

The Effect Of Rotation, Earth Revolution To The Timing Of Salat

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ABSTRACT

This research is a study, study of astronomy as arithmetic, used by Muslims to practice their daily worship, especially praying, fasting, and pilgrimage to the temple of Mecca. The main subject is to determine the timing of praying, precisely and carefully based on data area and formulation of praying timing. The subject of this research is, the effect of rotation, earth revolution to the timing of prayer, done either by theory and practice, how the astronomy as an arithmetic, to determine sign of prayer time precisely and carefully in one place, Accuracy and precision can be proved and accountable scientifically based on the formulation of praying time. The timing of praying, early month of Ramadan, the first Syawal and Zulhijjah, as well as the timing of Aid Al-fitr and eid al-Adha, and the other great day for Muslims. The result of arithmetic and ruqyah can be proved and accountable scientifically. Research result showed that astronomy as arithmetic is so beneficial for Muslims to determine the timing of worship as to determine the beginning of Ramadan month, direction of Qiblah, set the time of breaking the fast and meal time. To set the beginning and ending of fasting Ramadan, To determining the day of Aid al-Fitr and Aid al-adha, direction of Qiblah in one area, started by the methods and practical ways, they are method of arithmetic (Hisab) and method of Ruqyah.

Key Words: Rotation, Earth Revolution

PREFACE

Praying is an obligation for Muslims, which have to be done five times a day; they are dzuhur, Asar, Maghreb, and the early Morning Prayer. For the execution time, Allah swt, and His Prophet provide guidance by intimation, such as mentioned in QS. Al-Isra (17:78) :

Translation:

Establish prayer at the decline of the sun (from its meridian) until the darkness of the night and (also) the Qur'an of dawn. Indeed, the recitation of dawn is ever witnessed.¹

This verse Allah swt, does not elaborate the limitation of praying time, but hadith of Prophet saw, as *tabyin lil Qur'an* explain the time of prayer clearly, based on data and the circumstances of the sun. Which means:

Narrated by Jabir bin Abdullah ra. Said: it came to the Prophet saw, Gabriel as, he said to him: get up and establish prayer; then Prophet saw pray on dzuhur, then the sun had slipped. Then Gabriel came to the Prophet again, at the time of Asar, he said: get up and establish the prayer, then the Prophet pray for Asar when the shadows of things were similar. Then Gabriel came again at the time of Maghreb, he said: get up and pray, then Prophet saw, pray for Maghreb when the sun had been set. Then Gabriel came again at the tiem of isya he said: Get up and pray; Prophet Saw then pray for Isya when mega red had been immersed. Then Gabriel came

¹Departemen Agama RI. *Al-Qur'an dan Terjemahnya* (Semarang: PT.Karya Toha Putra, 2002), pg. 436

again to him at the time of dawn, Gabriel said: get up and pray, prophet then pray for dawn at the time of dawn had risen, or the time of sunrise.²

Thus the time of obligatory prayers that were explained in Hadith of Prophet saw, as *tabyin lil Qur'an*

Delivery hadith of Prophet about the time of prayer with intimation ways, Muslims will have difficulties if they are guided by the hadith, especially when raining season because the will not appear (cloudy). The advance of science and technology, coupled the advancement knowledge of Muslims, so the time of prayer as explained by the tradition of Prophet saw, can be adapted with the time of hour, based on the relevant data area, for example on June the prayer of Maghreb exact at 18.00 or less than 18.00 Central Indonesian Time (CIT).

Prayer practice done by Muslims established daily prayer is guided by the hour, based on the result of arithmetic of the relevant data area, so Muslims must not go outside to measure and see the sun. but what has to be observed is clock appointment in a week, or every month is not similar, for example; on June the prayer time of Maghreb at 18.00 CIT, but on July the time of maghrib prayer is not the same as at 18.00 CIT. the difference or change of the time prayer is the effect of rotation, earth revolution.

In modern age, astronomy uses many math in its practice, there is no doubt in its success, on the other hand modern astronomy uses data controlled by observation every time. That is why astronomy is said provides the Qath'i result and sure. It is Important to be remembered that astronomy gives the result of calculation of time and position.

B. DISCUSSION

1. Rotation, Earth Revolution

Everything is not easy to be understood perfectly, without firstly known what the definition of those. So the writer will elaborate about "the earth and its coordinates," they are;

Earth

As comparative material (Comparison) the writer will propose definition of earth as mentioned by the expert, they are:

Suripto Probodipuro

"Our earth is a planet, namely a sky thing such as the sun, the moon, and the stars."³

John Wiley and Sons

"The third planet out from the sun is our Earth."⁴

Mustafa, KS

"Earth is a planet which is the third from the sun after Mercury and Venus."⁵

Based on some definition above, the writer conclude that earth is the third planet from the sun, or Natural (World) which is placed by creatures including human as place to live.

