# GEOGRAPHICAL VIEWS OF MIRZO ULUGBEK

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**Annotation**: The article is devoted to the study of the first geographical views of Mirzo Ulugbek, a statesman and thinker who made a worthy contribution to the development of the Second Renaissance in the East from the great figures of the Middle Ages. As a result of his lectures on mathematical geography at the madrasah opened in Samarkand in 1420 and observations at the observatory opened in 1428 on the Kokah hill, the world-famous work "Ziji Quragoniy" was created. requires recognition as one of the scientists.

**Keywords**: Mirzo Ulugbek, renaissance, madrasa, student, educational process, lecture, science, mathematical geography, observatory, astronomical observation, coordinates of cities and stars, globe, space geography.

**Introduction**. Mirzo Ulugbek (real name Muhammad Taragay, 1394-1449) is one of the great figures who made a worthy contribution to the development of world science. He was one of the great figures who raised the science and culture of the peoples of Movarounnahr to the heights of the Eastern Renaissance in the Middle Ages and brought it to world civilization.

Muhammad Taragay is the son of Shahrukh, the youngest son of Ulugbek Amir Temur. Ulugbek was born in Sultaniye, Azerbaijan, during the military campaign of his grandfather Amir Temur. His father, Shahrukh Mirza, was a ruler of Khorasan, an enlightened king interested in science. His mother, Gavharshodbegim, was also one of the most intelligent, knowledgeable and enterprising women of her time. As a child, his grandfather Amir Temur affectionately called his grandson "Ulugbek", and with this name he will become famous in the world of science, making a worthy contribution to world science in the future.

According to Sharafuddin Ali Yazdi's “Zafarnoma”, a courier came to Amir Temur and told him that Ulugbek had been born and that the astrologers had predicted that he would be both a scholar and a ruler in the future. To the delight of the Sahibkiran, Mordin stopped the siege of the castle and canceled the payment imposed on his people. The fact that he named his grandson Muhammad Taragay and Ulugbek can also be connected with the above prophecy of the astrologers. Secondly, he was born in the spring of the beginning of “Navruz”.

Amir Temur paid special attention to the upbringing of his beloved grandson Ulugbek and took care of his development to be physically healthy, intelligent, moral

and well-rounded in science. Ulugbek was brought up by knowledgeable and experienced coaches of his time, introduced him to the basics of religious and secular sciences. Under the leadership of Amir Temur, he brought books and manuscripts from many parts of the world and created a large library in Samarkand, creating opportunities for young people to acquire knowledge.

As a child, Ulugbek had a sharp mind, a strong memory, deep thinking, determination, and a curiosity about the causes of events and happenings in nature. He is fluent in Arabic and Persian, saw the Maragha Observatory (near Tehran) as a child, and eagerly vowed to "build it too", inviting him to explore the mysteries of the universe in the future. This will allow him to become famous in the future as a well-known scientist, statesman and patron of science. At the same time, Amir Temur gradually took Ulugbek to events of national importance. According to the Spanish ambassador Clavijo, he saw Ulugbek during the receptions of his grandfather's foreign ambassadors and in the celebrations of Navruz in Konigil in 1404. After the death of Amir Temur (1405), the struggle for the throne began among the Temurids, and political turmoil intensified. As a result of this struggle, in 1409, two independent states were formed in Khorasan and Movarounnahr.

15-year-old Ulugbek became the ruler of Shahrukh, the capital of Herat, and Movarounnahr, the capital of Samarkand.

**Main part**: While managing the political and economic life of the country, Ulugbek is seriously engaged in scientific work, actively participates in the discussions of scientists. According to sources, his teacher Qazizoda Rumi Ulugbek studied the scientific heritage of his predecessors Al-Khwarizmi, Ahmad Fergani, Farobi, Beruni, Ibn Sino, Umar Khayyam through rare books available in the Kuksaroy library. Through the works of great thinkers, he became acquainted with the works of the ancient Greek scholars Plato (Plato), Aristotle (Aristotle), Hipparchus, Ptolemy.

