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Research Article

## **Religion-Scientific Study of Solar Resting Phase and Solar-Lunar Finality**

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**Abstract.** Religious views on the final state of the Sun, the Moon, the Final Hour, and the astrophysical findings of the solar and lunar fate have been reviewed. Religious views are that the Sun runs its course for a specified time, and it has a resting phase. Also, the advent of the Last Hour will be marked by the Sun's overhead appearance causing tremendous heat, sunrise in the western sky, engulfing of the Moon, and ultimate vanishing. These religious forecasts were made in the 7<sup>th</sup> century. Scientists have found that the Sun has lived for 4.5 billion years and make forecast for living another 4.5 billion years. It passes through violent and quiet states every 11 years. The Sun's red giant state will be large enough to spread beyond the orbit of the Earth by 20% and will be 3,000 times brighter. The Moon recedes away from us, and it will be lost in the Sun. After the red giant phase is over, the Sun will end up as a white dwarf with half of its mass. These astronomical

discoveries were made in the early 20th century. Many discoveries could be made if the heavenly bodies' Qur'anic highlights would be followed.

**Keywords:** Religion-Scientific, Solar Resting Phase, Solar-Lunar Finality

## INTRODUCTION

The Quran is known as the Quranul Hakim meaning full of wisdom. The Holy Prophet (PBUH) said that the Quran is presented in a concise form, a trait that distinguishes it from other heavenly books. It is like a fathomless depth under a dot. Hints are given in the Quran. Allaah says in Surah Al- Imran "(3:190) Surely in the creation of the heavens and the earth, and in the alternation of night and day, there are signs for men of understanding. (3:191) those who remember Allah while standing, sitting or (reclining) on their backs, and reflect in the creation of the heavens and the earth, (saying): 'Our Lord! You have not created this in vain. Glory to You! Save us, then, from the chastisement of the Fire. (3:192)". These signs can be used to reach the absolute truth, the word of Allaah. The phenomenon can be followed thoughtfully along with remembrance of Allaah for unfolding the hidden facts to glorify Him. This work needs research and thinking. Earth-stationed observers can watch the heavenly bodies– stars, planets, satellites, comets, galaxies, extraterrestrial bodies, sunshining marking the day, moonshining at night, occurrences of days and nights, appearances of comets from time to time, comets and asteroids striking planets, shooting stars, eclipses, explosions of stars into supernovas, cosmic rays, pair creation, and the laws of nature governing them, etc. etc. All heavenly objects are floating in space in the cosmic marvelous design which is an awe-striking phenomenon. Answers to how these work, why these exist, and who creates them, etc. naturally lead to the Grand Creator's purposefully glorious deeds urging bowing down heads. It is due for us to investigate the Quranic highlights to understand the intricate network of His magnificently majestic creation.

Because of the highlights of heavenly objects in the Quran and Hadith, Islamic cultures started the study of astronomy in their Golden Age (9<sup>th</sup> -13<sup>th</sup> century). Still today, Arabic names of stars and Arabic words - Aldebaran, Altair, Deneb, Alkaid (in the Big Dipper), and astronomical terms such as alidade, azimuth, and nadir, are still referred to by their Arabic names. About 10,000 manuscripts of Islamic astronomy remains scattered throughout the world ([https://en.wikipedia.org/wiki/Astronomy\\_in\\_the\\_medieval\\_Islamic\\_world#:~:text=Several%20forms%20of%20quadrants%20were,of%20the%20Sun%20or%20stars](https://en.wikipedia.org/wiki/Astronomy_in_the_medieval_Islamic_world#:~:text=Several%20forms%20of%20quadrants%20were,of%20the%20Sun%20or%20stars)). Had the Islamic culture continued the trend of studying the bodies in the sky, Muslims would be at the forefront in the astronomy discipline and make the appropriate translation of the Quranic words.

Modern stellar astronomy's most useful and powerful plots in astrophysics is the Hertzsprung-Russell diagram (Fig. 1) (hereafter called the H-R diagram) that first

originated in 1911 from the plot of stellar absolute magnitude (brightness from a distance of 3.26 light years where 1 light year equals about 9.5 trillion kms) along the vertical axis and the colors (along the horizontal axis) that effectively represented stellar colors by the Danish astronomer, Ejnar Hertzsprung. Two years later in 1913, the American astronomer Henry Norris Russell plotted spectral class (along the horizontal axis) vs absolute magnitude (along the vertical axis). Their resultant plots showed that the relationship between temperature and luminosity (total amount of energy radiated per second) of a star appeared to fall into distinct groups. These are seen in the H-R diagram below. The plot identifies some specific stars and shows the main regions ([https://www.atnf.csiro.au/outreach/education/senior/astrophysics/stellarevolution\\_hrintro.html#:~:text=One%20of%20the%20most%20useful,colour%20\(hence%20effective%20temperature\)](https://www.atnf.csiro.au/outreach/education/senior/astrophysics/stellarevolution_hrintro.html#:~:text=One%20of%20the%20most%20useful,colour%20(hence%20effective%20temperature).)).

This article demonstrates that the modern days' astronomers' discoveries about the solar and lunar ultimate conditions agree with what the religious views were preached in the 7<sup>th</sup> century, and that the Sun has a resting phase which cannot be called a "resting place" or "dwelling place", between two successive violent phases.

## **METHODOLOGY**

The Quranic verses and Hadith pieces related to the Sun, the Moon, and the signs of the advent of the Final Hour, and the Judgement Day have been collected. Information on astronomers' discoveries of the stellar life cycle and violent and quiet Sun conditions based on the appearances of solar activities of sunspots, flares, coronal mass ejections (CME), has been acquired. Physical laws of the spin motion of the Earth, the Sun, the Moon, solar energy release in space from magnetic reconnection, tide-arising forces in the Earth's water bodies, and the conservation of angular momentum have been mentioned at the layman level.