² Asy-Syaukani, *Nailul Authar*, Juz.I (Mesir: Mustafa, al-Babil Halaby wa-Auladah, 1063) pg.436

³ Suripto Probodipuro, *Ilmu Pengetahuan Bumi dan Antariksa (IPBA)*, (Surakarta: Widya Duta, t.t), pg.57

⁴ John Wiley and Sons, *Planets, Stars and Galaxies*, (U.S.A, Library of Congres Card, 1961). Pg. 55

⁵ Mustafa KS, *Islam dan Kehidupan Biologis di Angkasa luar*, (Print.I.Bandung: PT. Al-Ma'arif, 1982) pg. 41

Rotation

Bambang Hidayat explained:

“Earth Rotation is a rotation of the earth around its axis.”⁶

Kuswanto, Said that:

“Earth Rotation is earth spinning on its axis”⁷

Based on the explanation of the expert, about the earth rotation, it is concluded that the rotation of earth is a spinning or earth on its axis that ends North Pole and South Pole.⁸

Among sky objects which are relevant to the worship function is the sun, earth, and moon. The orbit of those three objects is so important that guide the time of prayer, the first moon of qamariyah, the number of years etc.

The movement of earth rotation, with 360° for one rotation, is run for 23 hours 56 minutes 4 second.⁹ It is then accomplished to 24 hours. This fact can be used as guide to compare between unit degrees and unit time, namely with comparing every 1 hour cover distance of 15°, every 1° is covered for 4 minutes, every 1 minute is similar to 15 minutes, and 1 minute is similar to 15 second.

Comparison of unit protractor, unit time, and unit of distance can be used as guide to do conversion, from degree to hour or otherwise.

Revolution

As the definition of earth and its rotation, the writer also will elaborate the expert opinion about earth revolution.

1. Abdur Rachim said that:

“Earth revolution is the orbit of earth to the sun, applied on west east direction in one year.”¹⁰

2. Bambang Hidayat

“Earth revolution is orbit of earth rounding the sun.”¹¹

3. Kuswanto

“Earth Revolution is earth completing its orbit, in 365_{1/2} days”¹²

Based on the expert explanation, the writer clearly defines that earth revolution is calculation of completing or earth rounding the sun through its orbit called in astronomy, in which earth rounding the sun with direction of the circulation which anticlockwise.¹³

In the relative way, the movement of earth can be recognized because it can be seen that it move from its place among the stars. If it is compared with its place from the previous day, easy

⁶ Bambang Hidayat, *Bumi dan Antariksa*, Jld. I (Edition.VII, Jakarta: PN.Balai Pustaka, 1983),pg.41

⁷Kuswanto, *Ilmu Pengetahuan Bumi dan Antariksa*, (ILMISA) Jld. III,(Edition.III, Solo, Tiga Serangkai, 1983), Pg 47

⁸See M.Syuhudi Ismail, *Waktu Salat dan Arah Kiblat* (Ujung Pandang,Taman Ilmu, 1983), Pg. 48

⁹See Muhyiddin Khozin, *Ilmu Falak dalam Teori dan Praktik*, I (Surabaya: Diantama, 2005), Pg. 4

¹⁰Abdur Rachim, *Ilmu Falak*, (Edition.I, Yogyakarta: Liberty, 1983), h.43

¹¹Bambang Hidayat, *Bumi dan Antariksa*, Jld. I, (Edition.VII, Jakarta: PN.Balai Pustaka, 1983), Pg.36

¹² Kuswanto, *Ilmu Pengetahuan Bumi dan Antariksa* (ILMISA)Jlt. III,(Edition.III,Solo Tiga Serangkai, 1983), Pg.49

¹³ See Maskufa, *Ilmu Falak*, (Edition.II, Jakarta : Gaung Persada, GP.Press, 2010), Pg. 46

way to recognize the movement is, if every day in a row in maghrib time, doing observation to the new stars that rise on the east horizon, and the next few days will appear, that the new stars rise every day will get higher and higher.

2. Earth as one of the solar system

Earth as a placed today is one of universe part which is so important to be discussed and understood, as earth can be found various phenomena in which will not be found on the other part of universe. The existence of earth in this universe is not alone and free. It is connected to the other solar system and influenced by the law of this truly wide universe.

The understanding of astronomy about earth is as an object of sky spinning on its orbit, and has influence to the earth itself. This is properly similar to al-Qur'an al-Mulk QS 67:5

Translation:

And We have certainly beautified the nearest heaven with the stars and have made (from) them what is thrown at the devils and have prepared for them the punishment of the Blaze¹⁴

This verse provides information that sky contains the stars called the sky of earth, and that is the well-known sky. So the object of sky can be divided into two, they are the moving object of sky called planets (al-Sayyarat), and unmoving object commonly called as stars (al-tsawabit).

