

History of the academic science in Tomsk and of the Institute of Atmospheric Optics

V.E. Zuev

*Institute of Atmospheric Optics,
Siberian Branch of the Russian Academy of Sciences, Tomsk*

Received September 24, 1999

Introduction

The science in Siberia has a much longer history than the Siberian Branch of the Academy of Sciences of Russia. This follows from many convincing facts: (1) the Imperial Tomsk University was founded in 1878, and then Tomsk Technological Institute was opened in 1896; (2) in 1922 the Institute of Applied Physics was founded at the Siberian Technological Institute, and in 1928 it was reorganized into the Siberian Physico-Technical Institute owing to creative efforts of physicists and, first of all, of Professor Vladimir Dmitrievich Kuznetsov.

By the beginning of foundation of the Siberian Branch of the Academy of Sciences of the USSR in 1957, Tomsk, beyond all manner of doubt, occupied the first place in science in the entire Siberian Region. Nevertheless, it was decided to found scientific centers of the Siberian Branch of the Academy of Science in Novosibirsk, Irkutsk, Yakutsk, and Krasnoyarsk. So, Tomsk was passed over because of the position of the then authorities of Tomsk Region.

History of foundation of the atmospheric optics in Tomsk

According to official Resolution of the USSR Government, issued late in 1955, the Siberian Physico-Technical Institute unfolded research program under the project entitled "Efficiency of operation of thermal direction finders and infrared vision systems under different atmospheric conditions. Within the framework of this project, systems operating in the thermal, or infrared, spectral region were studied. Thus, the task was to study the atmospheric transmittance in this spectral region, that is, to consider one of the atmospheric optics problems. The management of the Siberian Physico-Technical Institute had to answer the question: Who will do this work?

It should be noted that at that time the atmospheric optics was a problem nobody dealt with not only in the Siberian Physico-Technical Institute (SPhTI), but all over Siberia from the Ural to the Pacific Ocean. In this situation it was hard to find specialists capable of tackling these problems. Professor Nataliya Aleksandrovna Prilezhaeva became a scientific

leader of this project. At that time she headed the spectroscopy laboratory at SPhTI and the Optics and Spectroscopy chair of the physical department of Tomsk State University. I was appointed to head the research work under this project.

So, the problem was formulated, and to solve it we had first to design the equipment needed and to gain corresponding knowledge. Some difficulties and incomprehension arising at the first stages of the atmospheric-optics research are perfectly well described in the paper by Vladimir Vinogradov [Sibirskie Ogni, No. 6, 135–146 (1980)]. This paper is cited below:

"... The discussion had to begin at ten o'clock.

It was assumed to take place at the high level and among only a few people. Some people thought that the recently organized research group headed by young scientist V.E. Zuev made pretensions not fully corresponding to its creative potential and that this group should be shown its place.

The group was small.

Three young scientists (V.E. Zuev, P.N. Kokhanenko, and V.K. Sonchik. – V.Z.) ... were a team joined around a research task, most of people didn't understand, and approved only by few specialists. The group was a part of the spectroscopy laboratory at the Siberian Physico-Technical Institute and studied optical wave propagation through the atmosphere.

Then, in 1950's, only a few scientists dealt with the optical region. Now we can clearly understand why: only some years later the lasers were invented by Soviet scientists N.G. Basov and A.M. Prokhorov and American scientist Ch. Towns, who won the Nobel prize for this invention, and the glory of lasers became a star on the sky of science. With the advent of lasers the optical region, as a magnet, began to attract the interests of many research groups, and it became the subject of numerous speculations.

This all occurred later, in 1960's–1970's. But in 1950's the optical region was most often the object of ironical exclamations, shrugs of shoulders, and tacit throwing-up of hands.

Several years later the Laboratory of Infrared Radiation was founded at the Institute (1960), and on its base the chair of opto-electronic devices was opened (1962). Then the large academic institution appeared – Institute of Atmospheric Optics of the Siberian

Branch of the Academy of Sciences of the USSR. The Institute of Atmospheric Optics was headed by Vladimir Evseevich Zuev, Corresponding Member of the USSR Academy of Sciences, well-known Soviet scientist, prominent statesman, deputy of the Supreme Soviet of the USSR, member of many home and foreign scientific committees, commissions, etc.