## **RESULTS AND DISCUSSIONS**

### **The Hertzsprung-Russell Diagram**

H-R diagram made advances to stellar understanding. All four sides of the diagram are marked with stellar information (Fig. 1). The bottom horizontal axis marks the spectral class of stars. The main classification is O, B, A, F, G, K, and M. Their sub classifications are marked by attaching numbers 0 through 10. Physically it means in going from left to right includes young and hot stars to old and cold stars compared to the young and hot ones. This fact is reflected in the top horizontal axis that extends from the hottest temperatures to the coldest temperatures (compared to the hottest ones).

The left side upright axis indicates the stellar brightness measured from the same standard distance of 10 parsecs (32.6 light-years). The right side vertical axis measures stellar luminosity compared to the luminosity of our star the Sun.

The S-shaped strip extending from the left side top corner to right side bottom corner is called the main sequence. Our Sun is a main sequence star. Stars with temperatures from 10,000 K to 3,000 K (K = Kelvin temperature = Celsius temperature + 273.15) and absolute magnitude between 0 to -2 and solar luminosity from the middle of 10 to 100 and to the middle of 100 to 1000 solar luminosities fall in a strip called the giants.

Stars with temperatures 20,000 K to about 3,000 K, absolute magnitude -5 to -10 and solar luminosities from the middle of 1000 to 10,000 to 1000,000 K fall in the supergiant class. White dwarfs have absolute magnitude from about 5 to a little over 14 and spectral class O through G. Their temperatures are well above 35,000 K to 6,000 K. Their luminosity range can be read from the H-R plot. Stars are born, become old, and die (when they are no longer stars).

Fig. 2. Illustrates stellar birth to death. Stars are born from giant gas clouds called nebula by gravitational collapse. The Quran states (Sahih International) "Then He directed Himself to the heaven while it was smoke and said to it and to the earth, "Come [into being], willingly or by compulsion." They said, "We have come willingly."" (Surah Al Fussilat, 41:11). Science states that gravity is the oldest force in creation which does not contradict with the Quranic verses. The next phase in the star formation is the protostar. In the T Tauri phase, stars do not have enough temperature to start the nuclear fusion reaction for the energy production (Fig. 3). It shines out of the gravitational collapsing energy. In the formation of the universal structure formation gravitational collapse is a fundamental mechanism. After the T Tauri phase, the stellar cycle progresses depending on their masses - low, medium, or high. Stars enter the main sequence phase by being elevated to self-sustaining nuclear energy production stage (Fig. 3).

Our Sun is a low-mass star. After the main sequence phase comes the red giant phase. In the main sequence phase, the central reserve of hydrogen is burned. In the red giant phase, off-centered hydrogen starts burning. At this stage the star can expand 400 times its original size and cools changing color to red (red color has the lowest energy among the seven colors). The next phase is the planetary nebula. The Sun may flare into a massive planetary nebula, a spectacular ring of gas and dust at its death in about 5 billion years. The Quran states "When the sky split open" (82:1). The solar busting can appear as the sky's splitting. The planetary nebulas may linger a few thousand or tens of thousands of years before dispersing into interstellar space. Further, verses on the Sun's and other stars' ending are "When the Sun is put out (81:1) and "When the stars fall down" (81:2). That will be the fate of the Sun.

**Stellar Energy Production**

The majority of stars have 90% hydrogen and 10% helium gases. Stars produce their energy by burning hydrogen. First, two hydrogen nucleus (protons) fuse together to produce a deuterium and other particles (positron and neutrino) plus energy (Fig. 3). Then one deuterium and a hydrogen nucleus (proton) fuse to produce a helium-3 or light helium and energy. And then two helium-3 nuclei fuse together to produce a helium-4, two hydrogen (protons), and energy. The helium-4 nucleus produced from four hydrogen nuclei (protons) has 0.7% less mass than the combined mass of four (hydrogen nuclei) protons. This mass difference is transformed into energy according to Einstein's  $E = mc^2$  meaning

$$\text{Energy} = (\text{mass})(\text{square of the speed of light})$$

which in words mean energy equals the product of the mass expressed in kilogram and the square of the speed of light expressed in meters per second which is  $9 \times 10^{16} \text{ m}^2/\text{s}^2$ . The Sun is believed to have enough hydrogen to burn for more than 5 billion years when it turns into a red giant as the calculation below shows.

Each fusion reaction loses  $4.8 \times 10^{-29} \text{ kg}$  of mass. Einstein's equation converts this mass to  $(4.8 \times 10^{-28} \text{ kg})(3 \times 10^8 \text{ m/s})^2 = 4.3 \times 10^{-12} \text{ Joules}$  of energy per fusion. But the Sun radiates  $3.8 \times 10^{26} \text{ Joules}$  per second. So, the Sun has  $(3.8 \times 10^{26} \text{ Joules/second}) / (4.3 \times 10^{-12} \text{ Joule/fusion}) = 8.9 \times 10^{37}$  fusions per second. As each fusion uses  $4.8 \times 10^{-29} \text{ kg}$  of mass for energy production, so  $8.9 \times 10^{37}$  fusions per second loses a mass of  $(4.8 \times 10^{-29} \text{ kg/fusion})(8.9 \times 10^{37} \text{ fusions/second}) = 4.3 \times 10^9 \text{ kg/second} = 4.3$  billion kg of mass per second. About inner 10% will be expended in fusion, and 0.71% of this will be used in core hydrogen burning. So, considering this selected amounts  $(2 \times 10^{30} \text{ kg})(0.1)(0.0071) / (4.3 \times 10^9 \text{ kg/second}) = 3.3 \times 10^{17} \text{ seconds} = 3.3 \times 10^{17} \text{ seconds} / 3.15 \times 10^7 \text{ seconds/year} = 1 \times 10^{10} \text{ years} = 10 \times 10^9$  which is 10 billion years. Since the Sun has already survived 4.5 billion years, it can burn hydrogen for 5.5 billion years more (<https://www.forbes.com/sites/startswithabang/2017/09/05/the-suns-energy-doesnt-come-from-fusing-hydrogen-into-helium-mostly/?sh=5ef897c770f9>)