Earth is only one small object in the universe. Moreover, it is said that how small earth in front of the universe, earth is like a very small point.

After the writer elaborated definition of earth, rotation and revolution of earth, the writer then would explain about solar system, it also would be discussed about the theory of earth and its coordinate.

In the earth, since mankind had known and studied about astronomy, they knew and studied about the stars, planet, and solar system on earth. In the morning, the sun rises in the east. It then slowly moves up until noon and it reaches the highest level in our place. Next, it descends slowly to the west. Finally in the afternoon the sun sets in the west. If the night is bright and clear, the stars appear clearly, there are such certain groups, it also pictures such as animal or other thing.

Leo, scorpion stars for example are stars moving from east to west. To observe about moving sun and moon is not difficult to do because both of them are clear to be observed, either their shape or their position. For the far stars, to observe them it firstly recognize certain constellation of stars then it can be observed carefully. Those objects of sky are placing so wide area that is called universe.¹⁵

¹⁴Departemen Agama RI. *Al-Qur'an dan Tafsirnya*, Jld. (Edition. III; Jakarta: Lembaga Percetakan Al-Qur'an Departemen Agama, 2009),

¹⁵ The universe or Universum in the terminology of Astronomy, is space and all matter and energy within it, even if only a small portion of celestial objects that are objects of calculation, for the sake of religious practices, for example: the sun, moon and earth on his position as a result movement. This is because all the commands execution of worship, both worship Mahda and worship social, time and manner of implementation of a general nature not in great detail, so for the time and manner of its implementation, must involve the heavenly bodies (the Sun Moon and Earth), for the implementation of worship can be done well and perfect. See Ahmad Izzuddin, *Ilmu Falak Praktis*, (Edition.II. Semarang:PT. Pustaka Rizki Putra, 2012) Pg 1-2

When observing, human succeed to formulate theory what the central of those object on the sky in the universe is. by this question there some scientist define about theory the central of sky objects. There are some of them become popular. They are;

Theory of Egocentric

"Ego means me", centrum means central based on to the definition of language term.¹⁶ According to this term, Theory of Egocentric is "an understanding consider that is what become the central of everything in this universe is human itself, where their position are."¹⁷

The writer cannot completely recognize who sparked the theory of Egocentric firstly, it is only said that the theory came from experiences. Human stands on earth, they then looked up to the blue sky appearing on the eyes such a big circle warped to certain line which is circles, it is then called horizon, or firmament. So the writer conclude that the theory of egocentric consider that the place of human are that is the central of universe.

Theory of Geocentric

Geo means "earth" meanwhile centrum means "central". It means that earth is central point from everything in this universe. The theory is defined by Claudius Ptolomeus (90-168), an expert in astronomy from Greece Alexandria; it also called theory of Ptolomeus.¹⁸

Next, the book *Planets Stars and Galaxies* explained that theory of Ptolomeus is:

- Ptolomeus wrote that earth is in the middle of sky in which is a place for observer if they get out in the night to see constellation.
- He said that earth is similar to a point when compared with sky...

He then explained that earth does not move, spin on its axis, so does spin around the sun.¹⁹

According to the explanation, it is clear that earth based on theory of Geocentric created by Claudius Ptolemeus "placing earth in the central. The sun and other planets rotate it."²⁰

The theory of Ptolomeus has spread on earth, and well known at the time. Furthermore it is used by expert in astronomy at the same age \pm 14 century ago. Next, in the XVI century, after astronomy scholar had observed more deeply, it made the new theory which is known theory of Heliocentric. (The sun becomes central of solar system).

It has been so long for Human (the expert of Astronomy) tried to exhibit proper universe with the observed symptom. In ancient Greece age, it was started by creating the model of a ball device paired with another, and rotated around earth as the central point surrounding the other sky object and rotate earth for 24 hours. This opinion was believed for 16 centuries until Copernicus then continued to Galilei with his telescope which placed the sun as the central of planets orbit, by explaining about the real movement based on spinning earth to its axis.