However, that time had not come yet, and the young scientists were going to fight for their theme, to prove its necessity and urgency, and to obtain appreciable results.

... The discussion started exactly at ten o'clock. ... He (V.E. Zuev. – V.Z.) clearly and briefly reported that for the first time they succeeded to obtain the reliable experimental evidence in support of the theoretical ideas on the dependence of the integral atmospheric transmittance on the distance from an observer. Besides, it became clear during the work that the transmittance should be divided into components to be studied separately. The results of three-year investigations were properly processed and took the traditional form of a scientific report.

Having found in the Zuev's report the analogy with his memory, the first opponent noted that he knew a professor who discovered the two-day period of temperature variations, but then it proved that duty operators were of very different height, and because of parallax one of them overestimated the measurement results, while the another underestimated them. Without the shadow of a smile, Zuev replied that he tried to use people of the same height.

The second opponent said that the work of the group under field conditions deserved approval, because it is healthy to breath fresh air, and in this sense a good result is achieved.

Zuev felt that the spring stressed in him began to unwind. Suddenly he replied bluntly.

– Under your very eyes, – said Zuev, – a new interesting field is dawning. This process is not easy. Many things are lacking. New ideas are hardly understood by people. We need your help, but you, who are leading specialists, do not want to understand the importance of the new theme and its urgency.

This attack produced the desired effect, and the opponents lost their nerve. To be correct, we should note that later almost all participants of this discussion in some or another way helped the formation of the new science. Now Zuev and his colleagues are thankful to the first and second opponents and others, who helped or, at least, let them work.

The Laboratory of Infrared Radiation was soon created, shortly after this meeting. It made the basis for the future chair and then the institute. The youngest laboratory in the institute quickly became the largest one; its staff fast increased up to one hundred.

Tomsk physicists then called this stage the “ante-laser era.”

In the process of accomplishment of the project “Tom” which was approved by the State Commission from Moscow, the collective of specialists in atmospheric optics was formed rather fast. The unique test bed site constructed ashore the Tom' River played then an important part in implementation of new projects in the research field of laser radiation propagation in the atmosphere. The new laboratory – Laboratory of Infrared Radiation – was organized in the SPhTI. Its staff in 1966 was more than 100. This laboratory became a recognized leader in solution of this problem. The main achievement of this group both in Russia and abroad was correct interpretation of the results of investigations into laser radiation propagation (spectrum, power, energy, divergence, coherence, etc.), as well as the part of molecular absorption of the laser radiation by atmospheric gases, scattering by aerosols, refraction, meteorological conditions, and others.



From left to right: director of the SPhTI, Professor M.A. Krivov, Professor V.E. Zuev, and Nobel Prize Winner Academician A.M. Prokhorov in the Laboratory of Infrared Radiation of the SPhTI (1967).

From almost the very beginning of the development of atmospheric optics, it became clear that the in-depth investigation required a complex solution, that is, combination of the corresponding theoretical and experimental studies with development of experimental instrumentation in parallel. The studies must cover all the fundamental phenomena of optical

radiation interaction with the atmosphere with the proper allowance for realistic models of the atmosphere, which is a very complex and dynamic system.

It was just this approach to the atmospheric-optics problems that has formed the basis for further success of the group even in the period of its formation within SPhTI. This approach has required fast growth of the staff caused, first of all, by the practical needs. Young scientists who graduated from the physical and radiophysical departments of the Tomsk State University were mainly admitted.

I am grateful to Academician Vladimir Dmitrievich Kuznetsov (the then director of the SPhTI) who helped and supported our group and me in the development of the new research field. It happened so that in my first postgraduate year I was elected the secretary of the communist party bureau of the SPhTI and the physical department. As a secretary, I often met Vladimir Dmitrievich both on my initiative and at his request. He often took my consultancy on many difficult problems as a father with his son. I was always delighted with his extraordinary goodness, humanity, cultural level, and honesty. Further, he supported and facilitated the development of the new field.

Concluding this section, I would like to note that the main results of the Laboratory of Infrared Radiation activity are considered in two my books: (1) V.E. Zuev, *Transmittance of the Atmosphere for Visible and Infrared Rays* (Sov. Radio, Moscow, 1966), 318 pp.; (2) V.E. Zuev, *Propagation of Visible and Infrared Waves in the Atmosphere* (Sov. Radio, Moscow, 1979), 496 pp.

