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ARCHITECTURAL HISTORY OF THE TBILISI GEOPHYSICAL OBSERVATORY

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Abstract. *The article deals with the history of the foundation and development of the 19th century Tbilisi Magnetic-Meteorological Observatories, with a focus on the so-called Kukia observatory. Built between 1859 and 1861, it was the first building to be designed as an observatory not only in Tbilisi but also in the Caucasus. The article also traces the history of the successors of Tbilisi Magnetic-Meteorological Observatory: Karsani and Dusheti.*
The paper pays tribute to the medieval observatory of Tbilisi: Shahistakhti.

Key words: *Magnetic-Meteorological Observatories, architectural history, buildings.*

The 19th century was an era of the beginning of uninterrupted absolute observations. It is when terrestrial magnetism, meteorology and other earth sciences began to be studied on a large scale.

As is well known the idea of establishing a chain of magnetic observatories worldwide was proposed by the prominent German scientist and naturalist Alexander von Humboldt (1769-1859). He argued that magnetic measurements were to be made simultaneously in the observatories, or 'magnetic houses' as he referred to them, which were located at quite a distance from each other [5, p. 291].

The history of observatories in Georgia in general and in Tbilisi in particular has its roots in medieval centuries. Tradition has it that the first observatory in Tbilisi was established towards the end of the 8th century, under the rule of the Arabs. It has been presumed that it was located in Shahistakhti (Shaistakhti) part of the Narikhala Fortress. The ruins of Shahistakhti, built from old brick and stone, can still be seen at approximately half a kilometer from Fort Narikhala, in what is now Sololaki Alley. The exact age of the multilayered Shahistakhti remains unknown.

The tradition and findings of scientific studies show that Tbilisi born scientist and doctor Fakhr ad-Din al-Khilati (1191-1282) presumably set up the ancient observatory of Tbilisi. Later he was invited by the famous Persian scholar, Nasir ad-Din at-Tusi, to the Marageh observatory [8, pp. 99-110]. As is well known, the Marageh observatory played an instrumental role in the history of medieval Muslim observatories (Fig. 1).

Fig. 1. Shahistakhti and the first Magnetic Observatory on its top. Early 20th century.

When organizing the observatories in the Russian Empire, Adolph Theodor von Kupffer (1799-1865) was instructed to apply to the Caucasian Viceroy (Commander in Chief), General Adjutant Baron Rosen (Georg Andreas von Rosen, 1781-1841) with a letter asking to assign the implementation of preparatory works for establishing an observatory in Tbilisi [1, p.59; 6, p. 56].

Though founded in the mid 1830s, the Tbilisi observatory was engaged in the common system of terrestrial studies only in 1844 when it was integrated into an international net of observatories together with the launch of regular absolute magnetic and meteorological observations.

Like many other observatories across the world, the Tbilisi observatory covered a huge space encompassing the southern areas of the Russian Empire, the entire Caucasus and the adjacent Caspian, Black Sea and Azov aquatoria.

Before moving into Tiflisser Kolonie, the Tbilisi observatory had changed its premises four times. The reason for this frequent relocation was that magnetic observations which are impossible to be conducted even under a slight distortion of a magnetic field, especially when it is caused by the high density of settlement and electrification of transport [6, p. 57].

The first magnetic and meteorological observations in the Transcaucasus, by demand of the Commander-in Chief Baron Rosen, were organized and launched by Major General Ober- Quartermeister of the separate Caucasian Corps Baron von der Hoven. For this very reason, during 1836 and 1837, he specially constructed an observatory on Mount Sololaki on the ruins of Shakhistakhti. 'This was the first 'magnetic house' erected on the site of the former observatory, which is strongly associated with a senior teacher of mathematics and physics at the Tbilisi gymnasium, the collegiate assessor Ivan Shestakov (born 1815). On 1 May 1844 (14 May old style), the date on which magnetic and meteorological observations were launched in Georgia, marked a new stage in the history of the observatory. It is thanks to the uninterrupted observations that this date has been accepted as the official opening date of the observatory. It is associated with the teacher of mathematics of the senior pupils of the gymnasium and a director of the Tbilisi observatory, Andrei Tymofeevitch Filadelfin (born 1815) who conducted observations until 14 August 1847: 'I started my observations on 1 May (old style) 1844 and continued up to 14 August, 1847', noted Filadelfin. Shestakov and Filadelfin must therefore be considered to be founders of the meteorological and magnetic study of Tbilisi. This very observatory was built on the slopes of Mount Mtatsminda and the design was commissioned to Jacob Ivanov, chief architect of Tbilisi from 1841 to 1846 [11, pp. 99,101,103]. The Mtatsminda observatory was the second of its kind established in Tbilisi in the 19th century.