Argument of expert about universe changed with the advance of medium to observe, and the advance of physic articulated by Newton (last XVII century), Lavoiser (last century XVIII), with

¹⁶See M.Syuhudi Ismail, *Waktu Salat dan Arah Kiblat*,(Ujung Pandang: Taman Ilmu, 1983),Pg.7

¹⁷See M.Syuhudi Ismail, *Waktu salat dan Arah Kiblat*, Pg.7

¹⁸See Jhon Wiley and Sons, *Planets Stors and Galaxies*,(U.S.A. Library of Congress Catalog Card, 1961) Pg.85

¹⁹Jhon Wiley and Sons , *Planets Stors and Galaxies* (U.S.A. Library of Congress Catalog Card, 1961) Pg.85

²⁰Keith Wilkes, *Religion and the Science*, Diterjemahkan oleh Staf Yayasan Cipta Loka Carana dengan judul *Agama dan Ilmu Pengetahuan*, (Edi, III, Jakarta : Sinar Harapan, 1982), Pg.24

the concept of eternal things argued that the universe is unlimited and its size is unpredictable. Among the physic expert, they said that material is eternal. the material will not disappear. It only changes to the equal energy. This universe is static, qadim, and eternal. In short, this opinion is against with Islam thought.²¹

Theory of Heliocentric

Helios means “the sun” centrum means “central” it is articulated by heliocentric that the sun is the central point of solar system. The theory was defined and improved by Nicolaus Copernicus (1473-1543) German who succeed in math. A more deeply elaborating study about relation among earth, planet, and sun, which in the end he succeed to create another theory called theory of Heliocentric.

The theory explained that; earth spins its axis, and with the other planet rotate the sun. Moreover, this theory explained that:

It is not earth which becomes central point of sky object, but the sun is the central, rotated by Mercury, Venus, Earth, Moon, Mars, Jupiter, Saturn, and then some stars like the sun. Astronomy of the sky object rotating the sun forms circle.²²

Based on that fact, the planets moving around the sun with their orbit forms ellipsis to the anticlockwise if seen from North Pole, in fact direction of planet revolution is similar to the sun rotation. It is different from what is observed from earth in which the daily rotation of sky objects such the sun, moon, and the stars is positive such as the direction of daily sun direction that rises in the east then set in the west. The reality made expert of astronomy conclude that solar system formed by material rotated with negative direction.

Theory of Kepler

One century after the theory of Copernicus came, an astronomy scholar from German named Johannes Kepler, (1571-1630). Kepler succeed to correct and to complete the theory of universe articulated by Copernicus. Using modern and sophisticated tools for the new math, such as logarithm and trigonometry finally argued three arguments called Kepler law. The three arguments are:

a. Theory of Kepler I:

The orbit of each planet is ellipse. The sun is one of the focuses.

b. Theory of Kepler II:

The line connecting between planet and the sun during the revolution of the planet is through the same long as their orbit time.²³

c. Theory of Kepler III

Quadrante when the revolution of the planets is proportionate with third degree with the average distance of the sun.²⁴

Theory of Planetesimal, Thomas C. Chamberlin (1843-1928)

It is called Planetesimal since it means small planet. The planet came from solid material. Furthermore, the sun also has existed as one of many stars. At one time, there was a star which is not far so the sun and that stars was pulling each other. When the stars went away from the sun, the solid material came back to the surface of the sun. Meanwhile the other were around

²¹See Achmad Baiquni, *Al-Qur'an dan Ilmu Pengetahuan Keamalan* (Yogyakarta: PT.Dana Bhakti Prima Yasa, 1997), Pg.201

²²See M.Syuhudi Ismail, *Waktu Salat dan Arah Kiblat*, Pg.10

²³Bambang Hidayat, *Bumi dan Antariksa*, h. 26

²⁴ M. Syuhudi Ismail, *Waktu Shalat dan Arah kiblat*. Pg. 12

the sun. This was what was called Planetesimal which in the future they became the planets spin to their axis and rotate the sun. ²⁵

In short what was observed by the experts such as theory of egocentric, Geocentric, Heliocentric was what the central point of this universe became. Otherwise, theory of Kepler and Planetesimal by Thomas C. Chamberlin is a theory observing the form of astronomy circle of planet and the movement of those planets. The truth of those theories is accepted until today such as theory of Heliocentric which argued that the central of solar system is the sun. Then, Kepler's law generally is used by many astronauts to calculate the distance of Planet to the Sun as the central point of our solar system.

Salat or Prayer is one of Islamic pillar that has to be established by Muslims. Prayer is important and special worship in Islamic thought which has been determined their time. It is agreed with hadiths Prophet saw, in which he gave signal that prayer is a measurement of someone path. The quality of someone path can be measured by their prayer because what make different from non Muslim is prayer. That is why Islam has decided that prayer is the principal worship, special, and fundamental which must establish certain time except certain circumstances which was arranged by syariat Islam. The command of prayer at the certain time is clearly said in al-Qur'an and hadiths. They are;

QS an-Nisa verse 103 means:

And when you have completed the prayer, remember Allah standing, sitting, or (lying) on your sides but when you become secure, re-establish (regular) prayer. Indeed, prayer has been decreed upon the believers a decree of specified times. ²⁶

The verse clearly explains that establishing the prayer has to be certain time. It shows that it cannot be postponed since the time has been determined by syar'i.