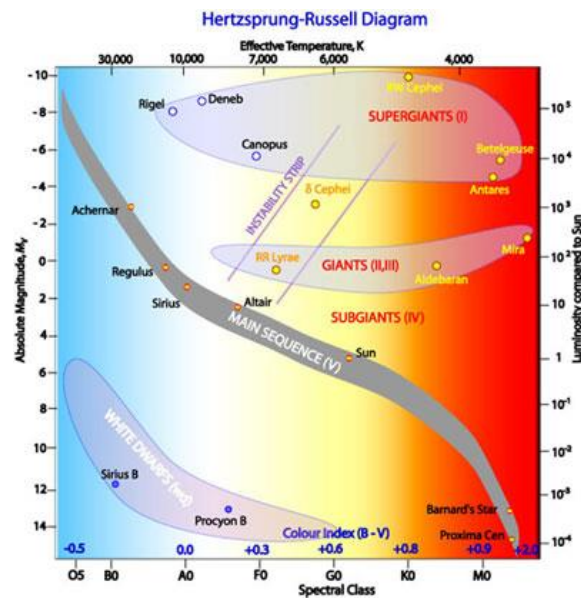


Fig. 1. Hertzsprung- Russel diagram (<https://astronomy.swin.edu.au/cosmos/h/hertzsprung-russell+diagram>)

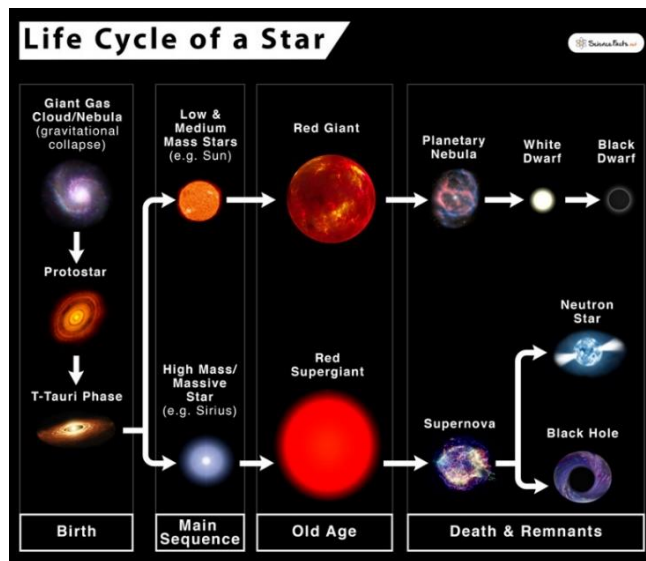


Fig. 2

Fig. 2. Life cycle of a star (<https://www.sciencefacts.net/wp-content/uploads/2021/04/Life-Cycle-of-a-Star.jpg>). The Sun falls on the upper branch.

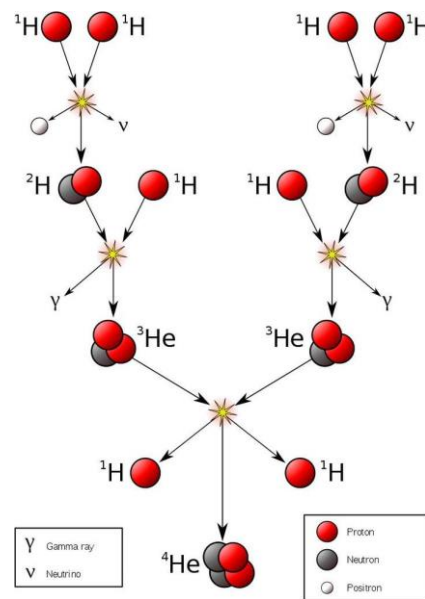


Fig. 3

Fig. 3 The proton-proton cycle that is thought to be solar energy production mechanism. This is the most straightforward and lowest-energy version of the proton-proton chain, which produces the solar energy (<https://www.forbes.com/sites/startswithabang/2017/09/05/the-suns-energy-doesnt-come-from-fusing-hydrogen-into-helium-mostly/?sh=5ef897c770f9>). Particles have been shown in false colors for distinction.

**Solar Layered Structure**

The silver plate in the sky our Sun is just a ball of gas gravitationally bound. Its radius is 690,000 km which is 109 times the Earth’s radius. Its gravity is 28 times stronger than the Earth’s gravity. The mass (quantity of matter) of the Sun is  $1.989 \times 10^{30}$  kg which is 333,000 times that of the Earth. About 1.3 million Earths can make the size of the Sun. The Earth spins anticlockwise once in 24 hours. Different parts of the gaseous mass of the Sun spin in the anticlockwise direction at different time intervals. This is called the differential rotation. From the equator to the pole the spinning intervals vary from 25 to 35 days to spin (Fig. 4).

The solar layers from inside out are the core, the radiative zone and the convection zone, the photosphere, the chromosphere, the transition region, and the corona (Fig. 5).

