتووست بوو تا کو ئه‌و دیارده به‌روونی ببینیت.

## 1. Introduction

### 1.1 Historical background of Lightning

The phenomenon of lightning has been associated with myths and legends for thousands of years. In which during the time that our Prophet (PUH) lived, i.e., in the seventh century AD, there was no one at that time having knowledge about the processes that occur during lightning. Experiments have shown that there are precise physical and chemical processes occurring in the lightning beam, which today is the subject of agreement by all scholars. Although, these processes can be seen today, by means of advanced digital cameras, but, the very fine stages of lightning remain a puzzle for scientists.

When the modern era came, since the middle of the seventeenth century to the present day, scientists have done thousands of scientific experiments, in order to understand this phenomenon. In 1746, Benjamin Franklin began his experiments on electricity. He then proposed the first organized scientific experiment that proved the electrical nature of lightning, and that lightning is an electrical spark caused by the convergence of two electrical charges.[1]

In 1766, a lightning protective system, invented in 1752 by Benjamin Franklin and often referred to as a Franklin rod system, was installed and no further lightning damage has occurred since. In Franklin rod system the metallic rod or the conducting string was polarized by the electric field of the cloud, so that charges of opposite polarities accumulated at the opposite ends of the conductor.[2] There are, however, many historic buildings which have never been seriously damaged by lightning, apparently because they had, in effect, a lightning protective system equivalent to that proposed later by Franklin.[3]

In 1752 Benjamin Franklin sketched sparks from the probably moist hemp string of a kite (Fig. 1). This can be account as a first direct proof that thunderclouds contain electricity, although several scientists had previously noted the similarity between laboratory sparks and lightning.[4] Not only kites but also balloons, mortars, and rockets were used to extend conducting strings into the electric field of the cloud.[5] Franklin also showed that lightning flashes originate in clouds that are most commonly in a negative state of electricity, but sometimes in a positive state. [6]



Fig. 1: Benjamin Franklin flies a kite a key is attached.

In 1876, James Clerk Maxwell suggested that Franklin rod systems attracted more lightning strikes than the surrounding area. He proposed that a gunpowder building be completely enclosed with metal of sufficient thickness, forming what is now referred to as a Faraday cage ( Fig. 2).[7] In practice, a combination of the Franklin rod system concept and the Faraday cage concept is often used. The modern era of electric and magnetic field measurements relating to lightning can be traced to the 1970s, when the first field records on microsecond and sub microsecond time scales were reported.



Fig. 2: Faraday's cage

Experiments continued, but knowledge of lightning remained modest until the end of the 19th century and the beginning of the twentieth century, when photography became possible. Scientists then could take

pictures of lightning flashes, analyze them, and learn some details that the human eye does not recognize [8].

### 1.2. Lightning circumstances

Under the circumstances that are occurring inside the lightning beam, none of the available device can tolerate the massive heat and very high electric potential. The temperature inside lightning flash can reach  $30,000^{\circ}\text{C}$ , i.e., five times greater than the temperature of the sun's surface (Fig. 3). At this temperature, air expands explosively and then contracts sudden expansion and contraction of air makes thunder. The electrical potential generated by the single lightning flash reaches millions of volts. Therefore, the lightning investigation is one of the most difficult and most complex types of investigation. Moreover, the period time for the lightning flash is in order of microseconds, i.e., the order of the part of a million second, this time is extremely small and difficult to detect.



Fig. 3: Lightning generates temperatures hotter than the surface of the sun

Lightning photography began in 1935 in the United States of America, but photographic equipment was slow, and the precise processes accompanying the lightning phenomenon remained unknown until the 1960s, where experiments developed and increased attention to avoid lightning shocks to boats Space, aircraft and industrial facilities [9]. Rapid imaging, spacecraft, radars, and computer were used to process and study data provided by lightning control laboratories. Thus, through the high-speed imaging and digital-data processing, scientists have finally succeeded to prove that the flash of one lightning is not continuous as we see it, but consists of several phases; the most important phase is the downward phase, in which the lightning passes through the clouds towards the earth, and the upward phase, in which the lightning beam returns from the earth to the clouds. The estimated time for downward and upward lightning cannot be detected by the naked eye, since this time is estimated at the average tens of parts of a thousandth of a second. Time has been measured for each stage with great accuracy and vision of these stages, and this was achieved only at the end of the twentieth century, and the beginning of the twenty-first century.

### 1.3. Types of lightning

From the observed polarity of the charge effectively lowered to ground and the direction of propagation of the initial leader, four different types of lightning discharges between cloud and Earth have been identified. [10] The four types of lightning, illustrated in Fig. 4, are (a) downward negative lightning, (b) upward negative lightning, (c) downward positive lightning, and (d) upward positive lightning. Discharges of all four types can be viewed as effectively transporting cloud charge to the ground and therefore are usually termed cloud-to-ground discharges (sometimes referred to as CGs).



