CONVERGENCE OF *QIBLA* DIRECTION ACCURACY OF THE OLD AIR TIRIS GRAND MOSQUE KAMPA RIAU

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Abstract

The community experiences both positive and negative consequences as a response of *Qibla* direction calibration, particularly in the ancient mosque, an ancestral heritage mosque whose authenticity must be preserved. One of them is the Air Tiris Great Mosque in Kampar, which must be preserved from the initial stages of growth because it is a tourist destination and an item of cultural heritage. This article aims to verify the calibration of the *Qibla* direction of the oldest mosque in Kampar and the techniques employed by earlier scholars in measuring their *Qibla* direction using field investigations and data sources from observations and interviews. This article concludes that the *Qibla* direction is accurate and correct, the Air Tiris Grand Mosque was established in 1901, and that it has never undergone renovation. When the global *Qibla* direction was wrapped in religious intuition, the cleric at the time, Datuk Engku Mudo Songkal, used the sun's shadow to bring religious intuition and scientific truth together.

Keywords: Air Tiris Grand Mosque; *Qibla* direction; calibration; convergence

Abstrak

Kalibrasi arah kiblat menyebabkan pro-kontra di masyarakat, khususnya pada masjid 'kuno' sebagai masjid warisan leluhur yang harus dijaga keasliannya. Salah satunya Masjid Djami' Air Tiris di Kampa yang menjadi objek wisata dan cagar budaya sehingga tetap harus terjaga sejak awal pembangunan. Melalui kajian lapangan dengan sumber data dari hasil observasi dan wawancara, artikel ini bertujuan untuk mengetahui kalibrasi arah kiblat masjid tertua di Kampa dan metode yang digunakan oleh ulama terdahulu dalam mengukur kiblatnya. Artikel ini menyimpulkan bahwa Masjid Djami' Air Titis dibangun pada 1901, belum pernah dipugar sejak awal didirikan, arah kiblatnya sudah benar dan akurat. Ulama pada saat itu, Datuk Engku Mudo Songkal, menggunakan bayangan matahari ketika rashdul kiblat global yang dibungkus dalam intuisi religious sehingga terdapat konvergensi antara intuisi religius dengan kebenaran ilmiah.

Kata Kunci: Masjid Djami' Air Tiris; arah kiblat, kalibrasi, konvergensi

A. Introduction

The splendor and beauty of a mosque are not a top priority, but the most important thing to note is that the mosque must point exactly towards the *Qibla*, namely the 'Masjidilharam'. It is very likely that the *Qibla* direction for each mosque varies from one to another because many of the mosques also have buildings that are quite old so with the development of science, especially Islamic astronomy in determining the *Qibla* direction, it is easy to know the difference in *Qibla* direction. Even now there are many sophisticated tools that can be used to measure and determine the *Qibla* direction. Apart from that, islamic astronomers have made various applications that can help ordinary people determine the *Qibla* direction.

The absence of statutory regulations that should regulate the implementation of *Qibla* direction measurement is one of the reasons why people do not know who is authorized in this matter. Meanwhile, there is only the statement recommendation of MUI (Indonesian Council of Ulama) No. 5 2010 with the editorial: "The *Qibla* of Indonesian Muslims is facing Northwest with varying positions according to the location of each area". This statement was issued because of the fatwa dictum No. 03 section of legal provisions No. 03 which then gave rise to the confusion of interpretation and questions from the public regarding the legitimacy of prayers this law was issued which will become a guideline for the community.[1]

There is a tendency for the community to leave the problem of determining the direction of *Qibla* completely to figures from their own circle so that what is decided by these figures becomes a guideline for the local community which in the end not a few are known that the determination of the *Qibla* direction is not quite right. Many also occur in groups of people who do not have an open mind, so that in this situation it is certain that we will experience difficulties without approaching these figures, even in determining the *Qibla* direction in this way the ideas we get will be in vain. This can cause unrest among

[1] Majelis Ulama Indonesia, *Himpunan Fatwa Majelis Ulama Indonesia, Fatwa Terbaru 2010, Arah Kiblat* (Jakarta: Majelis Ulama Indonesia, 2010).

Indonesian Muslims because the *Qibla* issue is very important for the implementation of Islamic worship.[2]

The problem of *Qibla* direction has always been widely discussed by the people of Indonesia, which stems from several research results conducted by Islamic astronomers on mosques in Indonesia. They concluded that most mosques in Indonesia do not have the correct *Qibla* direction. However, in this case, there are many pros and cons in society. Not a few people who are less enthusiastic say that it is impossible to make changes to the *Qibla* direction of the existing mosque because the mosque is a sacred ancestral heritage, so its authenticity must be maintained. Including old mosques that have high historical and historical value. So that it needs to be reviewed regarding the *Qibla* direction for historic/old mosques that are around us.

Among the many mosques that have historical value in Kampa, the old Air Tiris Grand Mosque is one of the most prominent. This mosque is located on the edge of the Kampa river, to be precise at Pasar Usang Air Tiris. Apart from being used as a place of worship for Muslims, this mosque is also one of the Kampa 'icon' in a tourist attraction that has historical and mythical news. This is the reason tourists feel curious. The architecture which is very interesting and different from other mosques can be seen from the choice of colors and building materials to build the Djami' mosque, all of which are unique. Because this mosque is registered as a cultural heritage protected by the Law of the Republic of Indonesia and must maintain the authenticity of the building, this shows that the position of the *Qibla* direction of this mosque has also remained the same since the beginning of construction. Researchers feel it is very important to check the *Qibla* direction because based on information from the mosque takmir so far the Djami' mosque has been the benchmark for the *Qibla* direction of mosques and prayer rooms around it.

B. Method

This type of research is field research which is located in Tanjung Berulak Village, Kampa Riau, which is one of the old and historic mosques of , the old Air Tiris Grand Mosque. This research is qualitative research, presenting a review of opinions or theoretical

[2] Andi Jusran Kasim, "Analisis Keakuratan Arah Kiblat Masjid Di Kecamatan Tanete Riattang Barat Kabupaten Bone" 3, no. 1 (2019): 93–107.

studies such as using the trigonometry formula needed in determining the *Qibla* direction, the theory of the shadows of the Sun which is then relevant to the reality on the ground. There are two sources of data in this study, the primary source obtained from observations (observational data) and interview results. While secondary data sources were obtained from the results of documentation, namely literature relating to the *Qibla* direction and the socio-historical Air Tiris Grand Mosque.