Then Hadith narrated by Abdullah ibn Mas'ud r.a. which mean:From Abdullah bin Mas'ud r.a. said: I have asked the Prophet. Which most preferred practice of Allah, Almighty? Prophet. answered: prays in time, I asked again, Then what else? Messenger of Allah said: filial to your parents, I ask again: what then? He replied; strive in the way of Allah.²⁷

Based on cues and instructions of the Qur'an and the traditions of the Prophet, the authors conclude that:

- a. Early duhur prayer time, since the sun slips, and ends when the shadow of something (like a stick that enforced) equal in length to the object.
- b. Asar time when the shadow of a body, twice the length of the object, or the sun is still clean / clear (not yellow).
- c. Maghreb time, since sunset, and ends when the mega red light in the west lost.
- d. Isha time, since the disappearance of mega red glow on the horizon west, ending up half the night.
- e. The dawn of time, since dawn, and ends when the sun had risen.

Thus provisions are obligatory prayers five times a day, between the salat prayer with others is continued, ending in a prayer that the next time to pray.

²⁵See, Maskufa, *Ilmu Falak*, (Edition. II, Jakarta: Gaung Persada GP. Press. 2010), Pg.30

²⁶Kementerian Agama RI, *Al-Qur'an dan Terjemahnya* (Jakarta: Syamil Qur'an, 2011), Pg. 95

²⁷Al-Asqalany, *Fathul Bary*, Juz. II(Mesir: Mustafa Al-Babil Halaby wa- Auladuha, 1378 H/1959 M) Pg.148

Be aware that the prayer time, one place to another place is varied, due related to the circle of the sun, it determines the times of prayer, we need to know a geographic location, such as how the latitude and longitude, and so on.

Greenwich time

For international interest, the purposes of scientific, we need to hold a valid universal time together. For this purpose it has been agreed that the time on the longitude that passes through a town named Greenwich, a city of viewer tool the oldest stars in the world, near the city of London, England.²⁸

Greenwich is 0° longitude, the time it occurred in the 0 ° longitude that is called the Greenwich Time or Greenwich Mean Time, or Greenwich Civil Time, as the daily GMT.

Earth is occupied at the moment, is divided into two regions longitude, the longitude East and West longitude, with degrees of longitude numbers are between 0 ° to 180 ° East longitude (BT), and 0 ° to 180 ° West longitude (BB). Each longitude is 15o or 15o multiples, to the east and the west longitude 0 °, longitude designated as Standard or Benchmark longitude, and time is called standard time or local time.

Based on on the description, it can be stated when Greenwich show the hours 10.00 am, for example: the local time at the longitude 30° standard BB, clock showed 8.00. It is obtained from 10.00 hours minus 2 hours. 2 hours is obtained from large standard longitude 15° and 30° divided then multiplied by one hour. Reduction was done, because the longitude of the standards is in the west of Greenwich.

In contrast, if the area is located at longitude 30° standard BT, the clock showed 12.00 figures. This figure was obtained from 10.00 hours plus 2 hours. The addition is done, because the standard is the east longitude Greenwich. So, the writer concluded that, any displacement of the place or area of 15°, to the West longitude, it must be reduced for 1 hour. Similarly, if the opposite occurs or if the displacement of the place or area to the East longitude of 15° degrees, it must be added (advanced) for 1 hour.

This is done because the area or place is in the East longitude, it firstly experienced the dark (night), if compared to regions or places in the western longitude.

Mintikad in Indonesia

The term Mintakad time in Indonesia, often called Local Time in Indonesia.

As in other countries in the world, which already have time zones, for example in our country (Indonesia), which consists of thousands of islands, situated between longitude 95 ° east with 140o 50m BT, have established or divided the time, as already known that, before the 29th of November 1963, the State Indonesia imposed a six (6) local time. Namely:

- | | |
|-----------------------|----------------------------|
| 1. North Sumatra Time | = GMT + 6 hours 30 minutes |
| 2. South Sumatra Time | = GMT + 7 Hours |
| 3. Java Time | = GMT + 7 hours 30 minutes |
| 4. Sulawesi Time | = GMT + 8 hours |

²⁸See M.Syuhudi Ismail, *Waktu Salat dan Arah Kiblat*, Pg.59

- | | |
|--------------------|--------------------------------|
| 5. Maluku Time | = GMT + 8 hours 30 minutes |
| 6. West Irian Time | = GMT + 9 Hours. ²⁹ |

The advancement of science and technology become more sophisticated, with the rapid development in the world of traffic and communication, air, land and sea, the government of the Republic of Indonesia reassess on a zoning the existing (valid). At the end of November 29, 1963, issued Presidential Decree number: 243/1963 which sets Indonesia is divided into three (3) local areas time i.e.:

1. Indonesia Barat

It is Covering an area of Level I, and Outstanding in Sumatra, Java, Madura and Bali with the time GMT + 7^j 00^m Benchmark and Benchmark 105° BT.

