

The Treasures of Pulkovo Observatory

Olga TSIOPA *1

This history and facilities of Pulkovo observatory (Central Astronomical Observatory of the Russian Academy of Sciences) are presented.

1. Introduction

Pulkovo observatory (as it is usually called after the name of a small village that was situated nearby) is officially named in Russian documents as the Main (in Russian it sounds as 'Glavnaja') Astronomical observatory of the Russian Academy of Sciences. The abbreviation is GAO RAN. In English it is traditionally named as The Central Astronomical observatory of the Russian Academy of Sciences..

It is situated on 70m hill 15 kilometers from St.-Petersburg. .

2. Historical Review

According to a special order of the Russian tsar Nickolay the I Pulkovo observatory was founded in 1839. That time St.-Petersburg was the capital of Russia.. Professor W.F.Struve (1793-1864) from Tartu university was invited to become the director. A lot of money was given to the observatory. The beautiful building was constructed after the design of one of the best Russian architects Brullov.

Never later in Russia (or Soviet Union) history astronomers were paid better. Good quality instruments were used for precise determination of the coordinates of heavenly bodies in order to compile star catalogues for geographical exploration of our vast country and the derivation of the most important astronomical constants. The observations held at Pulkovo were so precise, that for some time European astronomers preferred to use Pulkovo meridian better than the Greenwich one. The observatory became widely known all over the world and deserved the honorary title of the "astronomical capital of the world".



Fig.1. Pulkovo meridian passes through the middle of the main building of the observatory, which possesses the precise orientation.

Pulkovo observatory used to own one of the richest scientific libraries in the world. Many precious books were brought by Struve from Tartu. Tartu University is very old and Struve used an opportunity to get many wonderful books from its library. Moreover, part of Peter the Great collection was passed to the Pulkovo observatory library. Peter the Great was very much interested in education. One of his projects was to collect old rare scientific books. He sent special people to buy such books in Europe at every auction. As a result the library was staffed with wonderful editions and unique books like one with the Copernicus handwritings. More than eighty incunabulae were presented in the Pulkovo observatory collection.

After the October revolution (1917) there was a war and an awful economical depression in the country, but in eight years the observatory got a new telescope from the socialist government.

During the World War II the buildings and the biggest telescope were completely destroyed. Still most of library treasures were heroically saved. There was a great fighting for the Pulkovo hill. Many thousands of

*1 Pulkovo Observatory, St.-Petersburg, Russia,
tsiopa@gao.spb.ru

soldiers are buried here. A memorial monument is erected on the Pulkovo meridian at the observatory. The territory around St.-Petersburg (that time it was called Leningrad) is almost an ideal plane. Even such a hill gives an advantage in a struggle. Almost three years (900 days) Leningrad had been in Nazi blockade. After the glorious victory in 1945 it was decided to restore all the monuments of culture destroyed by the enemy. Many great architectural masterpieces were reborn in Leningrad and its surroundings. An incredible work was done. St.-Petersburg (Leningrad) is one of the most beautiful cities in the world.

Already in 1954 the restored Pulkovo observatory was opened again.

3. Main Activities

Pulkovo observatory is surrounded with a nice old park. Wonderful nightingales sing at white nights among the domes and antennas of radio telescopes. A big conference hall with an outstanding acoustics affords to hold significant international conferences and even concerts of classical music.

In the middle of the main building there is a round hall with a memorial mark of Pulkovo meridian and a surrounding gallery. It is a museum. The oil paintings of all the former directors of Pulkovo observatory and life portraits of Gauss, John Hershel and other famous scientists are presented here. One can see many old documents and astronomical instruments. A 70 kg piece of the fabulous Sikhote-Alin meteorite is exhibited. The visitors usually have a fun of trying to pick it up. Old astronomical instruments including original telescopes of Peter the Great provided by the Hermitage are of particular interest.

The stratospheric solar automatic station is also included into Pulkovo observatory museum collection. These balloon experiments of 1966, 1970 and 1973 resulted in detailed images and spectra of the solar surface obtained by the telescope 20 km above the earth.

Every day many people (mostly schoolchildren) come to have an excursion in Pulkovo observatory. They can see not only the museum, but old and even functioning instruments as well.

The large Pulkovo radio telescope (100 m) constructed in 1954 (!) became the prototype for RATAN 600.

St.-Petersburg is a big city and one can imagine that in some other places on earth the astroclimate can be much better. The first place chosen by Pulkovo astronomers to bring their telescopes to was the Crimea. Now Crimean Astrophysical Observatory belongs to Ukraine.