Data collection techniques using observation techniques, interviews and documentation. Observations (observations) are used to retrieve *Qibla* direction data of the Djami' mosque using the *istiwa'* stick when the Global *Qibla* Rashdul and Local *Qibla* Rashdul calculations. Then make observations using Google Earth software connected to the internet. Interviews were conducted with the mosque administrator of the Djami' mosque who understand and know the socio-historical history of the mosque which can assist in conducting analysis regarding the accuracy of the Djami' mosque's *Qibla*. In addition, it also uses the documentation method to collect data related to *istiwa'* sticks and google earth as well as information related to the Djami' mosque.

C. Result and Discussion

C.1 Profile of Air Tiris Grand Mosque Kampa

Riau is a Malay area that has a strong cultural variety with Islamic nuances. In this area, especially Kampa, one of the historical heritages with high artistic value was found which was also used as evidence of past history, namely the Djami' Mosque. Among the many mosques that have historical value, this mosque is one of the most prominent. It is located on the banks of the Kampa river, to be precise at Pasar Usang Air Tiris, Tanjung Berulak Village, Kampa District, Kampa Regency, Riau Province, which is 54 Km west of the Riau provincial capital, Pekanbaru.[3]

The historical value attached to the Djami' mosque is a combination of physical and non-physical aspects. From a non-physical aspect, this mosque is a symbol of the unity of the Air Tiris community in developing Islamic religious teachings and filling this mosque with

[3] Abbas Hasan, *Masjid Djami' Air Tiris Sejarah dan Perkembangannya* (Pekanbaru: Suska Press, 2008), 11.

religious activities. Meanwhile, from the physical aspect of the building, the Djami' mosque was built during the Dutch colonial period and turned out to have a very unique architect. Because of the uniqueness of the Djami' mosque, it has become a cultural heritage based on the Decree of the Minister of Culture and Tourism Number: KM.13/PW.007/MKP/2004 concerning the establishment of the Siak Palace, the High-Density Hall, the Tomb of Sultan Kasim II, the Mosque Raya Syahabuddin, Koto Tinggi Tomb Complex, Tomb of Sultan Abdul Jalil Rahmadsyah, Dutch Barracks, Controller Building, Landraad Building, Djami' Ait Tiris Mosque, Bendang Kenagarian 50 Koto Traditional House, Pekanbaru Grand Mosque which is located in the Riau Province Region as a Cultural Heritage Object, Sites, or areas Protected by Law of the Republic of Indonesia Number 5 of 1992.[4]

Air Tiris Grand Mosque is also a mosque that has a very interesting historical and mythical story so many tourists visit it and many tourists are curious. This mosque is the oldest mosque in the Kampa district area it was built in 1901 by Datuk Enku Mudo Sangkal who was a major scholar at the time and then began to be actively used in 1904. movement of wood and stone. Even this mosque also has a stone that resembles a buffalo's head in a pond which has mysterious powers and stories. The local community thinks that this buffalo headstone can grant a wish so that these things become an attraction that makes this mosque often visited by tourists.[5]

The existence of the Djami' mosque as a place of worship makes this village a center for the development of Islam. The Djami' mosque building has similarities with other old mosques in the archipelago. Among them which consists of two fused building masses, the form of a stage with a pyramid roof or a three-tiered 'tajug' roof in the prayer hall and two in the mihrab room. The building structure is made of wood with a peg connection system.[6] This mosque is an old building with typical Malay and Chinese architectural constructions. Made of special wood and full of carved Malay Kampa motifs. The construction of this

[4] Ibid., 12–14.

[5] Riska Novita Basuki, "Factors Decision to Visit a Mosque Jami' Air TirisKampar Regent Riau Province," *JOM Fisip* 2, no. 1 (2015): 1–17.

[6] Dinamalia, "Kajian Struktur Kayu Pada Bangunan Masjid Jamik di Kabupaten Kampa Riau," *Jurnal Arsitektur Melayu Dan Lingkungan* 4, no. 1 (2017): 12–18.

mosque did not use nails or iron, which was built with the cooperation of the community or craftsmen from 20 'banjau' of the Ministry of Air Tiris and Limo Koto.[7]

C. 2 *Qibla* Direction Concept

Facing the *Qibla* is a condition for the validity of the prayer so it is not valid to pray without facing the *Qibla*, except for the khauf prayer, the circumcision prayer on a vehicle or boat which is allowed to face whichever direction the vehicle is facing.[8] In the practical, the method of determining *Qibla* direction from time to time has certainly developed. Starting from traditional methods that only use special sticks to modern methods based on satellite imagery such as *Qibla* Locator, Google Earth, and so on. In addition, from a theoretical point of view, determining *Qibla* direction cannot only be calculated using spherical trigonometry, scientific frameworks such as geodesy can also be used to calculate *Qibla* azimuth by approximating the shape of the Earth as an ellipsoid and navigation theory.[9] Facing the *Qibla* is a valid requirement for Muslims when performing fard prayers and other sunnah prayers.[10] Knowing the *Qibla* direction is mandatory for every Muslim, as Allah SWT says. Surah Al-Baqarah 144:

> "*We see the turning of thy face (for guidance to the heavens: now shall We turn thee to a Qibla that shall please thee. Turn then Thy face in the direction of the sacred Mosque: Wherever ye are, turn your faces in that direction. The people of the Book know well that that is the truth from their Lord. Nor is Allah unmindful of what they do.*"

Qibla direction is the closest direction or distance along the great circle that passes through the city of Mecca (Kaaba) to the city in question.[11] Direction in Arabic is called *jihah*

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[7] Hasan, *Masjid Djami' Air Tiris Sejarah dan Perkembangannya*, 13.

[8] Ahmad Wahidi and Evi Dahliyatin Nuroini, *Arah Kibat dan Pergeseran Lempeng Bumi Perspektif Syar'iyah dan Ilmiah*, ed. Abdul Halim Fathani (Malang: UIN Maliki Press, 2012), 11.