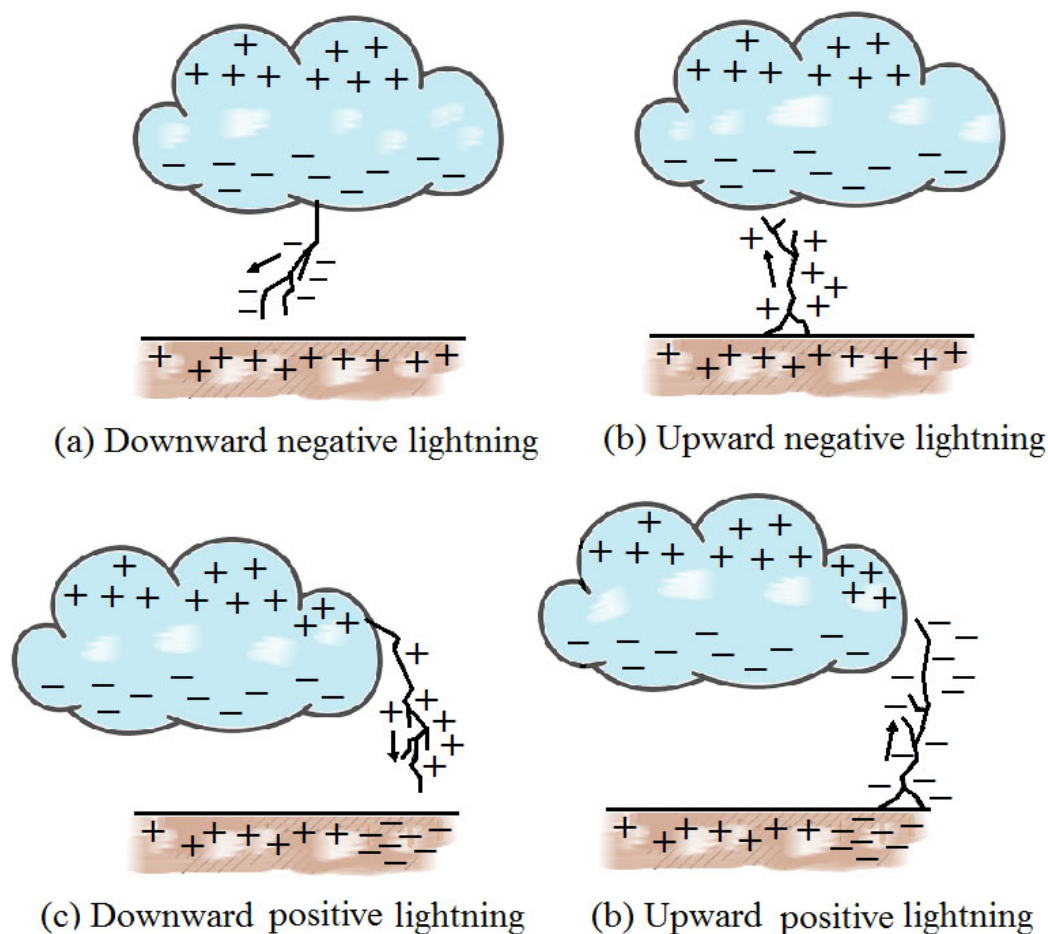


Fig. 4: Four types of lightning effectively lowering cloud charge to ground. Only the initial leader is shown for each type. In each lightning-type name given below the sketch, the direction of propagation of the initial leader and the polarity of the cloud charge effectively lowered to ground are indicated.

Discharges of all four types can be viewed as effectively transporting cloud charge to the ground and therefore are usually termed cloud-to-ground discharges. It is believed that downward negative lightning flashes, type (a), account for about 90 percent or more of global cloud-to-ground lightning, and that 10 percent or less of cloud-to-ground discharges are downward positive lightning flashes (type (c)). Upward lightning discharges, types (b) and (d), are thought to occur only from tall objects (higher than 100 m or so) or from objects of moderate height located on mountain tops.[11]

It is usually assumed that the atmosphere above a height of 60 km or so, under quasi-static conditions, becomes conductive enough to consider it an equipotential region. The electrical conductivity increases abruptly above about 60 km because of the presence of free electrons. This region of atmosphere just above 60 km or so where free electrons are the major contributors to the conductivity is sometimes referred to as the electro sphere[12]. All types of lightning occur as a result of convergence of opposite charges. In the coming paragraphs, we will see that the engineering mechanism for the occurrence of all types of lightning is similar in all its forms.

There is also lightning happening in the summer time and in winter time, and there is lightning in the form of a ball, lightning and many more. Scientists have also spotted lightning on some planets such as the Jupiter 100 times stronger than those strikes our Earth.

#### 1.4. Clouds thunder

Today, scientists have been studying and monitoring lightning from space for many years. They have come up with many facts about this phenomenon, so it can be said that the details about the lightning mechanism in this study is a discussion of the facts of determinism. Because it is not acceptable for us to construct a scientific interpretation of a dignified verse or a prophetic Hadith only if we possess certain facts.