Both these books were translated into English and published in the USA, what certainly has played a significant role in recognition of extraordinary achievements of the Tomsk scientific school in atmospheric optics.

Formation of the Institute of Atmospheric Optics

In 1966, when the staff of the Laboratory of Infrared Radiation exceeded 100 persons, the SPhTI could not provide enough room for its further development, especially taking into account that the further growth was dictated by the country needs which were clear from requests of leading firms of the corresponding ministries of the USSR. Under these conditions I appealed to the first secretary of the Tomsk Regional Committee of the Communist Party E.K. Ligachev with the suggestion to organize the optical institute within the framework of Siberian Branch of the USSR Academy of Sciences in Tomsk from the Laboratory of Infrared Radiation of the SPhTI. Ligachev positively supported this suggestion. He arranged my meeting with Academician M.A. Lavrent'ev.

This meeting made the inextinguishable impression on me. Having listened to my talk about our problems here in Tomsk, Academician Lavrent'ev said the

following: "In formation of the Siberian Branch we fleeced Tomsk. Now it is the time to pay the debt.B

On the resolution of the Presidium of the Academy of Sciences, in early January 1967 special commission visited Tomsk. It included famous academician, Nobel Prize Winner A.M. Prokhorov and well-known specialist in spectroscopy I.I. Sobel'man. The commission gave positive resolution on the foundation of the Institute of Atmospheric Optics SB AS USSR, the first academic institute in Tomsk.

Finally, on August 5, 1968 the Presidium of the Academy of Sciences passed the Resolution No. 594 on the formation of the Institute of Atmospheric Optics and the Institute of Petroleum Chemistry SB AS USSR in Tomsk.

On September 5, 1969 Academician M.A. Lavrent'ev put his signature on the Resolution of the Presidium of Siberian Branch of the Academy of Sciences on opening the Institute of Atmospheric Optics with the first staff of only five. I was appointed its director.

From the very beginning of the Institute formation, it included the laboratory of electronics headed by Professor G.A. Mesyats which was planned to be then separated as an independent institute. G.A. Mesyats was appointed the first deputy director responsible for the research work.

Personnel policy of the IAO

In the just opened institute there were one professor-doctor and ten candidates of science; they all were young, as most of engineers and technicians who left the same Laboratory of Infrared Radiation of the SPhTI. For 30 years of the Institute history, one of the main concerns of its leaders was engaging young scientists into the staff. This was most evident in the first years. Thus, already in 1969, in addition to the first five positions, Academician Mikhail Alekseevich Lavrent'ev granted 200 staff positions to the Institute. These vacancies were filled for three months and mostly by young people. In the following years, 30 to 40 most talented young scientists that graduated from the Tomsk State University and some other high education institutes were recruited every year. At that time the science was a carrier of prestige.

Summing up this activity, I would like to note that now we have in our Institute one academician and four corresponding members of the Russian Academy of Sciences, 30 doctors, and 200 candidates of science. Besides, 20 doctors of sciences who made their scientific carrier in the Institute are now working in the universities of Tomsk and other Siberian cities, as well as in other regions of Russia.

In November 1972 a Special Design Bureau "OptikaB was founded. Its main goal was to provide for the relevant technological basis for the research programs the Institute took part in. As in the Institute of Atmospheric Optics, the staff policy in the "OptikaB SDB was oriented toward young people. Formation of the SDB in parallel with the Institute allowed the

combined approach to solution of atmospheric-optics problems to be realized. By this it is understood the through process starting from academic ideas to basic and applied research with the use of unique experimental equipment and to the design of experimental and pilot samples of new equipment and to small-series production at the final stage of this process.

By 1988 this chain was already active due to sufficient financial support coming to the Institute from rich leading firms of the main industrial ministries. The Institute staff in that year exceeded one thousand, and that in the Design Bureau was about 900. The personnel in both of these collectives met the highest requirement imposed by the scientific and technical progress.

It was just at that time that we had the Joined Institute of Atmospheric Optics – the complex that had no analogs in the world. The director of the Institute was at the same time the general director of the Joined Institute, and the director of the Design Bureau was the first deputy director.