[9] Ahmad Izzuddin, *Kajian Terhadap Metode-Metode Penentuan Arah Kiblat dan Akurasinya*, ed. Mohammad Arja Imroni (Jakarta: Kementerian Agama Republik Indonesia, Direktorat Jenderal Pendidikan Islam, Direktorat Pendidikan Tinggi Islam, 2012), 2.

[10] Slamet Hambali, *Ilmu Falak 1: Penentuan Awal Waktu Shalat & Arah Kiblat Seluruh Dunia*, ed. Abu Rokhmad, *Semarang: Program Pascasarjana IAIN Walisongo*, 1st ed. (Semarang: Program Pascasarjana IAIN Walisongo Semarang, 2011), 67.

[11] Yusuf Somawinata, *Ilmu Falah: Pedoman Lengkap Waktu Salat, Arah Kiblat, Perbandingan Tarikh, Awal Bulan Kamariah dan Hisab Rukyat*, ed. Monalisa (Depok: PT RajaGrafindo Persada, 2020), 27–28.

or *syathrah* and sometimes it is also called *Qibla* which comes from *qabbala yaqbulu* which means facing.[12] The *Qibla* axis is the center line of the globe that connects the Kaaba to the opposite of the Kaaba through the center of the Earth. The *Qibla* direction in the Kaaba building is facing the Kaaba wall and may face north, south, west, east, northwest, southeast, southwest, northeast, and so on (free). Whereas on the celestial sphere, the *Qibla* direction angle can be defined as an arc calculated from the north or south point to the Kaaba projection through the horizon or horizon.[13]

C. 3 *Qibla* Direction Determination Methods

The determination of *Qibla* direction in Indonesia has developed from time to time. At first, the determination of the *Qibla* direction was just a guess, that is, by facing west because Saudi Arabia is to the west of Indonesia, so the *Qibla* direction at that time was exactly the same as the sunset. The classification of the method of determining *Qibla* direction to see accuracy in calculations is as follows:

Based on Calculation:

a) Loxodrome, namely calculation by following a fixed (constant) direction angle because it follows a small circle (small circle) even though the distance becomes far away, this method is used in navigation. So on a flat map (Mercator map) it appears that the path is straight even though the path on the surface of the Earth is curved.

b) Orthodrom (Spherical Trigonometry Theory and Geodesy/ellipsoid), namely calculations by following the angle of direction that is not fixed with the closest distance. The reference uses the great circle which divides the Earth's sphere into two equal parts and uses the reference point of the Earth's center which is a reference from spherical trigonometry and the theory of geodesy.[14]

[12] Watni Marpaung, *Pengantar Ilmu Falak* (Jakarta: Kencana, 2015), 55.

[13] Slamet Hambali, *Ilmu Falak: Arah Kiblat Setiap Saat*, ed. Ahmad Fadholi and Ismail Khudhari (Yogyakarta: Pustaka Ilmu Yogyakarta, 2013), 14–16.

[14] Ahmad Izzuddin, *Kajian Terhadap Metode-Metode Penentuan Arah Kiblat dan Akurasinya*, ed. Mohammad Arja Imroni (Jakarta: Kementerian Agama Republik Indonesia, Direktorat Jenderal Pendidikan Islam, Direktorat Pendidikan Tinggi Islam, 2012), 118–28.

Based on Directional Measurement:

a) Magnetic Compass is an ordinary compass that uses the help of the Earth's magnetic field to direct the compass needle to the north. Compasses that are classified as magnetic are marine compasses and induction compasses.
b) Rub'u Mujayyab and protractor are methods of measuring the *Qibla* angle with maximum accuracy which can only be achieved in minutes. It can be seen from the sexagesimal form contained in this quarter circle shape.
c) Theodolite, a tool used to measure angles which is a further development of the astrolabe and rubu' mujayyab. The use of this tool in Islamic astronomy is to measure the height of the sun, rukyatul hilal, and eclipses.
d) Star.
e) Sun.[15]

Based on Observations

a) *Rashdul Qibla*, namely the provision of time in which the shadow of an object exposed to sunlight points to the *Qibla* direction. *Qibla* direction is determined based on the shadow of a pole or stick at a certain time. This method is guided by the exact position of the sun or close to the zenith of the Kaaba. The latitude position of the Kaaba which is smaller than the maximum declination value of the Sun causes the Sun to pass through the Kaaba so that the results are recognized as accurate compared to other methods. *Rashdul Qibla* is divided into 2 types, namelyLocal *Qibla* Rashdul and Global *Qibla* Rashdul which occurs every year on May 27 (leap) or May 28 (basitah) at 11.57 LMT (Local Mean Time) and July 15 (leap) or July 16 (basitah) at 12.06 LMT (Local Mean Time).[16]
b) Satellite Map, namely observing *Qibla* direction through several existing *Qibla* software such as Google Earth. This program is an image patch of maps put

[15] Ahmad Izzuddin, *Akurasi Metode-Metode Penentuan Arah Kiblat* (Jakarta: Kementerian Agama Republik Indonesia, 2012), 155.

[16] Ahmad Izzuddin, *Menentukan Arah Kiblat Praktis*, ed. Mukhsin Jamil (Semarang: Walisongo Press, 2010).

together. Basically, this application uses an astronomical mathematical form, namely the approach of a spherical Earth.[17]

Based on the measurement, it is classified based on the typology as follows:

a) Alamiah (Natural)

Qibat direction determination by using celestial bodies as a guide. For example, the Companions refer to the position of the stars and the sun which can give direction to *Qibla*. Apart from the stars, the use of the special stick to find out the true north of a place is also included in the natural classification.

b) Alamiah Ilmiah

The method is based on natural events or phenomena which are then used to determine the *Qibla* direction by calculation. For example, the use of a theodolite, which utilizes the position of the sun to determine the *Qibla* angle by aiming at the sun.

c) Ilmiah Alamiah

The method that starts with scientific calculations is then proven naturally in the field. This method utilizes the sun's journey which can be calculated in detail. For example, *Rashdul Qibla* by calculating the *Rashdul Qibla* clock according to the place where you want to know the *Qibla* direction. The provision of time in which the shadow of an object exposed to sunlight can indicate the *Qibla* direction.[18]

C. 4 Correction of the *Qibla* Direction of the Old Air Tiris Grand Mosque, Kampa

There are several methods used to ensure the calibration and accuracy of the *Qibla* direction of the old Air Tiris Grand Mosque, Kampa. Using the Digital Falak application version 2.2.7 and Google Earth to retrieve the mosque's latitude and longitude data. including the following methods:

The coordinates of the Air Tiris Grand Mosque

Latitude Location: 0°22'22.95" North Latitude

Longitude of Place: 101° 05'38.18" East Longitude

[17] Ahmad Izzuddin, "Metode Penentuan Arah Kiblat dan Akurasinya," in *Annual International Conference on Islamic Studies (AICIS XII)*, 2012, 759–811.