The lightning does not happen in any clouds, but there are specific clouds, in which scientists called them thunder clouds, the suitable environment for the occurrence of lightning. There may be one cloud or several clouds, which is the actual case. These clouds are normally filled with electric fields because of the wind that drives the molecules of water vapor, pushing it up, causing these particles to interact with each other, these in turn generating electric fields. At the same time, negative and positive charges accumulate in the cloud, but positive charges often rise, and the negative remains at the bottom of the cloud near the Earth. Studies have also shown that there is a difference in electrical voltage between the Earth's surface and the ionosphere by about 500 000 volts, and this difference is produced because of the global distribution of thunderstorms, which are necessary to maintain this difference [13]. Thus, lightning requires dense, heavy clouds weighing millions of tons. That is exactly explain, what Allah (S.W.T) said in Surah Ra'd 12 "It is He who shows you lightening, [causing] fear and aspiration, and generates the heavy clouds"[14].

#### 1.5. The origin of the charges

The speech about the clouds means talking about the water that these clouds carry. It is obvious that each molecule of water is composed of an atom of oxygen and two atoms of hydrogen. Since, negative charges are spread over the oxygen atom, while positive charges spread to the hydrogen atoms due to the so-called hydrogen bonds in the water molecules; this bond is an important source of positive and negative charges, which spread in the parts of the cloud and air. To take a broader idea regarding the lightning, one can anticipates some recent statistics on lightning flashes on the surface of the globe. It can be noted that every single second there are hundreds of lightning flash in the world, meaning, during every single day there are 8.6 million lightning flash (Fig. 6) [15].

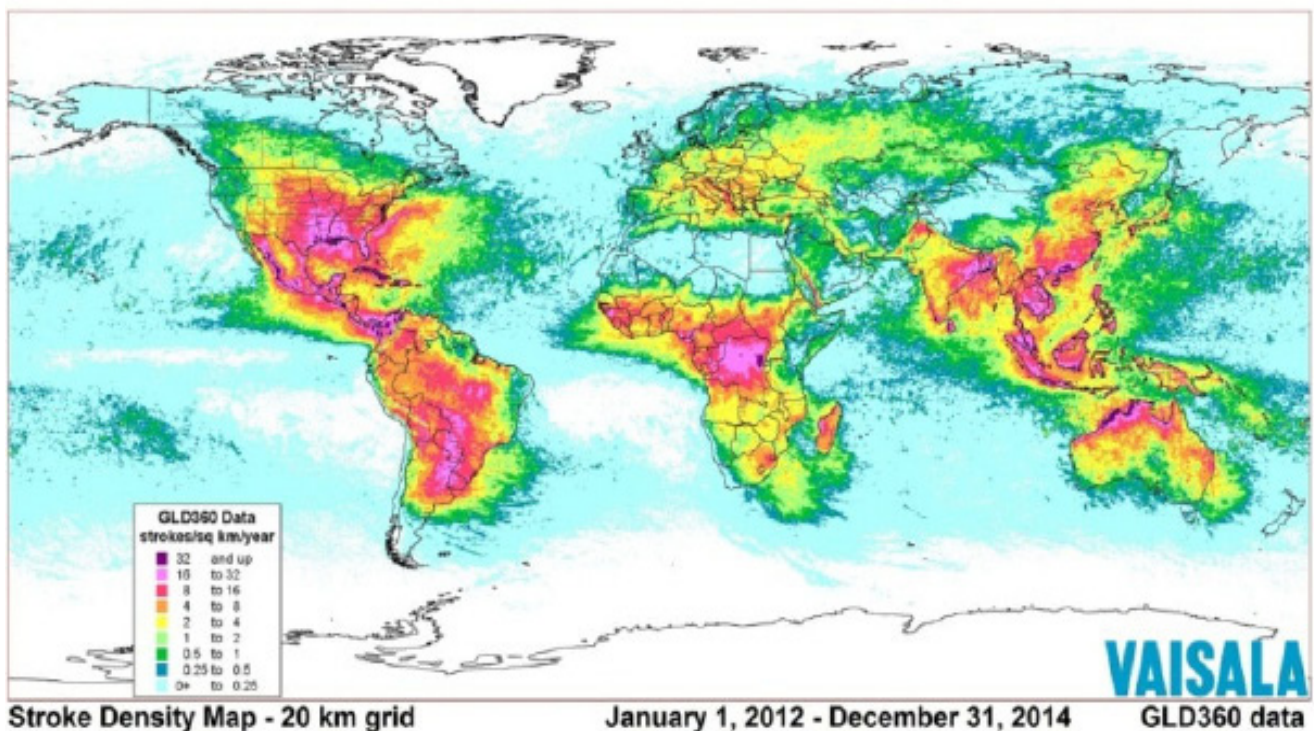


Fig. 5: Lightning strikes from around the world from 2012 to 2014. Graphic by Vaisala