2. Central Indonesia

Covering an area of Level I, Kalimantan, Sulawesi, and Nusa Tenggara, with time Measuring GMT + 8^j, 00^m, and the degree of Benchmark 120° BT

3. Eastern Indonesia

Covering an area of Level I, in Maluku, and Irian Jaya, with time Measuring GMT + 9^j,0 and 135° BT.³⁰

Based on the information above, it can be understood that at the time of Indonesia is divided into six (6) local time, has a time difference boundary between the areas adjoining half an hour. However, after the State of Indonesia is divided into three local areas time, then the western Indonesian time with a time of central Indonesia, has a difference of one hour. Neither happened between the times of central Indonesia at the time of Eastern Indonesia, have difference of one hour. Then the difference between the time the western part of Indonesia, the eastern part of Indonesia time, have a margin of two hours. This provision is based on the difference in longitude, because each area defined by longitude big difference is 15° and 15° longitude difference calculated every one hour.

Solar Time

The time used daily as a guide in the implementation of worship designated by the hour is based on the daily journey of the sun. If sunrise is categorized that day was 6.00 hours, and when the sun is at the zenith or (culminate on) means that the sun is already showing 12.00 hours, and if the sunset means the show at 18:00, and if the sun is at the bottom in meaning (culminated below) means the day at 24.00, or in colloquial language that is very popular is called to 12:00 midnight. So for a day and night takes an average of 24 hours, then it is understood in the community with solar time, or the intrinsic local solar time.

Because the sun's ultimate journey is not fixed, it means that a day and night can sometimes take more than 24 hours, and sometimes less than 24 hours. To find out sooner or later than the sun traveling essentials, is to use the sun's imaginary which journey is completely flat course, which is a day and night in a distance of precisely 24 hours. Sun imaginary time is called a mid or middle solar time.

If the solar time is compared to the middle, there will be differences in time are always changing between the two. The difference between the two at that time known as Perata Time³¹

²⁹See Abdur Rachim , *Ilmu Falak*, (Edi,I.Yogyakarta: Liberty,) Pg. 56

³⁰Dep. Agama RI, *Almanak Hisab Rukyat*, (Jakarta: Proyek Pembinaan Badan Peradilan Agama Islam, 1981), Pg.167

³¹See *Ephemeris Hisab Rukyat*, (Jakarta: Ditjen Bimbingan Masyarakat Islam, Kemenag.RI, 2011) Pg.2

Based on description above, it can be concluded that the time based on actual solar which journey is called the solar time. And time designated by the sun imaginary time journey time is called middle. Then the time difference between solar time with the time the mid-is known as *prata time*.

Meridian Time

Time is usually used in the entire universe, is a Meridian area. For the purposes of Meridian time, the earth is divided to 24 sections the area of each 15° , then called local time (Zone Time). Based on the Regional division of the time, then every time zone covers an area lying between $7^\circ 30^m$ in the east and $7^\circ 30^m$ in the west of longitude east part of the standard areas concerned. Therefore, all the places that are in a time zone must be adjusted time is to the standard longitude. Time set in this way is called Meridian Standard Time, or commonly abbreviated with Meridian time.

Since every region in the world is not the same degree of longitude, on the standard these different regions longitude will certainly get a different sun. For example it could be addressed in this study, local time Central Indonesia (WITA), longitude 120° BT while longitude Kendari $122^\circ 35^m$. If you want to know the time in Kendari, then longitude standards must be reduced by longitude Kendari, for example: $120^\circ - 122^\circ 35^m = 2^\circ 35^m$, the result is then used as hour / minute by means of shared 15° , ($2^\circ 35^m : 15^\circ = 0^\circ 10^m 20^d$), then the results time is added to the time Kendari, if you want to know the local time (Kendari).

Of description above, it can be stated that the time based on the local meridian is called Meridian Time, because each place has its own longitude, therefore each place has its own meridian time. Subsequently the place or area that is located on the same meridian necessarily have the same local time as well, since the place or area that people on seeing the sun passes the meridian at the same time.