It should be noted that the madrasas built under the leadership of Amir Temur were to some extent specialized. For example, in the madrasah of Muhammad Sultan, in the madrasah of Mawlana Qutbiddin Sadr, in the madrasah of Mawlana Qutbiddin Sadr, in the madrasahs of Idigu Temur, Saroymulkhanim, where general specialists, such as intellectuals, imams, scholars, schoolteachers, are trained. There is also historical information that the madrassas trained general intelligence, general military, general administration.

Classes in madrassas were conducted in Arabic, Persian, and Turkish (Uzbek). More time is devoted to teaching Arabic grammar. For this purpose, Saadi Sherozi's "Gulistan", "Boston", Farididdin Attor's "Mantiq ut-tayr" and others were taught.

The foundation letter of each madrasah stipulates the admission of students, teachers and other staff, as well as the conduct of educational work.

By the time of Ulugbek, such sciences as mathematics, astronomy, and geography were especially developed. Much attention was paid to the development of medicine, history, literature, as well as religious knowledge. According to Ulugbek's decree, madrassas were built in the country. Three madrasas built in Bukhara (1417), Samarkand (1420) and Gijduvan (1433) proved to be scientific centers in the development of science.

The words written on the facade of the Bukhara madrasah: "It is obligatory for every Muslim to seek knowledge" are still visible.

According to the anthology of Uzbek pedagogy (1995), the scientists gathered around Ulugbek were faced with the task of applying the science of astronomy to life. In particular, according to tradition, in the Muslim countries and in Islamic culture in general, the exact sciences, astronomy (astronomy), mathematics (mathematics) and geography (geography) have played an important role. This is because it is obligatory for a Muslim to pray five times a day, from early morning to evening, no matter where he is.

The prayer is performed facing the qibla - the direction of the Qaba in Makkah. The times of prayer are determined in each latitude according to the height of the Sun above the ground. In addition, the Hijri calendar, which is accepted in Islam, consists of 12 lunar months of 354 days, and the new moon, the crescent, is visually identified from the top of a mosque tower or observatory. Therefore, the life of a Muslim was associated with solving the following five pillars related to astronomy, mathematics, geography, crafts, and architecture:

1.Determining the geographical direction of the place;

2. Determine the angle between the local meridian and a large circle indicating the direction of the qibla;

3. Know the rules and methods of accurate trigonometric calculations for the calculation of geographical directions;

4. Know the rules for determining the height of the Sun on the basis of geographical orientation;

5. To know the exact rules of spherical astronomy, which determine the position of the Sun, Moon, planets and other lights at any time of day and night;

6. Carrying out geodetic measurements to determine the distances between different cities;

7. Development of various time measuring instruments;

8.Creation of maps to have a clear idea of the administrative part of the land;

9. To know the conditions of appearance related to mathematics for mapping;

10. Knowledge of high-precision mathematical calculation methods for performing calculations related to astronomy, geography and geodesy;

11. To have data from meteorology and geophysics, as the observation of lamps is related to the weather;
12. To be aware of the art and traditions of architecture for the construction of mosques, madrasas and observatories.

As can be seen from the list given, almost all of them require knowledge of geography. The universities built in these ancient cities of Movarounnahr, in particular, the Samarkand Madrasah, are considered to be modern universities. In these madrasas, along with the theology, the Qur'an, the Hadith, the description-fixq (rules of religion and Sharia), the secular sciences such as mathematics (mathematics), xandosa (geometry), astronomy (astronomy), medicine, history, geography, and the science of aruz (poetics), Arabic language and its morphology (kofiya). Ulugbek's madrasah in Samarkand had two floors and fifty rooms. Each room is divided into three rooms: a pantry (warehouse), a bedroom and a classroom. More than a hundred students lived and studied at the Samarkand madrasah. Mawlana Shamsuddin, one of the great scholars of that time, and Muhammad Khawafi were the leading teachers in the madrasa. Famous medieval scholars Qazizoda Rumi, Giyosuddin Jamshid Kashani, Mirzo Ulugbek and his student Alouddin Ali Kushchi also taught various subjects at the madrasah. According to the famous 16th century writer Zaynuddin Wasifi, the first lecture was given by Shamsuddin Muhammad Khawafi on September 21, 1420, the day the madrasah was opened. 90 scholars took part in the training, but no one but Mirzo Ulugbek and Qazizoda Rumi understood the meaning of the lecture. Because this report was extremely scientifically powerful and covered complex issues.