In one year more than 20 million lightning flashes occur only in the United States. Each lightning flash generates electrical potential ranging from 100 million to 1000 million volts. Each lightning flash produces an electric current from 10000 to 200000 amperes. If one look at the Earth at any moment, he sees 2000 thunderstorms occurring at the same moment (Fig. 6). Lightning is not limited to thunderstorms, but some



lightning is seen in large hurricanes, in volcanoes, and in massive snowstorms. The spark of lightning can extend to more than ten kilometers horizontally. Precise statistics tell us that lightning killed 3696 people in the United States, during 45 years, between 1959 and 2003 [16]. While, from 2006 through 2016, 352 people were struck and killed by lightning in the United States [17]. Here we remember what Allah (S.W.T) said in Surah Ra'd 13 "And the thunder exalts with praise of Him [Allah] - and the angels [as well] from fear of Him - and He sends thunderbolts and strikes there with whom He wills while they dispute about Allah ; and He is severe in assault"[14].



Fig. 6: Earth's Lightning Seen from Space

### 1.6. Previous attempts

It is worth mentioning that this scientific attempt is a modest attempt and a complementary attempt to what people did before us. In fact, the authors appreciate the previous attempts; spatially the engineer Abdaldaim Al-Kaheel and he preceded us in this regard. We believe, this attempt gives a special scientific character with the use of many scientific evidences and sources. As far as possible, we tried to stay away from the complex aspects of this topic because the majority of our readers were people who were not specialized in physics in general and lightning science in particular. We could not get the exact details about our predecessors because some of them are scattered here and there in untrusted websites and they are not following the scientific researches. In general, we hope that our attempt can add even a little knowledge to the respected readers. Fundamentally, our first and last goal is to use the available capability to service our religion. We declare to all that our religion is the religion of science and addresses all people in every place and every time. We hope Allah (S.W.T) guides us and show us the right path.

2. How lightning happens

We know from the laws of electricity that when the opposite charges come together, they produce a flash or electric sparkle, and that is what happens in lightning. Clouds are formed by the combination of high vapor molecules from the Earth. These particles are charged with positive and negative electrical charges; as a result of their interaction, friction and collision, as we have every so often stated, negative charges are at the bottom of the cloud from the near-Earth side. This is caused by gravity, which in turn distributes the charge, and the positive charge is at the top of the cloud. This happens in the so-called thunder clouds that always cause lightning [18].

The electric charge, or static electricity, is exactly what we feel when we touch the grip of the door after the friction of our feet with the carpet, or when we touch the computer screen sometimes. We feel a light electric bulb, and it is only a mini electric spark. Also, when we connect two wires, one positive, the other negative connected to the poles of a small battery, we see a spark generated between them. When there is an increase in the number of electrons at the bottom of the cloud, a negative electric field is generated. This increase in the upper cloud is offset by a lack of electrons, so the positive electric field is generated. When suitable amounts of electrons gather at the bottom of the cloud, the negative charges are transported by the wet air between the cloud and the surface of the positively charged earth. A very fine channel is formed at the base of the cloud. And then precede through this channel what scientists call the beam leader from the cloud towards the earth, and this beam that passes and steps in successive steps is the first stage of lightning. When this leader reaches the earth, through the negative field nearby it, the positive charges are attracted to the surface of the earth. These positive charges move towards the leading beam and collide with it tens of meters above the earth's surface. Then the air is broken down and becomes a transmission of electricity, and a strong current is generated that lights up in the shape of a flash upward, called the return stroke, and this reaction is what we actually see because most of the light is generated by it. The speed of the lightning beam at this stroke is 160000 km/s, remaining only 40 microseconds and producing a returning current of about 10000 to 20000 amperes. Followed by, a period of 3 to 100 milliseconds the process is restart again by using the same channel that was established before and so several strokes will happen [19].

## 2.1. Lightning step by step

In order to make it easier to see exactly what happens in lightning, we use illustrations in Fig. 7 which represents the lightning process in five different steps [20]. These drawings are a close approximation of what is happening, and indeed the enormity of the processes, and their incredible speed in sparkling lightning, can never be understood.

A total of 47 lightning strikes were recorded in one flash. It is worth noting that the longest flash recorded is not exceeding 1.5 seconds. Scientists would not have known these scientific facts had they not been able to invent rapid imaging devices, as well as the invention of precision measuring devices, i.e. the invention of the computer by which the data coming from the measuring devices are analyzed in digital form [21].



**Step 1** Lightning begins with the first step of the leader. This beam does not fall away at once, but it passes through steps. This beam charge is often negative.

It takes the stepped leader about 50 milliseconds to reach its full length, though this number varies depending on the length of its path. Studies of individual strikes have shown that a single leader can be comprised of more than 10,000 steps.