So called permanent expeditions were opened in Armenia (Ararat expedition), in Azerbaijan (Ordubad expedition), at the Caucasus (Kislovodsk Mountain Station), at the Pamir (Shor-Bulak, 4300m above the sea level), in Chile (with the perfect telescope made by Maksutov himself), in Bolivia and a branch in Nikolaev. Special Astrophysical Observatory of the Russian Academy of Sciences (SAO) at Zelenchuk including radio telescope RATAN 600 and 6m telescope (the biggest optical telescope in the world in 1970-ies) was also founded by Pulkovo astronomers

Unfortunately the expedition in Chile was closed for political reasons. The USSR government could not allow soviet astronomers to stay in the country after Pinochet had taken the power. The other branches had been functioning successfully before "perestrojka" happened.

The political and economical changes brought a lot of troubles in 1990ies to soviet/ russian astronomers. Most of young people were forced to immigrate or to go into business for their living. The problem was not only in the salaries. No big telescope has been constructed in Russia for the last thirty years.

Fortunately, in 1990 the borders were opened for scientists. Alongside with the internet development it made the international cooperation possible.

Pulkovo observatory had a new 1m telescope, but there were no funds to mount it. Italian colleges agreed to fix it in Italy. Now the collaborative project of infrared supernova search is held together.

Unfortunately most of the permanent expeditions were lost both for political (after the death of the USSR some of Pulkovo telescopes happened to be situated in the other countries) and economical reasons.

Only Kislovodsk Mountain Station was heroically saved. There were no funds, no electricity, sometimes even no gas and water. Kislovodsk observatory is situated at the North Caucasus not far away from SAO and is mostly specialized on solar observations. The new constructing telescopes are planned to be mounted there.

Bolivians were so kind to preserve the domes and

buildings without any financial support from Russia during the most difficult period. Now there is a hope to reanimate the Bolivian branch. Dr. I.S.Guseva even managed to start observations

Ten years ago Pulkovo observatory passed through the fire in the library and robbing the museum.

Not every scientific institution survived that dangerous period of Russian history. The Institute of Theoretical Astronomy (ITA), specialized on the celestial mechanics was closed. Part of its staff was accepted by Pulkovo observatory. Hence, Pulkovo observatory is a unique astronomical institution (perhaps the only one in the world), where all the branches of the modern astronomy (astrophysics, solar astronomy, astrometry, radio astronomy, celestial mechanics, stellar astronomy and even cosmology) are present. The scientific staff consists of more than one hundred persons.

Pulkovo observatory has a long-term collaboration with St.-Petersburg State University. Most of Pulkovo astronomers graduated from this university. Many students start their scientific studies at Pulkovo observatory during the period of their university education. On the other hand some scientists are invited to teach at the University.

Like most of old significant observatories Pulkovo has a glass library. It includes more than 40 000 plates. Most of them naturally exhibit the northern hemisphere of the sky (St.-Petersburg is situated at 60 degrees parallel), but the southern hemisphere is also presented by the images obtained in Latin America.

The photographic observations started in Pulkovo already in 1893, almost immediately after the photography itself was invented.. Four hundred of images are older than a century. That offers a unique opportunity to notice long term changes in stellar positions and brightness. First of all the orbits of binaries can be calculated precisely. Then distant asteroids and variable stars can be investigated even by schoolchildren. First steps in this direction are already made.

It is amazing that most of plates were saved by astronomers through the both world wars. All the old plates were preserved, though it was not easy. In some cases the plates had splitted into emulsion and glass counterparts and a restoration with a specially prepared glue became a work of real art. The plates are kept like an archeological collection.

It is important not only to save the information, but to use it effectively as well. The glass library in its "hard copy" form is available only for Pulkovo astronomers. That's why the impressive process of digitalizing of the glass library is started. A digital catalogue of frames (coordinates of images) is already available. It means that one can easily find out if an object under his investigation was sometime observed with Pulkovo telescopes .Later the scientist can visit Pulkovo or find somebody open for collaboration (it is not difficult).

The digital copy of the whole Pulkovo collection of plates is in preparation. Hopefully the job will be finished soon and not only professional astronomers, but even schoolchildren will be able to search for variable stars and asteroids using these old images.

4. Conclusion

One can find beautiful pictures of Pulkovo observatory in the "gallery" at www.gao.spb.ru. Typing "Pulkovo" will bring you to the airport site. The St.-Petersburg airport is situated close to the observatory and is also called Pulkovo.

References

- [1] Vitinsky Yu.I., 1981, "The Main Astronomical Observatory of the Academy of Sciences of the USSR at Pulkovo", "Nauka", Leningrad.
- [2] Kanaev I., Kanaeva N., Poljakov E., Pugach T., 2002, "A Digital Copy of the Pulkovo Plate Collection", Universidade de Sao Paulo, Araraquara, Brazil, Proc. of the International Conference "AdeLA-Astrometry in Latin America and the Third Brazilian Meeting on Fundamental Astronomy