It should be noted that the Taliban studied at the madrasah for at least 15-16 years, fully mastered the basic disciplines of its program and was able to demonstrate their knowledge in the examination classes. One of such certificates was written in the name of Shamsuddin Muhammad of Balkh in Ulugbek's madrasah in Samarkand, in 838 AH (1435) under the signature of Qazizoda Rumi. The famous poet Abdurahmon Jami also continued his studies at the Herat Madrasa at the Ulugbek Madrasa in Samarkand. He studied and was educated at the madrasa by Qazida Rumi, Mirzo Ulugbek and Ali Kushchi.

Some of the scholars who taught at the Ulugbek Madrasa, in addition to teaching students in various disciplines, were also engaged in research and practical issues in astronomy, mathematics, geography. Before the observatory was built and put into operation, the monitoring of the condition of the skylights was carried out to some extent in the muqatta 'mosque built by Ulugbek under this madrasah.

The works on the earliest stars in the Islamic world are called “Zij”, and they consisted mainly of tables. The most perfect "Zijlar" written before Ulugbek were Beruni's "Qanuni Mas'udi" and Nasriddin Tusi's "Ziji Elkhani" written in 1256.

In Movarounakhr, however, no zij was recorded after the Mongol invasion. For these reasons, Ulugbek first of all seeks to establish the science of stars. It was necessary to build an observatory.

Historical sources show that four years after Ulugbek completed the construction of the Samarkand madrasah, in 1424-1428, he selected the observatory and built an observatory near the city on the hill of Obi-Rahmat near the city. Built in the shape of a circle, this huge building has a circumference of 47 meters and a height of 31 meters. A 15,000-volume library covering various fields of science has been established at the observatory.

According to Zahriddin Babur, it was three stories high. The surface of the building is covered with tiles and mysterious rivets. The interior of the building is divided into four sections by a Sudei veteran (sextant) and a corridor. Each section is divided into several halls and small rooms. The walls of the rooms of the building depict the dome of the sky, celestial bodies, their location and relationship, the orbits of the planets, fixed (fixed) stars, seas, oceans, mountains, the globe divided into climatic zones by deserts, and so on.

So, the inner walls of the observatory depict the general view of the universe and the earth, which is why this area is known among the locals as "Nakshi Jahon". At the same time, Ulugbek has a rich library of his time under the observatory. This library contains about fifteen thousand books belonging to almost all branches of science. The French philosopher, writer and historian Walter wrote: "Ulugbek founded the first academy in Samarkand, ordered the measurement of the globe and participated in the compilation of astronomical tables." (Walter, Selected Works. Geneva, 1769, 1X, p. 199). At that time, about 200 scientists gathered around Ulugbek in Samarkand. It should be noted that a scientific connection has been established between the madrasah and the observatory, that is, some of the researchers working in the observatory also taught at the madrasah. Among them were Giyosiddin Jamshid Kashani and Mirzo Ulugbek himself. Ulugbek often argued with the students of the madrasa and took exams. One day, Ulugbek wanted to give the madrassa students an exam in mathematics and geography. He asked the following question: “Tell me, scholar, tell me, on which day does the year 818 AH, the middle of the twelfth and fifteenth of the month of Rajab, and the twelfth and fifteenth of the month of Rajab 918 correspond to? This will require you to be able to memorize a lot of numbers. None of the students can solve this problem. Then Ulugbek gave it as a homework assignment, and with politeness and kindness, he explained and wrote down the issue. Then Abu Rayhan opened Beruni's book "Qanuni Mas'udi" and read an excerpt from the seventh chapter of his sixth article. He then closed the book and asked the students a few questions. The teacher, who was partially satisfied with the answers, gave the students and

scholars a deeper analysis of the work and a homework to understand its essence, which shows that he is such a demanding scientist and mentor.