The Motion of the Earth

As well as the globe can be rotate on its axis, so does the world we live in today, "not static, but rather circulate at the speed of about a thousand miles per hour".³² The motion of the earth there is applicable on its axis, called the rotation, besides there is also moved around the sun through the celestial sphere, called a revolution. Both the motions of the earth take place according to the direction from west to east. it is very clear to can be believed that the earth was moving, since "if the earth does not move / spin, there definitely will not be a change of night and day". The Earth's motion indicates with certainty that if the earth does not move / spin, then it will happen tonight continuous and prolonged, or would otherwise occur during continuous and prolonged, until the Day of Judgment will come. This is stated in the word of Allah, as contained in the Qur'an in Surah al-Qasas verse 71 as follows:

Translation:

Say, "Have you considered: if Allah should make for you the night continuous until the Day of Resurrection, what deity other than Allah could bring you light? Then will you not hear?"³³

It need to be understood beside rotating / moving on its axis (rotation), for one rotation, takes an average of 24 hours, and this is called a day and night, this motion is called the daily motion

³²See Waheduddin Khan, *Islam Menjawab Tantangan Zaman*, (Edition. I, Surabaya: PT. Bina Ilmu, 1982), Pg. 59

³³Kementerian Agama RI. *Al-Quran dan Terjemah*, (Jakarta: Syamil Quran, 2011), Pg.384

of the earth. Subsequently besides spin on its axis also rotates through a trajectory called the celestial sphere of the earth, the earth's rotation on the orbit is called revolution, for one revolution taking an average of 365 1/4 days or one year. The motion of the earth in an orbit called the annual the motions.³⁴

It can be concluded that the earth we live in is indeed moving, then the motions of the land is circulate on its axis, there is also a move / revolve in its orbit. And both the motions of the earth, very influential on the world we live in today.

Earth Rotation

As we understand, that the earth we live in is spinning on its axis that the polar ends of the North and South poles, rotation of the earth on its axis, called "rotation."³⁵

Nicolaus Copernicus was the first inventors to propose that: "Earth is rotating around its axis once round within one day (24 hours)",³⁶ by direction from West to East.

The events the Earth's rotation has led to numerous influences that can be seen in the nature of the universe, as a sign and at the same time can also be used as evidence that the Earth is actually rotating. This incident (Rotation of the Earth) results in a change of day and night. It happens since the Earth does not have its own light, so that heat / light derived from the sun, the surface of the Earth facing the sun gets bright light supply. So that part of the earth is experiencing bright daylight. Instead, the surface of the earth to the sun did not receive the supply of light and dark, so that any part of the dark earth is called the evenings. The influence due to the depths of the earth to the sun before, or after another, then there was a change of day and night on this earth.

The change of day and night regularly by itself between one region and another time will experience the difference. A region facing the sun first time is from the area to the west. Colloquially, the east region is getting first getting sunlight. Otherwise getting in the western region that is getting slower the sun. Because the Earth rotates on its axis in one circumference along with a loop or 360°, and applied for 24 hours, then every 15 ° equal to 1 hour, and every 1° equal to 4 minutes. The occurrence of the difference time in these areas is a proof due to the rotation of the earth.

Therefore, it is clear that the presence of the Earth's rotation that takes an average of 24 hours, a great effect on the timing between one regions to another. For example, if Irian has entered a time of prayer dzuhur then that moment in time not yet entered duhur , because it is located more to the west than New Guinea, Irian earlier so the city was illuminated by the sun rather than the city of Kendari. For more details on the comparison period, the writer proposes the comparison between Irian to Kendari and between Irian to Jakarta. If Irian already showed 08.00 hours in in the morning, then Kendari shows 07.00 hours in the morning, while in Jakarta shows 06.00 hours in the morning. The The time difference can be detected through the difference in longitude area. As explained earlier, that Indonesia has been divided to three (3) local time to three (3) types of longitude areas where between one region adjoining the longitude of different 15°, or the time difference between the two regions adjoining is one hour.³⁷ For example Irian has longitude 135°, Kendari longitude 120°, and longitude 105°

³⁴See M.Syuhudi Ismail, *Waktu Salat dan Arah Kiblat*, Pg. 48

³⁵See Maskufa, *Ilmu Falak*, (Edition. II, Jakarta: Gaung Persada ,GP. Press) Pg. 43

³⁶See Suripto Probodipuro, *Ilmu Pengetahuan Bumi dan Antariksa*, (IPBA), (Surakarta: Widya Duta, t.t.), Pg. 49

³⁷See Bambang Hidayat, *Bumi dan Antariksa*, jld. I, (Edition.VII; Jakarta: PN.Balai Pustaka,1983), Pg.42

Jakarta. To distinguish the the three time of the areas, then the first thing to note is the longitude of the area, then it is divided longitude 15°, and then multiplied by 1 hour. As the three an example for that the writer suggested longitude to three area of three square areas that have been stated above, namely:

1. Longitude Irian in general to be a region of 135° WIT local time, the results

$$\frac{135^\circ}{15^\circ} \times 1 \text{ hour} = 9 \text{ hour}$$
2. Longitude Kendari area in general to be a region of 120° CIT local time, the results

$$\frac{120^\circ}{15^\circ} \times 1 \text{ hour} = 8 \text{ hours}$$
3. Longitude Jakarta area in general to be a region of WIB 105° local time, the results

$$\frac{105^\circ}{15^\circ} \times 1 \text{ hour} = 7 \text{ hours}$$

In short, the time difference between Guinea to Kendari is 1 hour difference. While the time difference between Irian and Jakarta is a difference of 2 hours. These results were obtained in a way that the local longitude minus to longitude, the result is divided 15° then multiplied by 1 hour. To prove the existence of the time difference with time Irian Kendari as described above, and then the procedure is = $135^\circ - 120^\circ = 15^\circ$. 15° used as = $\frac{15^\circ}{15^\circ} \times 1 \text{ hour} = 1 \text{ hour}$.