[18] Ibid.

Kaaba coordinates

Latitude Location: 21°25'21.17" North Latitude

Longitude of Place: 39° 49'34.56" East Longitude

1) *Rashdul Qibla*

Rashdul Qibla is the only method of determining *Qibla* direction that is free from the influence of the shape of the Earth. For areas near the Kaaba, determining the *Qibla* direction at the time of this event can be done easily because the sun is still quite high, for example for the western region of Indonesia.[19] The author checks the *Qibla* direction during the global *Qibla* Rashdul phenomenon on July 15, 2022 and July 16, 2022 at 16:27 WIB. The data at that time showed that the *Qibla* direction of the Air Tiris Grand Mosque was accurate towards the Kaaba. This can be seen from the shadow of *Istiwa*'s stick as straight as the direction of the mosque building.

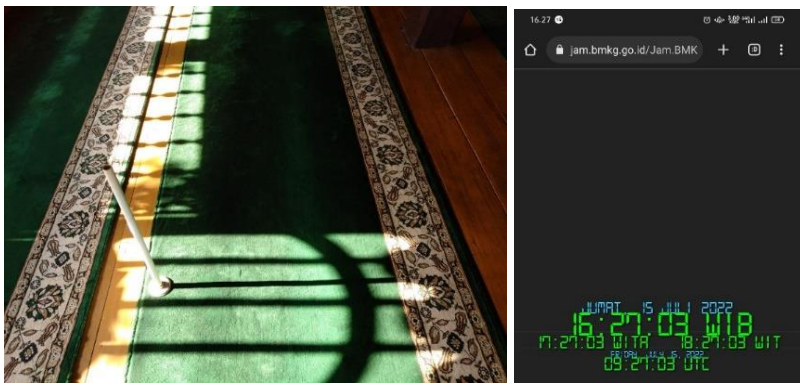

Figure 1. Global *Qibla* Rashdul on 15 July, 2022

Measurements are taken from inside the mosque here seen from the light that enters through the window of the mosque. Where the windows of the Djami' mosque do not use glass so there is no potential for refraction or deflection of light due to glass. In picture 1 above the direction of the shadow of the stick is exactly straight with the direction of the mosque building. The window model for the Djami' mosque uses a window model made of wood with a total of 14 windows about 150 cm high and 70 cm wide. Each window only has 3 pillar partitions per window without using glass. So that light can directly enter from the window of the mosque.

[19] Riza Afrian Mustaqim, "Analisis Metode Penentuan Arah Kiblat Masjid Agung Baitul Makmur Meulaboh Aceh Barat" 6, no. 2 (2020): 181–94, doi:10.30596/jam.v.

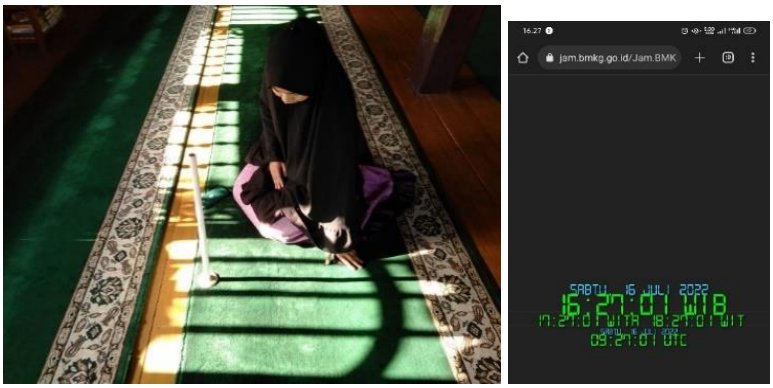

Figure 2. Global *Qibla* Rashdul on 16 July, 2022

The next calibration will take place on 16 July, 2022 at 16:27 WIB. If seen from the picture above, there is no difference from the previous day that the *Qibla* direction of the Djami' mosque when the global *Qibla* Rashdul phenomenon is correct. From the picture above it can be seen that the saf is parallel to the direction of the sun's shadow when the *Rashdul Qibla*.

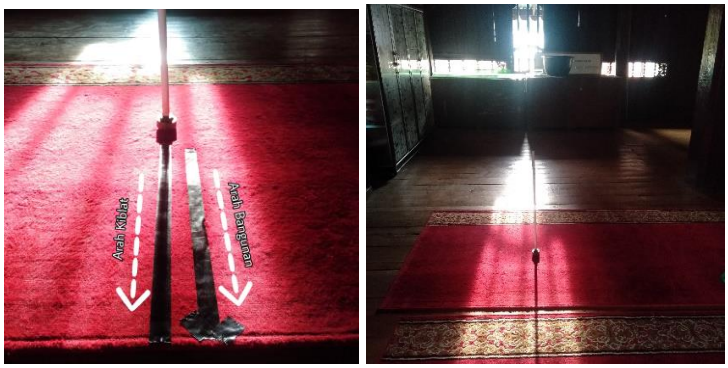

Figure 3. Local *Qibla* Rashdul on 31 December, 2022

Calibration was also carried out using the Local *Qibla* Rashdul clock with spherical trigonometry calculations on December 31, 2022 which obtained the Local *Qibla* Rashdul clock at 07:19 WIB. *Qibla* direction at local *Qibla* rashdul clock is done with the help of sunlight as well as global *Rashdul Qibla*. Every day local *Qibla* rashdul clock changes because it is affected by a different declination every day. Repeated calibration is carried out so that there are no mistakes or human errors that can affect the validity of a data.