To build the third magnetic observatory one of the elevations of the left bank of the River Mtkvari was chosen. Though altered, the three-storey building of Tbilisi Magnetic-Meteorological Observatory, still stands at the intersection of Martkopi and Observatory streets in the district of Avlabari. It was constructed under the direct supervision of Arnold Moritz (1821-1902) famous astronomer between 1850 and 1851. Hourly observations were launched on 1 December, 1851 (new style) and lasted until 5 pm, 13 April, 1860 (Fig. 2).

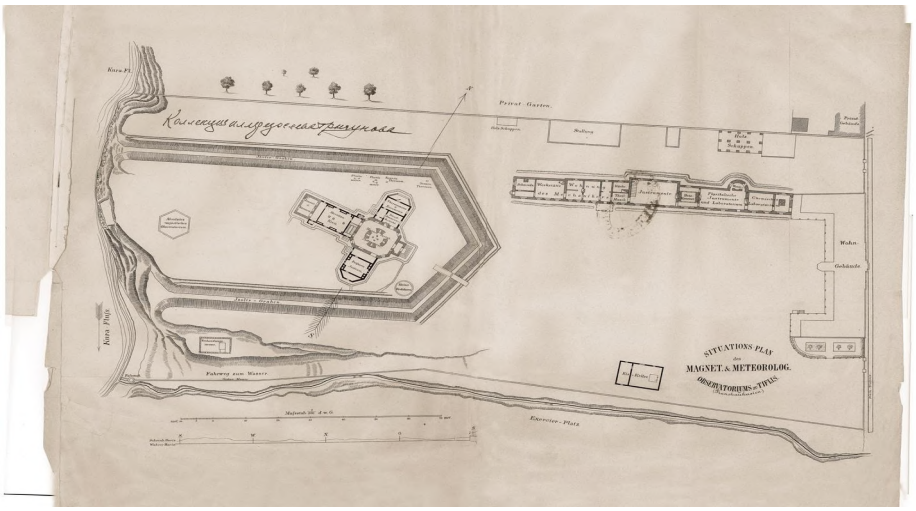

Fig. 2. Layout plan of the Kukia observatory instrumentally surveyed and drawn by Heinrich Kiefer, 1866.

According to scientific sources, Otto Wilhelm Hermann von Abich (1806-1886) preceded Arnold Moritz to the position of director of the observatory [11, pp. 53,55,57,59].

It was Arnold Moritz who, together with his companions, laid a firm foundation for the undertaking of geophysical studies in Georgia and later, from the early 1850s, the advancement of this branch of science.

Moritz in the middle of the 19th century was responsible for the construction of a magnetic-meteorological observatory which was the first building designed as an observatory in the cultural and administrative hub of the Caucasus. It is the history of this building, distinctive in many respects.

The land taken up by what was then the district of Kukia, in Tiflisser Kolonie, was selected for the building of the complex of Tbilisi Magnetic-Meteorological Observatory (Fig. 3- Fig. 5).