**Step 2** As the stepped leader approaches the ground, its strong, negative charge repels all negative charge within the immediate strike zone of the earth's surface, while attracting vast amounts of positive charge.

When one of these positively charged streamers connects with a negatively charged stepped leader (30 to 100 meters) above the surface of the earth, the following steps occur in less than 100 microseconds.

**Step 3** The electric potential of the stepped leader is connected to the ground and the negative charge starts flowing down the established channel.

**Step 4** An electric current wave, called a "return stroke", then shoots up the channel producing a brilliant pulse. It only takes the current about 1 microsecond to reach its peak value, which averages around 30,000 amperes.

This "return stroke" is more than 99% of a lightning bolt's luminosity and is what we see as lightning. The stroke actually travels from the ground into the cloud, but because the strike takes place so quickly, to the unaided eye it appears the opposite is true.

**Step 5** Finally, the lightning strike ends with the rise of the beam back to the cloud, and there is a pause in the tens of parts of the millisecond, and then the strike is repeated again according to the same steps, so the lightning strike can be repeated a number of times to give one flash. It takes the current about 1 microsecond to reach its peak value, which averages around 30,000 amperes.

Fig 7: The lightning process in steps[22]



## 2.2. Lightning strikes diagram

Scientists have drawn up many schemes on lightning and its phases, and represented processes that take place on a variety of drawings in order to facilitate understanding of this complex phenomenon. We can therefore consider the following scheme, in which we observe the phases of lightning, the time of each phase. This study was carried out for a typical cloud rising from the Earth's surface 3 km and up to 10 km (Fig. 8) [23].

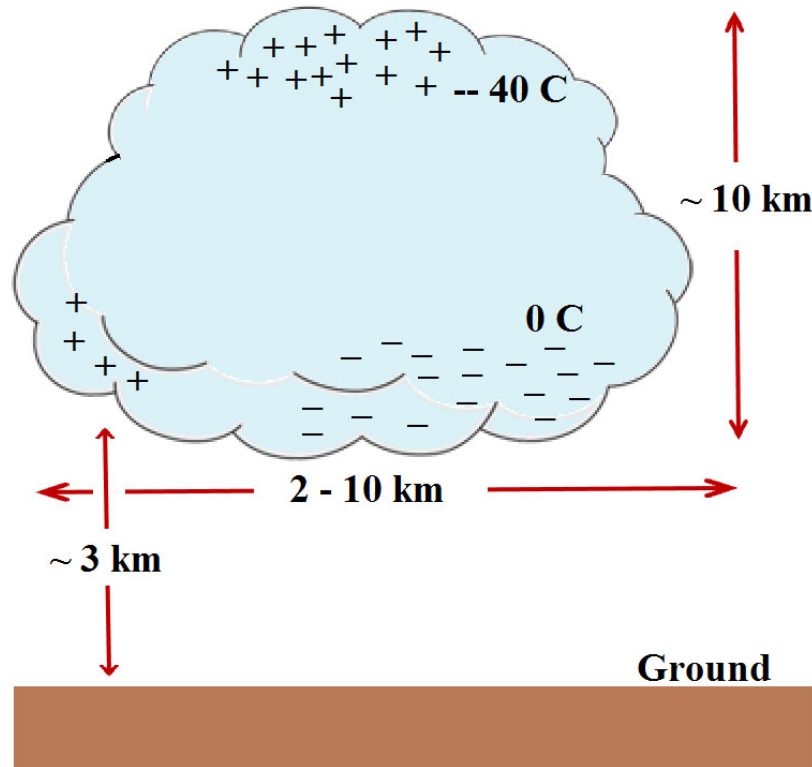


Fig. 8: A typical cloud 3 km above the surface of the earth, 2 to 10 km long and 10 km high. Negative charges at the bottom of the cloud and positive charges are placed at the top of the cloud. The temperature in the heart of the cloud falls below 40 ° C below zero.

## 3. The Prophetic Hadith

After we saw the results of researches and experiments lasted two and a half centuries, and after we saw scientists who spend their lives, and some died in order to know the identity of lightning and its phases and stages, and how much money spent in order to identify lightning strike does not exceed the time parts of milliseconds. We come after these scientific facts to see the truthful truths of the Prophet, and come to live a pleasant journey with the words of the Prophet (P.U.H) (Fig. 9), and we compare and manage without carrying the Prophetic hadith unreliable interpretation then we will ask: why this Hadith totally agrees with today's scientific findings?

Prophet Mohammed (P.U.H) in this Hadith talking about the path (Sirrat), a bridge that will be set up over Hell, on the Day of Resurrection. The ways in which people will pass over the Path will vary according to their deeds. Some will cross running like lightning, some walking, some crawling, and some will be snatched and thrown into the Fire, each according to his deeds.