2) Satellite Map

In general, the *Qibla* calibration technique requires the sun's shadow as a reference to determine the angle of a place to the Kaaba. However, this is seen as

having limitations, especially if the *Qibla* direction calibration is carried out during cloudy or rainy conditions. As one of the tips for achieving the right direction in facing the *Qibla*, in this case, an alternative to calibrating the *Qibla* direction is to use Google Earth. Where this application can be used as a *Qibla* direction calibrator to ensure the accuracy or accuracy of *Qibla* direction somewhere. However, it is recommended that the use of Google Earth be limited to checking *Qibla* accuracy and is not recommended for initial measurements of *Qibla* direction somewhere.[20]

Analyzing this satellite map method is by observing *Qibla* direction through some existing *Qibla* software. In checking the *Qibla* direction of the Djami' mosque, the writer uses Google earth. According to Bakosurtanal experts, this program is a patch of pictures of maps put together. This application can be consumed by the general public, basically using an astronomical mathematical form, namely the approximation of a spherical Earth. However, the risk is that when retrieving data from Google Earth can cause systemic errors. That is, when taking data from one point in fact it has changed 1 cm, it will cause a shift in accordance with the change earlier. In addition, the application of the angle calculated by the program cannot be applied in the field. However, this method with satellite maps remains one of the observation methods to determine *Qibla* direction by taking this into account.[21]

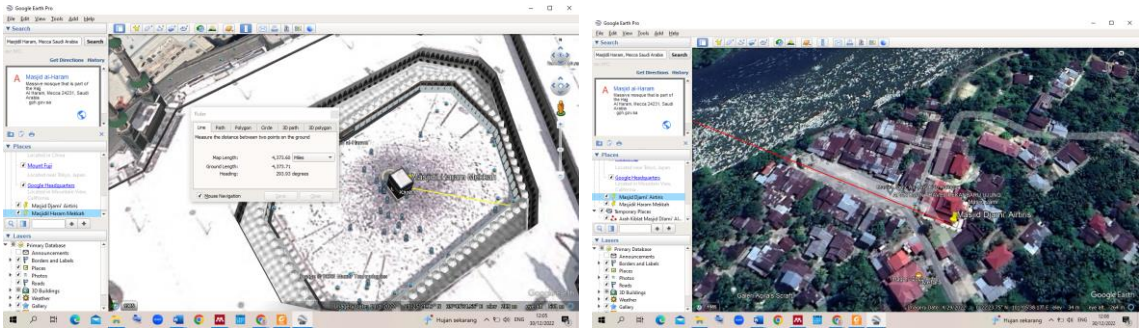

Figure 4. Calibrate the *Qibla* direction of the Djami' mosque with google earth

[20] Riza Afrian Mustaqim, "Penggunaan Google Earth Sebagai Calibrator Arah Kiblat," *Jurnal Ilmu Hukum, Perundang-Undangan dan Pranata Sosial* 6, no. 2 (2021): 194–216.

[21] Izzuddin, "Metode Penentuan Arah Kiblat dan Akurasinya."

Observations using Google Earth were carried out on December 30, 2022 by taking the location of the Djami; mosque Air Tiris, the following satellite imagery results were obtained:

The print screen results of the condition of the Air Tiris Grand Mosque with some information, namely the results of shooting on (imagery date) 4/29/2022 with a view height (eye alt) of 164 feet and an elevation of 34 m, obtained the latitude coordinates of 0°22'22.95 " (North latitude) and Place Longitude 101°05'38.18" (East Longitude). After saving the coordinates of the Air Tiris Grand Mosque, then proceed with saving the coordinates of the Kaaba. After both locations are saved, the Djami 'mosque and the Kaaba are connected by dragging and extending the cursor to the position of the Kaaba. After that, a line will be drawn that connects the Djami' mosque with the Kaaba. This line is the *Qibla* direction and Google Earth it can also display the *Qibla* azimuth angle.

So, from the results of this observation, the *Qibla* azimuth is 293.93 degrees, or if it is changed to the form of degrees, which is 293°55'48" (UTSB). The results obtained from Google Earth are only 16.63 seconds different from the calculations obtained using the calculation spherical trigonometry of the *Qibla* direction. In the sense that the *Qibla* direction of the Djami' mosque is correct towards the Kaaba. As well as being able to see it from the azimuth angle, it can be seen from the longitudinal "red" line that connects the Djami' mosque with the Kaaba in the picture above that looks straight and not turning, it is at the right angle towards the Kaaba building.

Apart from using Google Earth to perform *Qibla* calibration, azimuth calculations are also carried out using the Vincenty formula through Vincenty's Inverse-Geodetic Calculators, so that the following calculation results are obtained:

Air Tiris Grand Mosque : 0°22'22.95" (N)/ 101° 05'38.18" (E)

Mecca : 21°25'21.17" (N)/ 39° 49'34.56" (E)

Ellipsoidal Distance: 7038643.24 m

Forward Azimuth: 100°49'20.80"

Reverse Azimuth : 293°49'30.48"

Qibla Direction : 66°10'29.52"

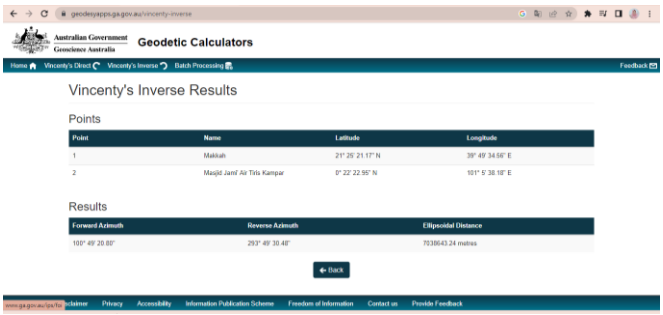

Figure 5. Calculation of *Qibla* Azimuth with the Vincenty Formula

Based on the results of calculations using the Vincenty formula, the *Qibla* azimuth is 293°49'30.48" (UTSB). The results obtained from the Geodetic Calculator are only 0°6'34.15" with the calculations obtained using spherical trigonometry calculations on the calculation of the local *Qibla* rashdul. If you look at the difference in the comparison of *Qibla* direction calculations using various methods, the difference is only in seconds and not up to 1° of arc, so it can be concluded that the *Qibla* direction is correct. A mosque is considered accurate if the direction of the mosque building does not deviate above 2° of arc from the direction of the Kaaba.[22]

C. 5 Analysis of Determining the *Qibla* Direction of the old Air Tiris Grand Mosque Kampa Riau

The old Air Tiris Grand Mosque is located at the exact coordinates at north latitude 0°22'22.95" and east longitude 101°05'38.18". This mosque is now cared for and guarded by Mr. Amiruddin Khatib (56) who is also the imam of the mosque. Regarding the historiography of this mosque, it can be categorized as one of many mosques that are unique and "sacred" like the Great Demak mosque in Central Java. According to information from the administrator of the mosque, Mr. Amiruddin Khatib, the history of the construction of this mosque has many extraordinary things. One of them was Datuk Enku Mudo Sangkal, who was a major scholar at that time, in terms of measuring his *Qibla*.[23]

[22] Ahmad Izzuddin, "Typology Jihatul Kaabah on Qibla Direction of Mosques in Semarang," *Ulul Albab: Jurnal Studi dan Penelitian Hukum Islam* 4, no. 1 (2020): 1–15, doi:10.30659/jua.v4i1.12186.