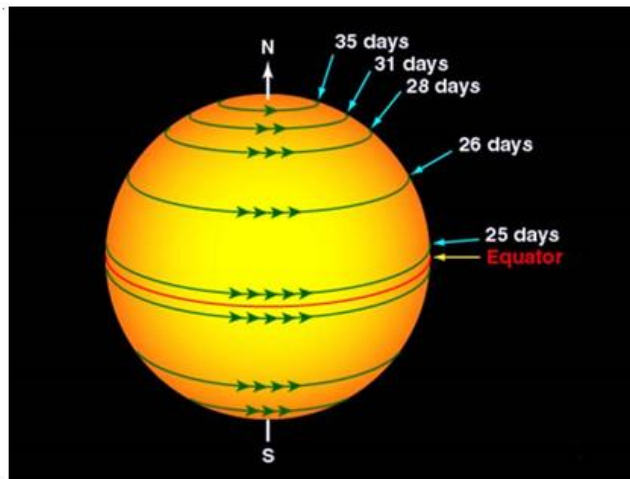


Fig. 4

Fig. 4 Solar differential rotation in the anticlockwise direction ([https://www.nasa.gov/mission\\_pages/sunearth/science/solar-rotation.html](https://www.nasa.gov/mission_pages/sunearth/science/solar-rotation.html));

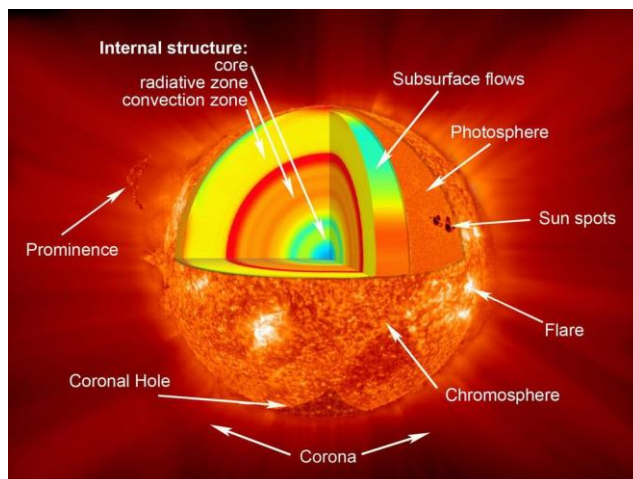


Fig. 5

Fig. 5. Solar layers ([https://www.nasa.gov/mission\\_pages/sunearth/science/Sunlayers.html](https://www.nasa.gov/mission_pages/sunearth/science/Sunlayers.html))

**Solar core** is the central region where nuclear reactions shown in Fig. 3 takes place consuming hydrogen to form helium. It may be called the solar oven.

**Solar radiative zone** is where energy transport through radiation takes place. It extends from the outer edge of the core to the bottom of the convection zone.

**Solar convection zone** is where energy transport takes place through convection (by movement of the material medium as granules ( a convection cell) shown in Fig. 6 and supergranules ( a particular pattern of convection cells) and extends from the outer layer of the radiative zone to the visible surface. Sunlight photons take eight



minutes to reach us, but these can take 100,000 years to come from the solar core to the surface.

**Photosphere** is the visible surface of the Sun.

**Chromosphere** is the layer above the photosphere marked by a rising temperature of 6000 °C to about 20,000°C. This high temperature is a hot topic of research.

**Corona** is the solar outer layer. A coronal mass ejection (CME) which is a stream of charged particle ejected from the corona (Figs. 7, 8, and 9). The coronal mass ejection of January 14, 2002, can be seen in [https://sites.ualberta.ca/~pogosyan/teaching/ASTRO\\_122/lect10/lecture10.html#flares](https://sites.ualberta.ca/~pogosyan/teaching/ASTRO_122/lect10/lecture10.html#flares)

**Solar wind** lies beyond the solar corona, and is the outward flow of solar coronal gas (Figs. 10, 11, and 12).

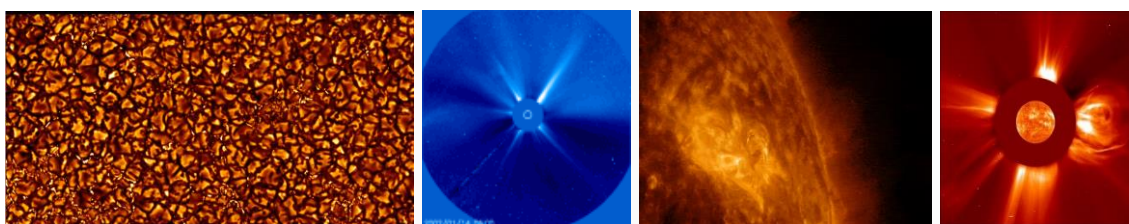


Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 6. Granulation motions on the Sun's surface observed by the [Swedish Solar Telescope](#)

([https://en.wikipedia.org/wiki/Solar\\_granule#:~:text=A%20granule%20is%20a%20convection,cells%20and%20is%20called%20granulation](https://en.wikipedia.org/wiki/Solar_granule#:~:text=A%20granule%20is%20a%20convection,cells%20and%20is%20called%20granulation))

Fig. 7. January 14, 2002 coronal mass ejection. ([https://sites.ualberta.ca/~pogosyan/teaching/ASTRO\\_122/lect10/lecture10.html#flares](https://sites.ualberta.ca/~pogosyan/teaching/ASTRO_122/lect10/lecture10.html#flares));

Fig. 8. NASA's Solar Dynamics Observatory captured this imagery of a solar flare, as seen in the bright flash. A loop of solar material, a coronal mass ejection (CME), can also be seen rising up off the right limb of the Sun. Image credit: NASA/SDO/Goddard (<https://spaceplace.nasa.gov/solar-activity/en/>);

Fig. 9. An image of a coronal mass ejection observed by NASA's Solar and Heliospheric Observatory, or SOHO, satellite in 2001. Credit: ESA/NASA/SOHO (<https://spaceplace.nasa.gov/solar-cycles/en/>)

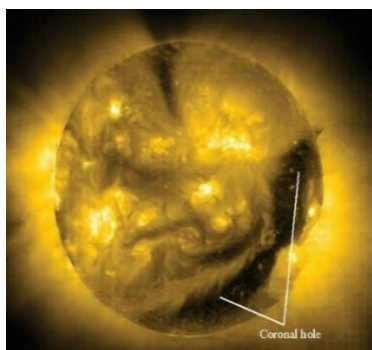


Fig. 10



Fig. 11



Fig. 12

Fig. 10. The dark regions are coronal holes created from coronal mass ejection; the solar wind originates from the coronal holes ([https://sites.ualberta.ca/~pogosyan/teaching/ASTRO\\_122/lect10/lecture10.html#xcorona](https://sites.ualberta.ca/~pogosyan/teaching/ASTRO_122/lect10/lecture10.html#xcorona)).