Due to the interaction of the observatory and the madrasah scientists, the connection between theory and practice, Ulugbek's scientific school - academy - raised astronomy and mathematics, as well as geography, which is a star science, to its peak in the Middle Ages. Scientists of the Samarkand Academy under the leadership of Mirzo Ulugbek, by the criteria of that time, achieved great success in astronomical (space geography) observations. In particular, the curvature of the eplex, the annual motion of the five planets (Venus, Saturn, Mars, Jupiter, Mercury), the length of the stellar year, the geographical coordinates of 683 of the settlements (cities) in Central Asia, the Near and Middle East. a table containing 1018 stars will also be created. The result of many years of research at the Samarkand Observatory is the masterpiece Ulugbek's work "Ziji jadidi Koragoniy", which combines theoretical and scientific issues of Eastern classical astronomy and enriches it with new evidence. Although this work was completed in 1437, the author made observations and additions to it based on the results of scientific research carried out until the end of his life. It should be noted that the accuracy and perfection of the scientific results presented in "Ziji Koragoniy" amazed scientists around the world. For example, Ulugbek's calculations about the year of the star are 365 days, 6 hours, 10 minutes, 8 seconds, in fact, 365 days, 6 hours, 9 minutes, 6 seconds.

Ulugbek "Ziji" in its composition continues the tradition of astronomy, which began in the VIII-X centuries, performed by our contemporaries Muhammad Khorezmi, Ahmad Fergani, Abu Rayhan Beruni, but with its scientific results is much higher. This royal work consists of an introduction and four articles. A study of Zij shows that it is intended for practical use only, and that Ulugbek did not intend to present theoretical issues. This is probably why Ali Qushchi was the first to comment on Zij, followed by Mirim Chalabi and Hussein Birjandir.

In 1447, Ulugbek's father Shahrukh died. After that, Ulugbek tried to unite Khorasan with Movarounnahr and create a strong state, but faced strong opposition. In the spring of 1448, at a place called Tarnob near Herat, a great battle took place between Ulugbek and his nephew Aloviddavlat. The battle ends with the victory of Ulugbek, but the victory was declared not in the name of Abdullatif, but only in the name of Abdulaziz. Moreover, the transfer of Shahrukh's property held at Ikhtiyoriddin Castle in Herat to state ownership further exacerbated the son's hostility towards his father.

Ulugbek left Abdullatif in Herat and went to Samarkand himself.

Some of the leaders serving in Ulugbek's palace, especially the reactionary forces, took advantage of his son's hostility to his father. In the autumn of 1449, Abdullatif's troops attacked Ulugbek and defeated him.

Mirzo Ulugbek, who went on a pilgrimage with the consent of Abdullatif, who seized power, and with the fatwa of the clergy, was executed in a village near the city of Samarkand.

After the tragic death of Mirzo Ulugbek, the Samarkand observatory was partially continued until 1469 by his student Ali Kushchi. Most of the scholars left Samarkand and spread to the countries of the Middle East.

They will also share the achievements of Samarkand scientists and copies of Zij. In particular, Ali Kushchi went to Istanbul in 1473 and built an observatory there. Thus, Ulugbek "Ziji" spread in Turkey and reached European countries through Turkey.