Then to get the time difference with time Irian areas of Jakarta, the procedures to be performed are: $135^\circ - 105^\circ = 30^\circ$. 30° made hour = $\frac{30^\circ}{15^\circ} \times 1 \text{ hour} = 2 \text{ hours}$.

15°

Based on and formula or the above-mentioned procedure, evident mathematically, astronomically (arithmetic / astronomy) Irian and Kendari difference in time one hours, while between Irian and Jakarta area, the difference in time is 2 hours. In this case the writer affirmed that if the area was asked has greater longitude, it must be added. Conversely, if the area being asked has smaller longitude, it must be deducted.

These are among the events that occurred as a result of the occurrence of a rotation of the earth. But there are still plenty of other events or influence resulting from the rotation of the earth, and which can be summarized as follows:

1. The occurrence of day and night
2. The occurrence of the time difference in the regions
3. The occurrence of apparent motion (relative) on celestial bodies
4. The occurrence of the turn of the tide and the low tide in ocean
5. The occurrence of deflection of the trade winds (legal Buys Ballot)
6. The occurrence of mapping the earth at both poles.³⁸

Revolution of Earth

As already described, besides circulating the earth on its axis the earth around the sun is often called the celestial sphere of the earth. Revolution or rotation of the earth on its orbit is known and name of the revolution of the earth.

³⁸See M.Syuhudi Ismail, *Waktu Shalat dan Arah Kiblat*, Pg.49

Earth circulating in orbit around the sun in one year or precisely is in 365,242199 days or 365^h 5j 48^m 46^d.³⁹ And the direction of revolution of the Earth is also from West to East as the direction of rotation of the earth.

While the earth encircles the sun, the positions of its two poles are not perpendicular, but the Poles form an angle 66° 30^m, so that the earth is tilted at an angle of 23°30^m.

FINAL

Conclusion

1. the way to prove that the Earth's rotation and revolution affect the timing of prayer is by hisab. Since the influence of rotation and revolution resulted in the afternoon and evening, by these events would affect the determination of the start times of prayer for each place, the most easterly region would firstly be night, from the spot in the west. The obligatory prayer five times a day has been timed by cues Quran and al-Hadith. Thus performing prayers on time is an obligation that cannot be negotiable, then performing prayers on time that has been determined that it is required a knowledge that Muslims can avoid establishing prayers outside of time.
2. Earth's rotation and revolution is closely associated with the timing of the obligatory prayers five times a day. Since with the rotation of the earth, then there was a change of day and night on the earth's surface uniformly. The incident itself constitutes a prayer from one place to another place is not the same. Likewise with the Earth Revolution also resulted in a change in the length of day and night. The events will also lead prayers always experience the difference hours, between one place to another. Although science technology has advanced, and growing and has shown progress by leaps and bounds now, but the calculation (computation) astronomy is still needed (required), as a science that has a very big role in the implementation of daily worship for Muslims because all worship for Muslims not out of time, especially the problem of determining the time of the obligatory prayers five times a day.

Suggestion

1. the explanation of al-Quran and al-Hadith, praying must be performed in time. then to avoid the implementation of prayers outside or before the time, Muslims are not only based on the designation clockwise alone but also using the results of the calculation (computation) astronomy, in relation to the determination of the times of prayer, the truth can be believed and proven and accountable scientific.
2. Presumably students IAIN Kendari in general, and particularly the students of the Faculty of Sharia, more eager to learn and explore Science swallowed astronomy will dim era of today's modern technological advances. As well as to promote and assure the Muslims, that astronomy is essential usefulness (benefit) in the implementation of daily worship for Muslims.
3. Realizing the fact today, the importance of astronomy in relation to determining the times of prayer and worship other Muslims, then presumably the sciences (astronomy) could presumably serve as the principal subject in all Faculties in IAIN Kendari.

With the completion of writer propose conclusions and suggestions, then this study is finished. Finally, the writer says a prayer to the presence of Allah Subhanahu wa Ta'ala. Hopefully this research can be beneficial to all Muslims in general, and especially to writers and academics IAIN Kendari.

³⁹Saadoe'ddin Djambek, *Hisab Awal Bulan*, (Edition.I; Jakarta: Tintamas, 1976), Pg. 3

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