Fig. 11. The solar wind pushes outwards in the anti-sun direction the gas tail of a comet (Comet Hyakutake in the picture). The gas tail arises from sublimating (conversion from solid to gas) from the comet so that the tail points away from the Sun ([https://sites.ualberta.ca/~pogosyan/teaching/ASTRO\\_122/lect10/lecture10.html](https://sites.ualberta.ca/~pogosyan/teaching/ASTRO_122/lect10/lecture10.html)).

Fig. 12. Solar wind particles hit nitrogen and oxygen molecules in the Earth's atmosphere causing them to be excited followed by colorful light display in the deexcitation. ([https://sites.ualberta.ca/~pogosyan/teaching/ASTRO\\_122/lect10/lecture10.html](https://sites.ualberta.ca/~pogosyan/teaching/ASTRO_122/lect10/lecture10.html)).

## Solar Activities

**Sunspots** are areas (as small as 16 kilometers to as large as 160,000 kilometers in diameter covering as low as 0.04 square degrees to 10 or more square degrees of the solar surface) that look dark on the solar surface because of being at lower temperatures than the surrounding areas (roughly 3000–4500 K (2700– 4200 °C)) , the surrounding material temperature is about 5,780 K (5,500 °C, [https://www.ngdc.noaa.gov/stp/space-weather/solar-data/solar-indices/sunspot-numbers/documentation/readme\\_sunspot-numbers.pdf](https://www.ngdc.noaa.gov/stp/space-weather/solar-data/solar-indices/sunspot-numbers/documentation/readme_sunspot-numbers.pdf)) ) (Figs. 13 and 14).

These are said to be cooler than other parts. The Sun is full of electrically charged particles – electrons, protons (hydrogen nuclei), and helium nuclei – which are in motion always. Since moving charged particles create magnetic fields, these charged particles are the sources of the solar powerful magnetic field. The random motion of the charged particles twists, tangles, stretches the magnetic field lines which visualize the magnetic field.

Sunspots are formed as a result of breaking away of near-surface magnetic field from the solar plasma pushing plasma aside. If the dark spots could have been removed from the solar surface, they would outshine the Moon.

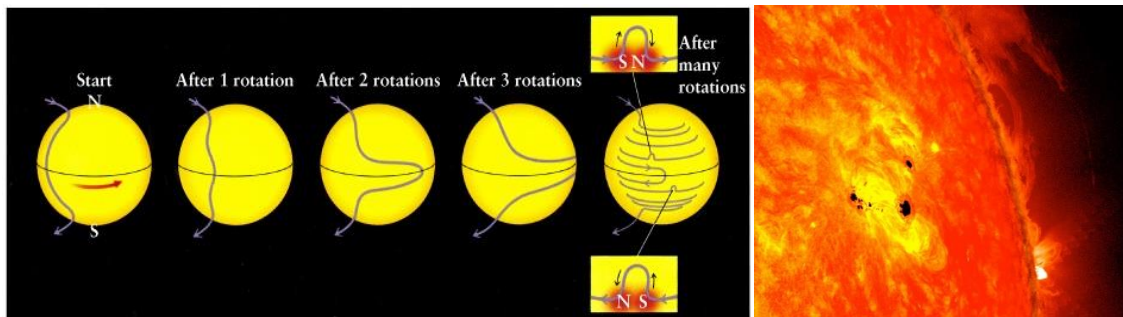


Fig. 13

Fig. 14

Fig. 13. Gradual development of sunspots. The differential rotation of the Sun- polar region rotation period 36 days and equatorial region 25 days- stretches magnetic field lines into “horizontal” flux tubes. This results in right polarity magnetic field loops protruding from the surface. ([https://sites.ualberta.ca/~pogosyan/teaching/ASTRO\\_122/lect10/lecture10.html](https://sites.ualberta.ca/~pogosyan/teaching/ASTRO_122/lect10/lecture10.html)).

The protrusion ultimately is detached off with energy leaving this less energetic spot darker than the surroundings.

Fig. 14. The image shows an active region in the sun with dark sunspots. Image credit: NASA/SDO/AIA/HMI/Goddard Space Flight Center (<https://spaceplace.nasa.gov/solar-activity/en/>)

The magnetic energy released per unit volume of magnetic field lines annihilation is  $(6.28 \times 10^{-7})$ (square of magnetic field intensity) or (square of magnetic flux density)/ $(25.12 \times 10^{-7})$  and given off as kinetic energy of plasma particles and heat.

Sunspots are found within 30 degrees north to 30 degrees south of the solar equator. Flare occurrences increase if sunspots are active, and solar flares originate from the sunspot areas. It is the powerful magnetic field of the Sun that gives birth to both sunspots and flares.

**Solar flares** are a sudden burst out of energy (Figs. 15 and 16) because of tangling, crossing or reorganizing of magnetic field lines near sunspots. Solar flares and other forms of activities increase with the increase of sunspot numbers; also, increases solar luminosity. The solar maximum condition is characterized by the maximum number of sunspots. A billion megaton of TNT energy ( at once explosion of 100 megaton explosion) can be carried by a flare.