[23] Interview with Mr. Amiruddin Khatib as administrator of the Djami mosque on 15 July 2022 at the Djami Mosque.

According to Mr. Amiruddin Khatib's statement, in determining the *Qibla* direction, he followed the *Qibla* direction of the Great Mosque of Demak, Central Java, only using the method of religious intuition as a way of obtaining the truth in his approach by closing his eyes, Datuk Enku Mudo Sangkal could immediately imagine and seeing the *Qibla* direction of the Great Demak Mosque in 1901 AD. Apart from following the *Qibla* direction of the Great Demak Mosque, the Djami' mosque also follows the architecture of the Great Demak Mosque by bringing acculturation of local Javanese, Hindu-Buddhist, Islamic culture. At that time he became a great scholar by slaughtering 10 buffaloes. So that this mosque is considered a sacred mosque and has always received many visits from domestic and foreign tourists, especially from Malaysia and Singapore.[24]

Because the Djami' Mosque is registered as a cultural heritage building and the authenticity of the building is maintained, this indicates that the *Qibla* direction of this mosque has remained the same since the beginning of construction. The *Qibla* direction of this mosque has never changed. Even in 2000, a group of researchers from the Guinness World Record, both domestic and foreign, praised the accuracy of the *Qibla* direction of the Air Tiris Grand Mosque. The researchers checked the *Qibla* direction using a tool such as a compass and they were amazed by the measurement results. Considering that the founders of this mosque long ago could be so precise in determining the *Qibla* direction, even now it is still the same.[25] The researcher also re-checked the *Qibla* direction of the Air Tiris Grand Mosque using the Global *Qibla* Roshdul method, Local *Qibla* Roshdul, Google Earth, and the Geodetic calculator as an additional calculation that the *Qibla* direction does not deviate and is in accordance with the theory of reckoning the *Qibla* direction.

Qibla direction calibration is carried out using the theory of spherical trigonometry and the theory of geodesy in terms of the equations that can solve the determination of coordinates, azimuth, direction, and distance from one place to another. But what sets it apart is the approximation of the shape of the Earth. Spherical trigonometry theory uses the

[24] Interview with Mr. Amiruddin Khatib as administrator of the Djami mosque on 15 July 2022 at the Djami Mosque

[25] FB Rian Anggoro, "Masjid Jami Air Tiris, Simbol Keberagaman Riau," *Antara*, 2010, https://riau.antaranews.com/berita/10833/masjid-jami-air-tiris-simbol-keberagaman-riau.

concept of a spherical Earth and geodetic theory uses an ellipsoid approximation.[26] Checking the calibration of the *Qibla* direction of the Djami mosque uses these two theories by using the calculation of the *Rashdul Qibla* and Google Earth with additional calculations using the geodetic calculator.

The measurement method used here is referred to as "*Ilmiah Alamiah*". The method that starts with scientific calculations is then proven naturally in the field. This method utilizes the sun's journey which can be calculated in detail.[27] Here the authors carry out scientific *(ilmiah)* calculations using the spherical trigonometry formula which is then proven naturally *(alamiah)* in the field by utilizing the journey of the Sun. This way of measuring the *Qibla* is called *Rashdul Qibla* which is classified as an accurate observation for measuring and checking *Qibla* direction.

Based on the observations made by the author by observing the method of observation using the *Rashdul Qibla*, the *Qibla* direction of the Djami' mosque is accurate and leads to the *Qibla*. Considering that this mosque has been established in 1901 and has never been renovated, it is somewhat extraordinary because in old times there were no tools as sophisticated as now and it was only done using intuition and relying on sunlight. According to Ahmad Izzuddin, the observations made by the author using *Rashdul Qibla* are the most accurate method of observation. Because this method can show accuracy in facing the *Qibla*, namely with the shadow time of the *Qibla* direction, although still making corrections using geocentric data.[28]

The next observation is using a satellite map, namely Google Earth. Something interesting is that measuring the *Qibla* direction can be done with Google Earth, looking at the distance between the Kaaba and the place where the *Qibla* direction is to be calculated, and measuring the *Qibla* direction in buildings all over the world.[29] Google earth displays a

[26] Anisah Budiwati, "Tongkat Istiwa', Global Positioning System (Gps) dan Google Earth untuk Menentukan Titik Koordinat Bumi dan Aplikasinya dalam Penentuan Arah Kiblat," *Al-Ahkam* 26, no. 1 (2016): 65–92, doi:10.21580/ahkam.2016.26.1.808.

[27] Izzuddin, *Akurasi Metode-Metode Penentuan Arah Kiblat*.

[28] Izzuddin, *Kajian Terhadap Metode-Metode Penentuan Arah Kiblat dan Akurasinya*, 2012, 145.