فقد روى الإمام مسلم رحمه الله تعالى في صحيحه عن أبي هريرة رضي الله عنه في وصف الصراط، ومرور الناس عليه يوم القيامة قال: قال رسول الله صلى الله عليه وسلم: (وَتُرْسَلُ الأمانة والرحم فتقومان جنبتي الصراط يميناً وشمالاً، فيمُرُّ أولكم كالبرق)، قال: قلت بأبي أنت وأمي، أي شيء كمرّ البرق؟ قال: (أَلَمْ تَرَوْا إِلَى الْبَرْقِ كَيْفَ يَمُرُّ وَيَرْجِعُ فِي طَرْفَةِ عَيْنٍ؟ ثُمَّ كَمَرَّ الرِّيحُ، ثُمَّ كَمَرَّ الطَّيْرُ وَشَدَّ الرَّجَالُ، تَجْرِي بِهِمْ أَعْمَالُهُمْ، وَنَبِيِّكُمْ قَائِمٌ عَلَى الصَّراطِ يَقُولُ رَبِّ سَلِّمْ سَلِّمْ، حَتَّى تَعْجَزَ أَعْمَالُ الْعِبَادِ، حَتَّى يَجِيءَ الرَّجُلُ فَلَا يَسْتَطِيعُ السَّيْرَ إِلَّا زَحْفًا)<sup>(١)</sup>.

(١) صحيح الإمام مسلم، كتاب الإيمان، باب: «أدنى أهل الجنة منزلة فيها»، رقم ٣٢٩ / ١٩٥

Fig. 9: The Prophetic Hadith Narrated by Imam Muslim[24]

The Prophetic Hadith about the Path in Day of Resurrection is considered to be one of the scientific miracles in the prophetic Sunnah. It is clear through this Hadith that the companion narrated the Hadith surprised by the expression of the Prophet (P.U.H) on the passage of lightning and its speed. In this Hadith narrated by Muslim the prophet says: "don't you see that the lightning comes and back in an eye blink" [24]. there is complete identification between our prophet saying and the most recent discovery concerning the lightning flash as scientists had found that the lightning flash happens when a ray of lightning get out of the cloud toward the ground and back again to the cloud. In this Hadith there is a sign that prophet Mohamed (P.U.H) talked very carefully about phases of the lightning, and also he determined the time as it is the time of an eye blink. It can be noted that, the average duration for a single blink of a human eye is 0.1 to 0.4 seconds, or 100 to 400 milliseconds[25]. As stated previously scientists had found that lightning has many phases and the most important phases are going down phase and going back phases. Time of the lightning flash is in milliseconds and this is the same as time of eye blink which was described precisely by our Prophet (P.U.H).

If we ask ourselves what made the narrator, i.e. Abu Huraira, surprised, and why he asked about the passage of lightning? The answer easily is people at that time thought that lightning, or light, does not need time to pass. But no one imagined that the light has a speed. At that time the dominant belief was the light is running in the blink of eye that is why Abu Huraira said: "O my beloved Prophet, is there anything like lightning's speed?"

This great companion, Abu Huraira, was surprised by the saying of the Prophet (P.U.H): "As a lightning speed," he did not imagine that lightning was passing and moving and walking. This is the first sign we can take from this Hadith that lightning is going at a certain speed. In the Prophetic Hadith: "The first of you will pass like lightning" which is a very clear reference to the existence of a time for the passage and the movement of lightning, and as we have seen, the strike is going faster than 300,000 kilometers per second. Although we cannot realize this speed with our eyesight, our Prophet (P.U.H) told us about it and referred to it in saying: "How pass and return back".

If we focus on this Hadith when the Prophet saying "doesn't you see that the lightning comes and back in an eye blink" we can easily state that it corresponds to a hundred percent with revelations of recently scientific researches. Scientists have ended up as we presented before that lightning is nothing but only a huge electric spark, occur as a result of contact of negative electric charge in the cloud with a positive electric charge in the ground, and that there are two main phases that lightning never occur without them, i.e. passing and returning phases. Not only this but also the scientific terms are "step", used by scientists to express the first stage means passes, and "return" which scientists used to express the process of returning. Surprisingly, these two terms agrees well with the expressions of our Prophet Muhammad (P.U.H). This indicates the accuracy of the Prophet's Hadith, and its compatibility with the scientific facts in 100%.

But what does it mean for us that today scientists use the same prophetic expressions? It means one thing: that the Holy Prophet (P.U.H) told us about certain facts as if we were seeing them, before the scientists of our time saw them. It also shows the miraculous mysticism in the words of this Prophet (P.U.H). Who told him that



scientists fourteen centuries later would use same words? And if the Great Prophet (P.U.H) has learned this science from scientists of his era, he came with myths and superstitions descriptions, which was dominated at that time.

Regarding the period time of lightning, we have found that time is a few parts of a second, and this time varies from place to place and from time to time, and the average lightning time is the fraction of a thousandth of a second. We ask ourselves: "is there any relationship between the time needed to strike the lightning, and the time necessary to blink the eye?" If the times are equal or equate, then the Prophetic Hadith will set the time of the lightning strike before scientists fourteen centuries ago. The surprise was that when we looked for the blink of an eye, and how long will take for eye remained closed during this blink? We found that the time is also tens of parts of the millisecond in average. This is exactly what we expected, i.e. the time needed to blow lightning.