### Solar Resting Phase

The Sun alternates its conditions between violence (period of high activity) and rest (period of low activity). The cycle is 11 years long and is between one rest phase and the next rest phase. Fig. 17 illustrates the solar resting phase. The peaks in the curves are the times when the Sun was violent. Solar irradiance, sunspot numbers, solar flare numbers, and the 10.7 cm solar flux all are highest during the solar violent condition. The lowest points in the curves denote the quiet Sun. These are the resting phases for the Sun. Figs. 19 and 20 together show the solar resting phases from the year 1750 up to the current time. The landmarks in the lunar waxing and waning phases – new moon, half moon, full moon, etc. – for time counting have been translated as “mansions” from the Quranic word “manajala” by some translators. Recently, lunar phases have been used for “manajala”. The Quran states [36:38] “And the sun runs to a “mustaqarrin”” and it has been translated as the Sun “runs to a resting place”. Without the knowledge of solar science “mustaqarrin” has been translated as a “place of dwelling” or a “place of rest”. The study of solar activities makes the good sense of using the best fit words “resting phase” consistent with the solar traits. The modified form of the Abu Dharr-narrated Hadith will be the Sun goes to a resting phase (minimum solar activities) and then rises (increasing solar activities) by Allaah’s command, and it will rise from the setting place (west) when it is the cutoff time to be a believer (Hadith number in Sahih Muslim [Arabic only]: 228). The setting Sun does not Allaah’s permission to rise again in the morning; rather, it may be the resting phase from which the Sun needs the Divine permission to start the activities of sunspots, flares, coronal mass ejections, surface hydrogen burning, etc. etc. to mark the chaos leading to Qiyamah, since He alone knows the Hour and not the Sun. The daily sunset in the west has influenced the use of “dwelling place” and “resting place” that are still in practice today.



Fig. 15

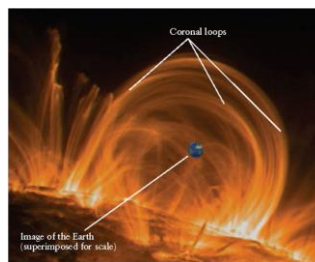


Fig. 16

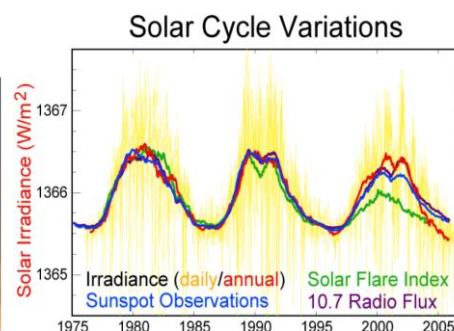


Fig. 17

Fig. 15. Solar flares are large outbursts like eruptive prominences, but larger and more energetic. (Most flares aren't as large as this one.) ([https://sites.ualberta.ca/~pogosyan/teaching/ASTRO\\_122/lect10/lecture10.html](https://sites.ualberta.ca/~pogosyan/teaching/ASTRO_122/lect10/lecture10.html)); Fig. 16. Solar

Activity increases to the end of the Solar Cycle time near equator ([https://sites.ualberta.ca/~pogosyan/teaching/ASTRO\\_122/lect10/lecture10.html](https://sites.ualberta.ca/~pogosyan/teaching/ASTRO_122/lect10/lecture10.html)).

Fig. 17. The figure shows the activity cycles 21, 22 and 23 seen in sunspot number index, total solar irradiance (TSI), 10.7 cm radio flux, and flare index. A special way of plotting makes the plot vertically raised ([https://en.wikipedia.org/wiki/Solar\\_cycle#/media/File:Solar-cycle-data.png](https://en.wikipedia.org/wiki/Solar_cycle#/media/File:Solar-cycle-data.png), Credit: Robert Rohde).

**Solar irradiance** is the solar power per unit Earth surface area in the form of electromagnetic radiation in the wavelength range of the measuring instrument. The SI measuring unit is per square meter ( $W/m^2$ ). Fig. 18 represents irradiance (along the vertical axis) for every nm (nanometer = one billionth of a meter) of wavelength (along the horizontal axis). The area under the yellow color is the irradiance on the top of the Earth's atmosphere. And the area under the red color is the irradiance on the sea level (Earth's surface). The gaps in the red area represent the portions of solar electromagnetic energy absorbed by the molecules of ozone, oxygen, water at four places, carbon dioxide, and water again.

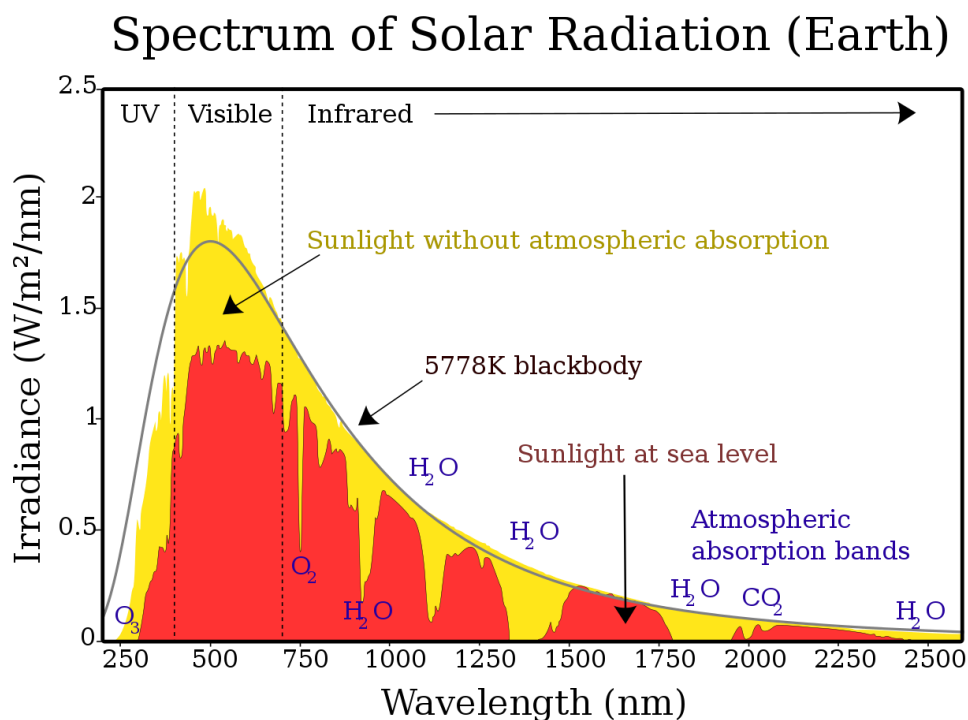


Fig. 18. Solar irradiance above the atmosphere in yellow and on the sea level in red ([https://en.wikipedia.org/wiki/Solar\\_irradiance#/media/File:Solar\\_spectrum\\_en.svg](https://en.wikipedia.org/wiki/Solar_irradiance#/media/File:Solar_spectrum_en.svg)).