[29] Zainul Arifin, "Akurasi Google Earth dalam Pengukuran Arah Kiblat," *Ulumuddin : Jurnal Ilmu-Ilmu Keislaman* 7, no. 2 (2017): 137–46, doi:10.47200/ulumuddin.v7i2.196.

virtual picture of the actual Earth apart from the constraints and limitations above. So that the use of Google Earth in calibrating the *Qibla* direction is more effective and easier to apply. In this case, google earth will show which direction the *Qibla* is somewhere. So even though it does not achieve true accuracy, it can give an idea of whether a *Qibla* is directed correctly or not.[30]

The location of the observation at this mosque is certain that in several years there has been no change, this mosque has also never been overhauled and rebuilt. However, only renovations in some parts of the building such as walls and roofs do not affect the position of the building. Apart from avoiding renovations and rebuilding, the direction of the *Qibla* shift was also caused by an earthquake shifting the Earth's plates. However, there are changes in latitude and longitude in the movement of the earth's plates in at least the last 10 years in the range of numbers after the decimal point in seconds. When calculated with the azimuth theory, the results of changing the *Qibla* direction obtained are only around fractions of a second. However, it should be noted that if the time period calculated is more than tens of centuries, it is necessary to correct the *Qibla* direction, which may cause significant changes. It is also important to consider how big the intensity factor of the movement is.[31]

The tolerance for *Qibla* deviation in Indonesia is divided into two uses. Mathematical tolerance, namely the tolerance for deviation from the *Qibla* direction, can be taken from the ability to face the *Qibla* other than the direction of the Kaaba for people who are far from the Kaaba, both the direction of the 'Masjidilharam' which is formulated according to the direction of the Quba Mosque. Sociological tolerance, that is, deviation from the *Qibla* direction can be guided by one's ability to face the *Qibla* when praying. Every person who performs the prayer is unable to keep his body below 6 degrees either to the left or to the right from the start of the prayer until it finishes. That is, if someone shifts his body while praying above 6 degrees to the left or right, then that person is considered to have turned away from the *Qibla* direction while praying.[32]

[30] Mustaqim, "Penggunaan Google Earth Sebagai Calibrator Arah Kiblat."

[31] Izzuddin, *Kajian Terhadap Metode-Metode Penentuan Arah Kiblat dan Akurasinya*, 2012, 145.

[32] Izzuddin, "Typology Jihatul Kaabah on Qibla Direction of Mosques in Semarang."

C. 6 Convergence of the *Qibla* Direction of the Old Air Tiris Grand Mosque with the Islamic Astronomy

Qibla direction measurements are generally only square off (estimates). In Indonesia alone, the majority of ancient mosques are found facing west. This is because the community's paradigm is embedded that the *Qibla* is west. In addition, the belief in a guardian, cleric, and figure is very strong so the mosques built by the wali, and religious leaders become very sacred and cannot be changed, including the direction of the *Qibla*. This happened because at that time there were no calculations and tools that had good precision.[33]

However, it is different from the old Air Tiris Grand Mosque, Kampa, which has an accurate *Qibla* direction that has even been measured by MUI before. In mid-July 2010, he urged all mosques to double-check the *Qibla* direction according to their geographical location because it was suspected that the *Qibla* direction had changed due to an earthquake. In fact, in around 2000 a group of researchers from the "Guinness World Record" originating from within and outside the country praised the accuracy of the *Qibla* direction of the Air Tiris Grand Mosque. The researchers checked the *Qibla* direction and they were amazed and praised the greatness of the founders of this mosque who in the past could determine the *Qibla* direction so precisely and until now the *Qibla* direction is still the same.[34]

In the previous discussion, the author explained that in determining the *Qibla* direction of the Old Air Tiris Grand Mosque, it followed the *Qibla* direction from the Great Mosque of Demak, Central Java, only using the method of religious intuition. To get the truth, he used an intuitive approach by closing his eyes so that he could immediately imagine and see the *Qibla* direction of the Great Demak Mosque in 1901 AD. The method of religious intuition as a way of obtaining truth in his approach in this case is opposite in the frame of astronomy which incidentally has a power scientifically and with a rational approach in obtaining the truth.

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[33] Siti Tatmainul Qulub, "Konsep Jarak Terdekat dalam Menghadap Kiblat," *Al-Qanun: Jurnal Pemikiran dan Pembaharuan Hukum Islam* 20, no. 1 (2017): 1–25, doi:10.15642/alqanun.2017.20.1.1-25.

[34] Anggoro, "Masjid Jami Air Tiris, Simbol Keberagaman Riau."

The two approaches turned out to give different results. One departs from the value of 'karomah' and the other departs from an astronomical mathematical methodology. But on the other hand, both are one approach to obtaining scientific truth. There is a common thread between these two different things that have a convergence point. Based on the author's analysis based on the results of Interview with Mr. Amiruddin Khatib as administrator of the Djami mosque on in directing the *Qibla* using religious intuition with reference to the direction of the sun's shadow by Datuk Enku Mudo Sangkal. Apart from the assumptions and beliefs of the people, from this, it can be seen that basically, the sacredness that belongs to him is only a symbol of determining the *Qibla* direction by using the direction of the Sun or its shadow or in the terminology of astronomy is called *Rashdul Qibla*.

The author views the intuitive method used by Datuk Enku Mudo Sangkal within the framework of Islamic astronomy as determining the *Qibla* direction using the sun's base as the initial guide, which will then be known from the sun's shadow. It was assumed that at that time Datuk Enku Mudo Sangkal most likely used the Global *Qibla*h rashdul, so that all objects standing upright at that time cast their shadows towards the *Qibla*. Because if a recalibration check is carried out at the global *Rashdul Qibla* clock, the *Qibla* direction of the Djami mosque is exactly straight with the direction of the sun's shadow when the sun is directly above the Kaaba so that all shadows at that time point to the Kaaba.

Then the sacredness of Datuk Enku Mudo Sangkal made this method turn into a myth. One theory states that historical events continued to exaggerate until finally, the historical figure attained the status of a god. So that the point of convergence is found, namely that between the two is a way of obtaining scientific truth, religious-intuitive is the approach of Datuk Enku Mudo Sangkal and scientific rational is the approach of Islamic astronomy. Apart from that, it also uses nature as a benchmark, namely the help of the Sun, which is classified as a valid ijtihad process for *Qibla* direction according to the fiqh school of thought.

D. Conclusion

The *Qibla* problem is very important for the implementation of Islamic worship. The problem of *Qibla* direction has always been widely discussed by the people of Indonesia,

which stems from several research results conducted by Islamic astronomers on mosques in Indonesia. Those that are always in the spotlight are old mosques that have high historical and historical value. So, it needs to be reviewed in relation to the *Qibla* direction for historic/old mosques. Among the many mosques that have historical value in Kampa, the Air Tiris Grand Mosque is one of the most prominent. Because it has been built since 1901 and has never been rebuilt. This mosque is the first and oldest mosque so it is used as a benchmark for *Qibla* direction by mosques and prayer rooms in the area.