We also found that the time of the lightning strike varies from one cloud to another according to the distance from the ground, depending on the surrounding weather conditions, the density of clouds and the extent of saturation with water vapor. Nevertheless, this time remains estimated several tens of milliseconds, and also found that the time necessary to blink the eye differs from one person to another according to the psychological, physiological and age conditions, but it is also estimated to be several tens of milliseconds. Glory be to Allah (S.W.T) for this accuracy in determining the times. The Messenger of Allah (P.U.H) gave us time, and time ranges. Does anyone could regret this miraculous talk which exactly agrees with the scientific findings?

It can be stated that scientists believe that a lightning strike can heat the air in a fraction of a second. When air is heated that quickly, it expands violently and then contracts, like an explosion that happens in the blink of an eye[26]. The phrase "in a blink of an eye" that has been used by scientists describe the events that take place in the lightning ray. This phrase is the same used by the Holy Prophet (P.U.H). Thus, scientists of the space and computer age use the same Prophetic metaphor, which means that these are not Prophet's words, but he learned from Allah (S.W.T). Allah (S.W.T) honored his beloved Prophet (P.U.H) with miracles in his Hadith during his life and after his death and to the Day of Resurrection. These miracles are nothing but only witness to the sincerity of his message to all people.

#### 4. Results

To summarize the most important results that we have reached in this research, which represent scientific miracles in the field of electricity and lightning.

The Hadith included a clear indication of the movement of the lightning and its passage as well as it has specific speed, not as it was thought and believed that the lightning goes at a glance without time. The Hadith included a description of the lightning phases exactly like recent discovery by scientists, and that the lightning occurs in stages as identified by the Holy Prophet (P.U.H). The Hadith defines the name of each stage (passing and returning), in its real and actual name, and corresponding with the scientific names. The Holy Prophet (P.U.H) is the first whoever talked about this scientific fact, namely the return of lightning and evolution back, and this scientific miracle in the Prophetic Hadith. This Prophetic Hadith defines the time of one lightning strike with a blink of an eye, and we have seen how these two times are equal, i.e., the prophetic analogy of lightning with the eye is very accurate and scientific. Through accurate measurements one can realize that a huge amount of negative charges come from the cloud to the Earth in less than a thousandth of a second, and then generate a backlash that travels through a specific channel at a speed of more than half the speed of light which gives the seeable flashing light.

The channel of the back stroke is used again for other strikes, i.e., the passage and return of the lightning beam. Thus, this repetition of lightning strikes can reach 3 or 4 or more, all of which is seen as a single flash. One of the conditions of the miracle in the Prophetic Hadith is that it is impossible to know the scientific truth that the great Prophet (P.U.H) told us about in his time. To examine the scientific development of lightning experiments, the precise study of this phenomenon began in the seventies of the twentieth century in America, Europe and Australia, and then in 1995 began the study of lightning from space through the satellites of the Space Agency (NASA). Therefore, we can say that, without a doubt, the Hadith is a scientific miracle, because it told us a scientific fact which was not confirmed with certainty and real images only at the end of the twentieth century.

#### 5. Conclusion

At the end of this study, it is necessary to answer a question that may concern the reader of this research for the first time: If this talk includes all this scientific accuracy and details about the complex lightning process, why did not Muslim scientists detect these stages? On the contrary, we see Western scientists who are non-Muslims discover these stages and they did neither read this Hadith nor see it. The answer is simply that Muslims believe everything that Muhammad (P.U.H) said but non-Muslim will benefit from these facts and these miracles thus this will be tangible proof of the truthfulness of the message of Islam. Another reason is that Muslim scholars did not investigate the holy Quran and Prophetic Sunnah for scientific facts well enough to takeout scientific facts from them. Thus, whenever Muslims stop doing scientific discoveries others will do and outran them.

When the Prophet (P.U.H) addresses atheists with scientific facts, they will discover them. This is the summit of superiority and persuasion that the Prophet is right. What is truly miraculous is that the Great Prophet (P.U.H) used this scientific miracle during the talk of the Resurrection, which is denied by the atheists, as if he wanted to address them in the language of science which they understand well and affirms to them. Therefore, as they saw the truth of the lightning passage and its return they certainly will face the Resurrection day. This also indicates that Islam addressed His enemies through the science language.