It is natural that the question arises as to what the information about geography is reflected in Ulugbek's work "Ziji Koragoniy". His secrets are hidden directly in the "zij". We will have to look for it directly from “Zij”. It is known that in the sources it is called "Ziji jadidi Koragoniy" ("New astronomical table of Koragoniy"), "Ulugbek ziji". According to current data, Zij has about 120 Persian and more than 15 Arabic versions. It should be noted that this work, written in the Middle Ages, was also translated into Latin. The work consists of two sections, a preface and a table based on the position of 1018 stars as a result of observations.

The introduction is divided into 4 parts. Part 1 - Chronology describes the methods of calculating the year of the peoples of the East, which describes the order of the year in Arabic, Greek, Iranian, Chinese and Uyghur, the ways of their transition from one to another and the methods of calculating specific national holidays and customs of these peoples. Part 2 is devoted to practical astronomy. It covers the methods of determining the angle between the ecliptic and the equator, finding the coordinates of celestial bodies, drawing the meridian line, determining the azimuth of the qibla, finding geographical coordinates, determining the length of the year and making differential measurements in the celestial sphere. In Part 3, the apparent motions of the planets are based on a geocentric system. Section 4 provides information about the horoscope.

In this regard, due to the efforts of the famous Uzbek geographer Hamidulla Hasanov, we have published information on geography in "Ulugbek Ziji" "Astronomical School of Ulugbek" by Academician TN Koriniyazi (Tashkent, Selected Works, Volume 6, 1967), Azerbaijani astronomer H. Works of J.Mamadbeyli "Founder of Marogan Observatory Muhammad Nasriddin Tusi" and “Ulugbek ibn Shohruh ibn Temur Koragon. "Ziji Sultan Koragoniy" № 2214 and these sources are compared with each other.

They are as follows. T.N. Koriniyaziy was the first in Uzbekistan to reveal the details of "Ulugbek Ziji" perfectly. Ulugbek's star chart was much more accurate than the one made in Europe 100 years later. In addition to the astronomical tables given, it also

shows the geographical coordinates of the cities, and he concluded that they were much more perfect than the previous "zijs." An unfounded claim about Ulugbek "Ziji" was made by the Azerbaijani scientist H.J. Mammadbayit. He used the following sentence: Some of the tables in “Ziji Elkhani”, compiled by Nasriddin Tusi, including the table of geographical coordinates of the cities, were copied directly to “Ziji Koragoni”. A careful examination proved that the table, which gave the geographical coordinates of 256 cities, had been transferred from “Ziji Elkhani” to “Ziji Koragoniy” without any changes, and that only the coordinates of Samarkand had been redefined (p. 232). In turn, the Uzbek scientist H. Hasanov, using a detailed study and comparison of a number of sources, proved that 256 cities in Zij, composed by Nasriddin Tusi, and 569 cities in Ulugbek Ziji were given coordinates. According to current research, their number is 637.

H. Hasanov in his work "Tourist Scholars" (p. 176) gave a hand-drawn scheme of the Main Meridians. His analysis shows that the series of islands (Schastlivye, Bajennykh, Ferro, Sa'da, Saodat) located in the Atlantic Ocean on the western shores of the African continent by Ptolemy, Khorezm and Beruni: Nasriddin Tusi and Ulugbek were taken as the primary meridian, while the Azores in the Atlantic Ocean and the Cape Verde Islands in the West (Vechnye, Rayskie, Khalidot Islands) were taken as the prime meridian. The Greenwich Observatory in England (1676) is now the principal meridian. In our opinion H. J. Mamedbeyli

We have come to the conclusion that the research carried out by N. Tusi and Ulugbek on the Khalidot Islands, which is considered to be the Main Meridian, is distracting.

During an excursion to the Ulugbek Observatory and Memorial Museum of a tourist who is currently visiting Samarkand, you will see a globe that attracts your attention and spreads a bright light. The students of the 15th century Madasa, scholars, ambassadors and tourists saw with their own eyes that the boundaries of the climates defined in it, mountains, deserts, oases, seas and rivers are defined. Visitors sang it widely to the world through the Great Silk Road. This is why it is widespread among European scientists and proves that Ulugbek has a worthy place among world scientists.