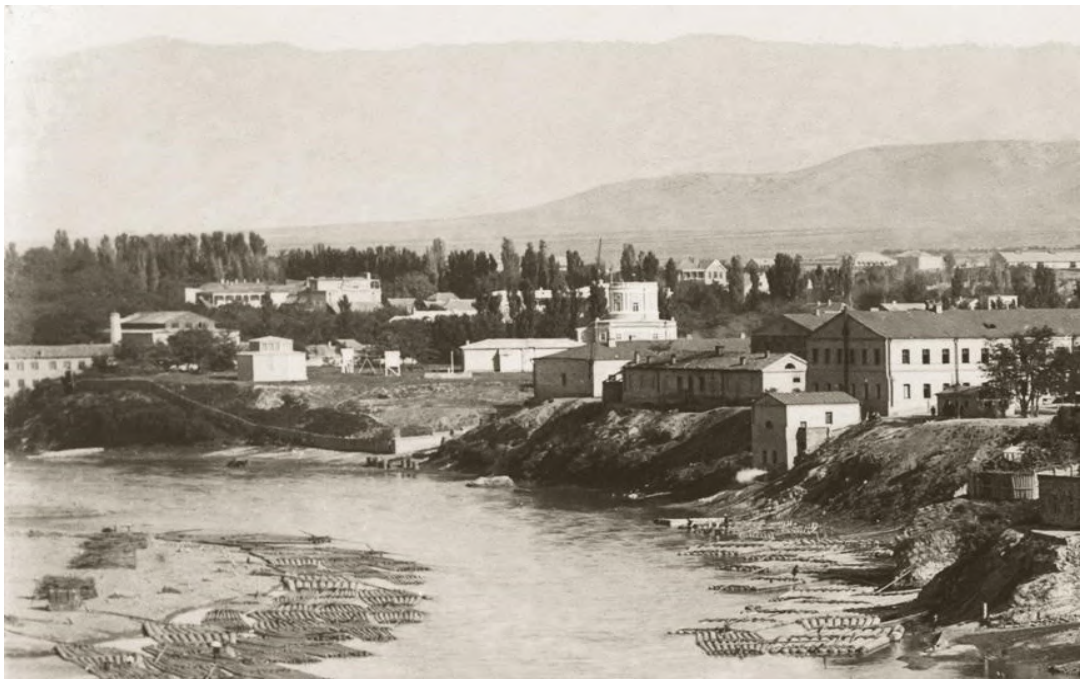

Fig. 3. General view of Tiflisser Kolonie from the river Mtkvari. Tbilisi Physical Observatory with its absolute building. Photo by D.Yermakov. End of the 19th century.

Fig. 4. Main building of the Kukia observatory. 1860 s.

Fig. 5. Main building of the former Tbilisi Geophysical Observatory as it stands today. General view. 2024.

The design for the observatory was made in 1859, while the construction was carried out between 1860 and 1861. It started functioning in a newly constructed building at 0 o'clock astronomical time, 1 May, 1862 [6, p. 57].

The chief of the Caucasian Triangulation Ioseph Khodzko was entrusted with the writing of a charter of the main observatory of the Caucasus. It was he who named the observatory as the Main Observatory of the Caucasus, defined its goals and objectives and set up physical and astronomical departments within the observatory assigning respective functions to each [11, pp. 35, 37, 39,41].

According to a layout plan dating from the time when Moritz was active (Situations Plan des Magnet. & Meteorolog. Observatoriums zu Tiflis (Transkaukasien), the dominant of the complex, was the main building of the observatory provided with a tall wooden tower rotating around the axis in the centre and with widely extended arms. The main building of the observatory (Hauptgebaude) still stands in the eastern half of a narrow strip of land between former Michael Street and the Mtkvari. It was designed by the engineer Ferdinand Lehmkul and architect Otto Jakob Simonson (1829-1914). The main building dominated the entire complex and served to organize the extremely spacious observatory grounds. The building was enclosed by a deep ditch (Isolir. Graben). The observatory was designed in Neo Classical style. The Tbilisi Observatory ranked as one of the most remarkable public buildings in Tbilisi. Having been home to the earliest scientific center

in the Caucasus and having been the first geophysical institution in Georgia, is remarkable for its architectural merit. Unique in the Caucasus, the building was characterized by its unusual typology, which, in turn, was conditioned by the unique function it was designed to serve [11, p.14-42].

The main building of the observatory was the first building designed as an observatory not only in Tbilisi but also in the Caucasus, which accounts for its distinction among scientific buildings in the Caucasus. It is this building that should be considered as the main point of reference in the history of the architecture of the Tbilisi observatories.

The participation of the Tbilisi observatory in the first International Polar Year held between 1882 and 1883, which involved fifteen countries, was initiated by the then director of the Tbilisi observatory Johann Mielberg (1841-1894) [6, p.58]. The reconstruction was done by the architect Leopold Bielfeld (1838-1922) who removed the moveable timber tower of the main building and replaced it by the brick one. Giving a tribute to Lehmkul-Simonson's Classicistic style the tower was designed in Classicistic manner [11, p. 123].

In terms of the architectural decoration, the main building bears all the features of the classicist style and retains the simplicity, austerity and monumentality typical of public buildings erected in Tbilisi in the first half and middle of the 19th century [11 p. 133].