The believer increases his faith when he sees this prophetic miracle, and if he cannot see this miracle or any other, his faith will never be broken. While, the atheist, nothing convinced him except scientific proofs and this Hadith is one of them. We ask Allah (S.W.T) to make good, guidance and encouragement in this research for anyone who doubts the message of Islam and the prophecy of the Prophet (P.U.H). We also ask Allah (S.W.T) to inspire us to cooperate on righteousness and piety, each according to His competence, to reach the satisfaction of Allah Almighty. And we ask Allah (S.W.T) among the people who described him in Surah Al-Imran: 191: "Who remember Allah while standing or sitting or [lying] on their sides and give thought to the creation of the heavens and the earth, [saying], "Our Lord, You did not create this aimlessly; exalted are You [above such a thing]; then protect us from the punishment of the Fire".[14]

## 6. References

- 1.Home, R.W., Electricity and the nervous fluid. *Journal of the History of Biology*, 1970. 3(2): p. 235-251.
- 2.TURNS, B.F., Benjamin Franklin and lightning rods. *Physics Today*, 2006. 59(1): p. 42.
- 3.McGaughey, S.L., Institutional entrepreneurship in North American lightning protection standards: Rhetorical history and unintended consequences of failure. *Business History*, 2013. 55(1): p. 73-97.
- 4.Rakov, V.A., Lightning discharge and fundamentals of lightning protection. *Journal of Lightning Research*, 2012. 4(1): p. 3-11.
- 5.Nag, A., B.A. DeCarlo, and V.A. Rakov, Analysis of microsecond-and submicrosecond-scale electric field pulses produced by cloud and ground lightning discharges. *Atmospheric Research*, 2009. 91(2): p. 316-325.
- 6.Franklin, B., Experiments and observations on electricity made at Philadelphia. London E Cave, 1774.
- 7.Zipse, D.W., Lightning protection systems: Advantages and disadvantages. *IEEE Transactions on Industry Applications*, 1994. 30(5): p. 1351-1361.
- 8.Rakov, V.A. and M.A. Uman, *Lightning: physics and effects*. 2003: Cambridge University Press.
- 9.Warren, L., *Encyclopedia of Twentieth-Century Photography*, 3-Volume Set. 2005: Routledge.
- 10.Nag, A. and V.A. Rakov, Some inferences on the role of lower positive charge region in facilitating different types of lightning. *Geophysical Research Letters*, 2009. 36(5).
- 11.Betz, H.D., et al., Lightning detection with 3-D discrimination of intracloud and cloud-to-ground discharges. *Geophysical research letters*, 2004. 31(11).
- 12.Rycroft, M., S. Israelsson, and C. Price, The global atmospheric electric circuit, solar activity and climate change. *Journal of Atmospheric and Solar-Terrestrial Physics*, 2000. 62(17): p. 1563-1576.
- 13.Pirjola, R., Effects of space weather on high-latitude ground systems. *Advances in Space Research*, 2005. 36(12): p. 2231-2240.
- 14.Khan, M.M. and T.-u.-D. Hilaali, *Translation of the meanings of the Noble Quran in the English Language*. 1997: King Fahd Complex For Printing The Holy Quran.
- 15.DeYoung, D.B., A Survey of Lightning. *Creation Research Society Quarterly*, 2013. 49(4).
- 16.Frank, M.V. and W.E. Kastenber, Probabilistic risk management using risk-based safety goals for the design of spacecraft with onboard nuclear reactor systems. *Nuclear technology*, 2007. 159(1): p. 25-38.
- 17.Jensenius Jr, J.S., A detailed analysis of lightning deaths in the United States from 2006 through 2014. *National Weather Service Executive Summary*, 2015.
- 18.Galiano, D., *Thunderstorms and Lightning*. 2003: The Rosen Publishing Group.
- 19.Uman, M.A. and E.P. Krider, A review of natural lightning: Experimental data and modeling. *IEEE Transactions on electromagnetic compatibility*, 1982(2): p. 79-112.
- 20.Dwyer, J.R. and M.A. Uman, The physics of lightning. *Physics Reports*, 2014. 534(4): p. 147-241.
- 21.Saba, M., M. Ballarotti, and O. Pinto, Negative cloud-to-ground lightning properties from high-speed video observations. *Journal of Geophysical Research: Atmospheres*, 2006. 111(D3).
- 22.Parker, P., *An Introduction to the Lightning Process®: The First Steps to Getting Well*. 2012: Hay House, Incorporated.
- 23.Sassen, K., et al., Highly supercooled cirrus cloud water: Confirmation and climatic implications. *Science*, 1985. 227(4685): p. 411-413.
- 24.Siddiqui, A.H., *Translation of Sahih Muslim*. University of Southern Carolina Centre for Muslim-Jewis Engagement-Avaibl from: [www.usc.edu/schools/college/crcc/engagement/resources/texts/muslim/hadith/muslim](http://www.usc.edu/schools/college/crcc/engagement/resources/texts/muslim/hadith/muslim), 2008.
- 25.Al-Chalabi, A., M.R. Turner, and R.S. Delamont, *The Brain: A Beginner's Guide*. 2006: Oneworld.
- 26.Elsom, D.M., *Lightning: Nature and Culture*. 2015: Reaktion Books.