This, too, has a maximum value during the solar maximum, and a minimum value during the solar minimum conditions.

## Solar-Lunar Finality

### Longer Daylength and Sunrise in West

In Surah 75 of the Holy Qur'an, entitled Al-Qiyamah, or The Resurrection, specific mention is made about the Sun and the Moon. Allah says, "So when vision is dazzled, and the moon darkens, and the sun and the moon are joined, Man will say on that Day, "Where is the [place of] escape?" (Qur'an 75:7-10). The Qur'an says in Sura At-Takwir meaning wound round and lost its light, "Ezash shamsu kuverat - When the Sun wound round and lost its light and is overthrown". Science says that the Sun will increase its brightness. Along with greenhouse warming, the oceans will boil away. At its red giant stage, it will blow up to 256 times increasing its luminosity 2730 times more than what it is now. Our only satellite Moon will be lost first before the engulfing of Mercury and Venus. Today, the Sun is visible from 93 million miles away. At the red giant phase, the Sun will be visible from about 960 trillion miles away – more than 10 times the current distance. The expanded Sun will eject much of its outer layers and become a smoldering, collapsed object at its white dwarf stage.

The Moon lights up by the sunlight. When the Sun changes from today's Sun, the Moon will not get the sunlight and will not be visible. Also, as the red giant Sun covers the Earth, the Moon will be lost in the red giant Sun. Further, as discussed below, the Moon is receding from us at a rate of about 4 cm per century. Over a period of a billion years or so when the lunar orbital radius will increase by 40,000 km or more, it might get loose from the Earth's gravitational pull, and be pulled by the Sun.

It is said in the Ahadith that the Sun will rise in the west after a three-night long night before the Day of Judgment (Stork, 2004). Sunrise in the west can occur if the earth starts spinning in the clockwise direction and a three-night long night can appear if the spinning rate of the planet is reduced by a factor of 3 i. e. the earth takes 72 hours to make one spin if this "day" means 24 hours.

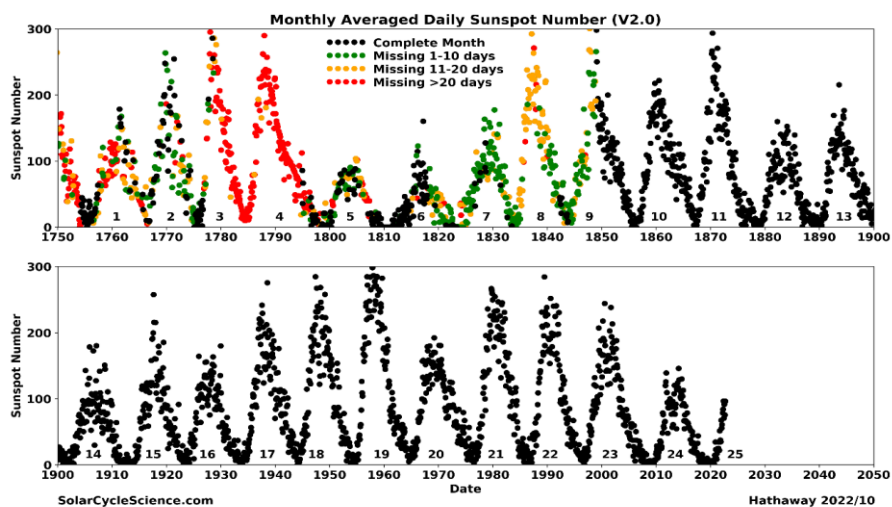


Fig. 19. Monthly Averaged Sunspot Numbers since 1750. Color indicates missing days in each monthly average and the black dot indicate complete months (<http://solarcyclescience.com/solarcycle.html>).

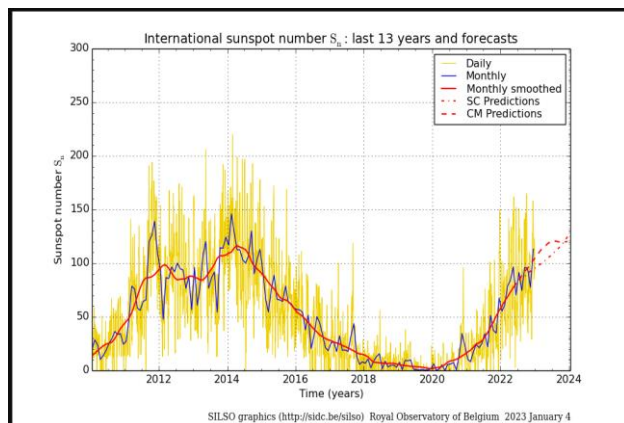


Fig. 20

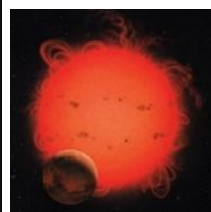


Fig. 21



Fig. 22

Fig. 20. Daily and monthly sunspot number (last 13 years) (<https://www.sidc.be/silso/dayssnplot>);

Fig. 21. Red giant Sun and the Earth (Credit: Lynette Cook Photo Researchers, Inc.);