The electrification of streets in Tbilisi in 1904 affected the normal magnetic field thus impeding magnetic observations, hence the decision to move the observatory with its belongings to Karsani, near Mtskheta, while the construction of the Zahes power station and the electrification of the Tbilisi-Khashuri railway section required its transfer from Karsani to the town of Dusheti [7, pp.13, 13', 14].

The Karsani observatory was initiated by Stephan Hlasek, director of the Tbilisi observatory. He is associated with the launching of a seismic station in Tbilisi Physical Observatory in December 1899. He had organised a reconnaissance expedition to the surroundings of Mount Karsani near Mtskheta in 1910 before launching the construction of an observatory on steep terrain. The building work was completed in 1913, while the installation of magnetic instruments by Hlasek and the magnetologist Sitnov finished in 1914. Worth noting is that Ernst Rudolph Assaffrey (1846-1925) of Estonian origin also took part in building the Karsani observatory and in the observations made there [3, pp. 7-9; 6, p.58]. The complex was designed by the civil engineer Hermann Otto Barth (1873-1937). The main building at Karsani is distinguished by Art Nouveau features and is of high artistic merit. Faced with an alteration of rough blocks of stone and brick with architectural decorative elements (a projection and a pilaster), the façades feature mullions and a wavy cornice on the tower-like structure, all inspired by Art Nouveau. The interior of the building also reveals the influence of Art Nouveau. The main building of the Karsani observatory demonstrates the extent of the influence of this movement in Georgia. Barth was also responsible for other structures of the Karsani observatory, including a residential building for the staff and a large magnetic pavilion [12, pp. 227, 229, 233] (Fig. 6, Fig. 7).

Fig. 6. Main building of the former Karsani observatory. 2004.

Fig. 7. Main building of the former Karsani observatory. 2024.

In 1918, Andria Benashvili (1868-1941), the well-known astronomer and geodesist, was appointed director of the Tbilisi observatory. During his tenure (1918-1922) a seismic bulletin was launched and meteorological and seismic stations expanded. Abandoned by foreign scientists, the Tbilisi observatory and the Karsani Magnetic Department remained non-functional during the First World War. Rudolf Assaffrey was among those few scientists who stayed in Tbilisi. The further advance of Tbilisi Physical Observatory and the restoration of Karsani Magnetic Department was largely due to Ernst Rudolph Assaffrey together with former directors of the Tbilisi Observatory Alexander Didebulize (1882-1951), Razhden Khutsishvili (1887-1942), Micheil Nodia. The mechanics of precise instruments, Florentin Weiss and Arnold Weiss also played an important role in this undertaking. Other figures who contributed to the revival of the observatory include the magnetologist Nikoloz Intskirveli (1900-1943), Shalva Pavlenishvili (1898-1938), weather forecaster S. Pantskhava who died in the Second World War and assistant at the Karsani observatory, Shalva Khuchua (Fig. 8).

a.

Fig. 8. Large pavilion for absolute observations of the Karsani observatory. 1910 s. Large pavilion for absolute observations. Dusheti. 2007.

b.

As early as 1932, Professor Micheil Nodia (1891-1975) organized and led a preliminary reconnaissance survey of some of the sites of the Dusheti district with absolute instruments and the so-called Schmidt scales, which confirmed the acceptability of the magnetic field of the town of Dusheti and its surrounding areas [4, pp. 7-14, 15-2, 7-14, 15-25].

It was at that time that the foundation was laid of the temporary magnetic observatory. Like the Tbilisi observatory and then its successor Karsani Magnetic Department, it was to serve the entire Caucasus and the vast water areas surrounding it. Hence Dusheti Observatory has a history of one hundred and eighty years.

Thanks to its scientific importance the Dusheti observatory ranked among the world's leading observatories. It should also be noted that among the edifices of Dusheti Magnetic Complex the so-called Old Variation Pavilion built in 1935 [10, p. 57] and the Pavilion of Absolute Observations was an exact copy of the one at Karsani. It was built in 1953 of material originally used for the Karsani magnetic pavilion [5, p. 297; 9, p.7-12; 11, pp.175, 177].

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The contemporary photos of Tbilisi and Karsani Geophysical Observatory main buildings as well as Dusheti Large Pavilion for Absolute Observations are by the author.