Based on the results of the *Qibla* direction calibration research at the Air Tiris Grand Mosque Kampa, it is correct and accurate to face the *Qibla*. Calibration is carried out using Global *Qibla* Rashdul, Local *Qibla* Rashdul, and Google Earth with the theory of spherical trigonometry and geodesy as a calculation approach. The unique thing is that the mosque which was built in 1901 became the first and oldest mosque in Kampa and has never been demolished so the mosque building has remained the same from the beginning and nothing has changed, but the *Qibla* direction is accurate to the *Qibla* with the same value of 293° using a variety of different methods. Considering that in old times it was not as sophisticated as now in determining the *Qibla* direction. So that the point of convergence is found, namely between religious intuition and Islamic astronomy which is a way of obtaining scientific truth, religious-intuitive is the approach of Datuk Enku Mudo Sangkal and scientific rational is the approach of Islamic astronomy. Apart from that, it also uses nature as a benchmark, namely the help of the Sun, which is classified as a valid ijtihad process for *Qibla* direction according to the fiqh school of thought.

E. Bobliography

Anggoro, FB Rian. "Masjid Jami Air Tiris, Simbol Keberagaman Riau." *Antara*. 2010. https://riau.antaranews.com/berita/10833/masjid-jami-air-tiris-simbol-keberagaman-riau.

Arifin, Zainul. "Akurasi Google Earth dalam Pengukuran Arah Kiblat." *Ulumuddin : Jurnal Ilmu-Ilmu Keislaman* 7, no. 2 (2017): 137–46. doi:10.47200/ulumuddin.v7i2.196.

Basuki, Riska Novita. "Factors Decision to Visit a Mosque Jami' Air TirisKampar Regent Riau Province." *JOM Fisip* 2, no. 1 (2015): 1–17.

Budiwati, Anisah. "Tongkat Istiwa', Global Positioning System (Gps) dan Google Earth Untuk Menentukan Titik Koordinat Bumi dan Aplikasinya dalam Penentuan Arah Kiblat." *Al-Ahkam* 26, no. 1 (2016): 65–92. doi:10.21580/ahkam.2016.26.1.808.

Dinamalia. "Kajian Struktur Kayu pada Bangunan Masjid Jamik di Kabupaten Kampar Riau." *Jurnal Arsitektur Melayu dan Lingkungan* 4, no. 1 (2017): 12–18.

Hambali, Slamet. *Ilmu Falak: Arah Kiblat Setiap Saat*. Edited by Ahmad Fadholi and Ismail Khudhari. Yogyakarta: Pustaka Ilmu Yogyakarta, 2013.

——. *Ilmu Falak 1: Penentuan Awal Waktu Shalat & Arah Kiblat Seluruh Dunia*. Edited by Abu Rokhmad. *Semarang: Program Pascasarjana IAIN Walisongo*. 1st ed. Semarang: Program Pascasarjana IAIN Walisongo Semarang, 2011.

Hasan, Abbas. *Masjid Djami' Air Tiris Sejarah dan Perkembangannya*. Pekanbaru: Suska Press, 2008.

Izzuddin, Ahmad. *Akurasi Metode-Metode Penentuan Arah Kiblat*. Jakarta: Kementerian Agama Republik Indonesia, 2012.

——. *Kajian Terhadap Metode-Metode Penentuan Arah Kiblat dan Akurasinya*. Edited by Mohammad Arja Imroni. Jakarta: Kementerian Agama Republik Indonesia, Direktorat Jenderal Pendidikan Islam, Direktorat Pendidikan Tinggi Islam, 2012.

——. *Kajian Terhadap Metode-Metode Penentuan Arah Kiblat dan Akurasinya*. Edited by Mohammad Arja Imroni. Jakarta: Kementerian Agama Republik Indonesia, Direktorat Jenderal Pendidikan Islam, Direktorat Pendidikan Tinggi Islam, 2012.

——. *Menentukan Arah Kiblat Praktis*. Edited by Mukhsin Jamil. Semarang: Walisongo Press, 2010.

——. "Metode Penentuan Arah Kiblat dan Akurasinya." In *Annual International Conference on Islamic Studies (AICIS XII)*, 759–811, 2012.

——. "Typology Jihatul Kaabah on *Qibla* Direction of Mosques in Semarang." *Ulul Albab: Jurnal Studi dan Penelitian Hukum Islam* 4, no. 1 (2020): 1–15. doi:10.30659/jua.v4i1.12186.

Kasim, Andi Jusran. "Analisis Keakuratan Arah Kiblat Masjid di Kecamatan Tanete Riattang Barat Kabupaten Bone" 3, no. 1 (2019): 93–107.

Majelis Ulama Indonesia. *Himpunan Fatwa Majelis Ulama Indonesia, Fatwa Terbaru 2010, Arah Kiblat*. Jakarta: Majelis Ulama Indonesia, 2010.

Marpaung, Watni. *Pengantar Ilmu Falak*. Jakarta: Kencana, 2015.

Mustaqim, Riza Afrian. "Analisis Metode Penentuan Arah Kiblat Masjid Agung Baitul Makmur Meulaboh Aceh Barat" 6, no. 2 (2020): 181–94. doi:10.30596/jam.v.

——. "Penggunaan Google Earth Sebagai Calibrator Arah Kiblat." *Jurnal Ilmu Hukum, Perundang-Undangan dan Pranata Sosial* 6, no. 2 (2021): 194–216.

Qulub, Siti Tatmainul. "Konsep Jarak Terdekat dalam Menghadap Kiblat." *Al-Qanun: Jurnal Pemikiran dan Pembaharuan Hukum Islam* 20, no. 1 (2017): 1–25. doi:10.15642/alqanun.2017.20.1.1-25.

Somawinata, Yusuf. *Ilmu Falah: Pedoman Lengkap Waktu Salat, Arah Kiblat, Perbandingan Tarikh, Awal Bulan Kamariah dan Hisab Rukyat*. Edited by Monalisa. Depok: PT

RajaGrafindo Persada, 2020.

Wahidi, Ahmad, and Evi Dahliyatin Nuroini. *Arah Kibat dan Pergeseran Lempeng Bumi Perspektif Syar'iyah dan Ilmiah*. Edited by Abdul Halim Fathani. Malang: UIN Maliki Press, 2012.