Fig. 22. PuWe 1, a planetary nebula following the blow off from a red giant star's outer layers near the end of the star's life. Photograph: T.A. Rector (University of Alaska Anchorage) and H. Schweiker (WIYN and NOAO/AURA/NSF) (<https://www.theguardian.com/science/2018/may/07/sun-will-flare-into-massive-planetary-nebula-when-it-dies>)

To understand the increasing day length and the Sun rise in rise in the western sky, Figs. 22 and 23 are helpful. As figure 23 shows, their common sides will have oppositely directed motion. There may be some tidal bulge toward the Earth. Their mutual friction will slow down the Earth's spin motion causing day length gradually longer than 24 hours. At one point , the earth will stop and start spinning in a clockwise direction which will make the sunrise in the western sky. The sun will rise from the west (its place of setting) (Sahih Bukhari, Vol 6: book 60: 159; Sahih Muslim, Book 041: 6931)). In the transition, the Earth will lose angular momentum and the Sun will negligibly gain it because of its enormous size. Artists' production of the video of the expanding sun can be seen in <https://www.youtube.com/watch?v=KrnJveTm9v0> and [https://esahubble.org/videos/hst15\\_red\\_giant\\_sun](https://esahubble.org/videos/hst15_red_giant_sun). Also, the day length is slowly increasing due to the tidal effect discussed below. In the red giant phase, the sun and the planetary system's angular momentum conservation will require shortening the

orbital radii of the planets. And when the Sun's size is reduced, the planetary orbital radii will increase.

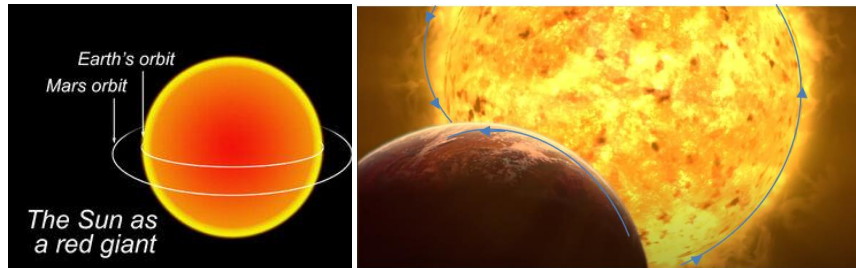


Fig. 22. The red giant ([https://terraforming.fandom.com/wiki/Red\\_Giants](https://terraforming.fandom.com/wiki/Red_Giants));

Fig. 23. Both the Sun and the earth spin anticlockwise (<https://www.youtube.com/watch?v=KrnJveTm9v0>). The sides they face each other, have motions oppositely directed. Under the huge solar covering of the tiny Earth, its spin direction is bound to flip.

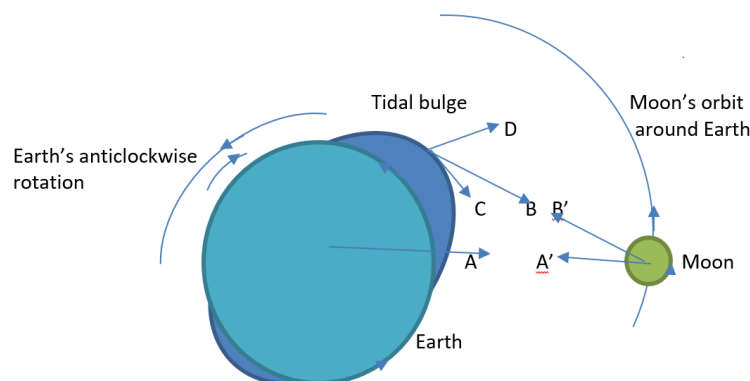


Fig. 24 Tidal breakdown of forces between the Earth and the Moon

In Fig. 24 AA' would be the location of the ocean water bulge if the Earth-Moon were stationary. The spinning Earth takes the bulge to the position indicated by D. The Moon's gravitational attraction along BB' holds back the bulge. The tide-arising force is along D. The gravitational force component C balances the frictional force that works between the bottom of the bulge and the solid Earth top. Tidal breaking slows the Earth's once-in-24 hours rotation and speeds up the Moon around the Earth. The spinning Earth's friction between the solid Earth top and the ocean bottom drags the tidal bulge ahead of the line AA' while the Moon's gravitational attraction holds back the bulge. This tug of war result is transmitted through the fluid ocean to the Earth, slowing its rotation- decreasing its angular momentum and increasing the day length 0.002 seconds per century. With the



slowing down of the Earth's spin, the angular momentum of the Moon increases – orbital radius increases – moves further away from the Earth in keeping with Kepler's third law of planetary motion - the square of the orbital period expressed in Earth years is proportional to (increases as) the cube of the semi-major axis measured in average Earth-Sun distance. This acceleration makes the Moon move away from Earth at a rate of about 4 cm every year. What is evident from here is that in the remote past the Moon was much closer to the Earth when it was spinning faster having day-night duration less than 24 hours.

## **CONCLUSION**

The Quranic verses and Hadiths pieces are very brief and hint at the result. The investigation of the missing information is the task of inquisitive minds. The Quranic teachings are absolute. The observation of the daily setting of the Sun in the west and the indication of its final rising from the west might have influenced the translators with the idea of translating "mustaqarrin" as a "place of rest" or "dwelling place", since not a leaf fall from the tree without His permission. This translation prevails still today. "Resting phase" instead of "place of rest" or "dwelling place" seems to be the best fit in keeping with the solar activities. The endeavor of scientists ultimately leads to that absolute realization. Muslims should have continued the study of astronomy to understand the appropriate meaning of Quranic words for better interpretation. The fact that very little is known about the Sun leaves the big question on solar survivability - will the Sun live for another 5 billion years? As the Quran says "Indeed, Allāh [alone] has knowledge of the Hour" [31:34]. The final Hour will certainly come to pass [51:6].

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