*Fig.1. Samarkand, Globe of Mirzo Ulugbek*

Ulugbek's ideas and contribution to the development of education and science are invaluable. Despite his preoccupation with public affairs, he placed great emphasis on the intellectual and enlightenment upbringing of the younger generation, encouraging them to acquire secular knowledge, believing that only advanced science and culture would contribute to the perfection of human thinking.

According to the scholar, the importance of the knowledge acquired and acquired by young people is to understand the purpose of this knowledge, to improve their knowledge, to know how to apply it in life, to acquire the necessary professions. That is why Ulugbek taught to acquire knowledge not only from books, but also from life itself.

Ulugbek considered making new scientific discoveries to be the highest virtue of a human being. In order to implement these noble ideas, Ulugbek turned the cities of Movarounnahr, in particular, Samarkand and Bukhara into centers of knowledge and enlightenment. Ulugbek devoted these human qualities to the development of science, educating young people, caring about the fate of young people, opening schools and madrasas, teaching children and youth, educating them, striving to develop education, respect and reverence for teachers, supported by the spiritual.

With these efforts, he made a significant contribution to improving the quality of education and revitalizing the education system in madrassas. In particular, he reformed the educational system in madrassas, introduced the teaching of specific subjects such as astronomy, mathematics, geography, improved the quality of educational content, reduced the duration of teaching in madrassas from 15-16 to 8 years.

During Ulugbek's 40-year rule, Samarkand prospered. Especially handicrafts, architecture and literature flourished. Science flourished, trade flourished, and

wonderful gardens were planted. Under his leadership, many public buildings (caravanserai, tim, baths) were built.

Historian Hayvar Mirzo wrote in his book "Tarihi Rashidiy": "Mirzo Ulugbek was a historian, and he also wrote" Four Nations ". Currently, this work is published in Uzbek. His 2 manuscripts are kept in British and Istanbul museums.

Ulugbek paid great attention to the method of observation in science and the role of scientific instruments. Emphasizes the role of mathematical tools and logical methods in revealing scientific truth. In their scientific observations and clear conclusions, nature's material existence and the phenomena in it are based on objective causal connections.

Ulugbek's legacy - "Ziji Kuragoniy" entered the world of European culture shortly after his death. Scientists from Turkey, Iran, Afghanistan, India and European countries, in turn, used the research methods created by Ulugbek, and many observatories were built similar to his observatory.

According to Chinese astronomers, "We Chinese have received all our knowledge in the field of astronomy from the West around Samarkand." This fully proves the great contribution of Ulugbek's discovery to world science.

His pedagogy was based on the principle of “seeing the teacher in the face of the students”. He wanted the teacher to be well-educated, well-prepared and well-educated. He explained that knowledge should be studied independently, emphasizing its importance. He left behind many disciples.

The 600th anniversary of Ulugbek's birth was celebrated in April 1994 in Paris, in October in Tashkent and Samarkand under the auspices of UNESCO, and international conferences were held. In the same year, a statue of Ulugbek was erected in Tashkent. His image is in the Pulkovo Observatory, in the conference hall of Moscow State University, among the portraits of world-famous scientists.

The Ulugbek Memorial Museum was established in Samarkand. In Tashkent, the National University of Uzbekistan, district, planetarium, street, neighborhood, metro station, park, town is named after Ulugbek, Fergana State University, Samarkand Institute of Architecture and Construction, Kitab International Latitude Station, from 2019 named

In conclusion, we would like to note that in Samarkand, Mirzo Ulugbek laid the foundation stone for the development of astronomy, mathematics, as well as geography. According to academician B.Valikhodjaev, the center of science and enlightenment, founded by the great scientist Mirza Ulugbek in Samarkand, was opened on September 21, 600 years ago. The establishment of the successor of Samarkand State University in Uzbekistan is celebrated all over the world.

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