Material resources for atmospheric optics

The total area of the four buildings of the Institute of Atmospheric Optics and six buildings of the "OptikaB Design Bureau is more than 50 000 m². In a special building, the Small (4 m in diameter and 10 m long) and Big (10 m in diameter and 26 m long) Aerosol Chambers were mounted. Both chambers, as well as other model setups, are made from stainless steel 16 mm thick. They can be filled with different aerosols of both natural and technogenic origin thus providing possibility of studying their microphysical characteristics, such as number density and size spectra of aerosols.

The vertical and horizontal chambers were also constructed. By filling them one can imitate realistic mixture of aerosols with gaseous components at the pressure and temperature characteristic of the atmosphere at the altitudes from 0 to 30 km. Besides, the unique multipass cell with 110 m length of a single pass between the reflectors. It allows the study of fine spectroscopic effects in different molecules under conditions that occur in the atmosphere at altitudes up to 30 km with the corresponding values of the atmospheric temperature and pressure. With this cell the record was made in the maximum length of the measuring path achievable under the laboratory conditions – up to 10–12 km. The second 1-m-diameter and 30 m long multipass cell provides the possibility of carrying out spectroscopic studies at high pressure and temperature typical, for example, of Venus.

The multifunctional Siberian Lidar Station occupies a specialized three-storied building. This station is included into the List of Unique Experimental Setups in the Russian Federation. It allows one to acquire simultaneously the vertical profiles of the ozone concentration, aerosol particle number density and size spectrum, concentration of nitrogen dioxide, and temperature up to the altitudes of 50 km. The results

obtained by now with this station give the Institute the priority in studying the mechanisms of the ozone depletion and transformation of the ozonosphere.

The Institute of Atmospheric Optics succeeded in creation of the "Optik-EB airborne laboratory mounted onboard an AN-30 aircraft and equipped with the unique equipment. This airborne laboratory was used to study the ecological state of the atmosphere over more than 100 towns of the former USSR, as well as the state of the water surface (sea, lakes, rivers, etc.), among them the Lake Baikal ought to be mentioned especially.

In co-operation with the "OptikaB Design Bureau the Institute has designed a series of mobile lidars including both ground-based and airborne. Among them there is a spaceborne lidar "BALKAN.B

A series of high and ultrahigh resolution spectrometers has been designed, as well as other non-laser optical devices and systems.

Main results of research activity

Two stages can be isolated from the history of formation and development of the Institute of Atmospheric Optics. The first stage lasted from 1956 to 1969. This period is its prehistory within the Siberian Physico-Technical Institute and it has been considered above in this paper. The second stage covers the period from September 5, 1969 up to the present time. It is natural that the main results were obtained in the second period. However, the first period is of principal importance, because it laid the foundation for the second one. It should be noted that already in the end of the first period the studies were conducted with the use of lasers.

The second stage of the development of atmospheric optics studies at the Institute differs markedly from the first one mostly by the technical resources available. The scope of the studies widened, the equipment improved. Lasers were used, as a rule, in quite new research areas, namely, in laser sounding of the atmosphere from the ground, as well as from aboard ships and aircraft. More than ten laser spectrometers of high and ultrahigh resolution were developed, and thousands absorption lines of different gases were recorded with their help for the first time.

At the second stage the original theories have been developed in all the main research branches of the modern atmospheric optics. The results obtained are generalized in the *Collection of Monographs on the Current Problems of Atmospheric Optics* (ed. by V.E. Zuev) that involves nine volumes.

I would also like to note the monograph by V.E. Zuev, *Laser Beams in the Atmosphere*, published in 1982 by the Plenum Publishing Corporation, New York. This book was published in the whole volume in English, and only its first part was published in Russian [V.E. Zuev, *Laser Radiation Propagation in the Atmosphere* (Radio i Svyaz', Moscow, 1981)].

It is beyond question that this monograph has played a significant part in gaining the world-wide acceptance of the Institute of Atmospheric Optics.



Winner of the Lenin Prize, Academician Rem Viktorovich Khokhlov, Chairman of the Commission on Inspection of the Scientific Activity at the Institute of Atmospheric Optics, rector of the Moscow State University, and Academician V.E. Zuev in 1979.

To sum up the results of the 30-year activity of the Institute (since 1969 until 1998), let me present some quantitative information: our scientists have published 130 books, including about 30 books in English, more than 6000 papers, including more than 500 papers in English, among them about 200 papers in the English edition of the monthly journal *Atmospheric Optics* (1988–1991) and *Atmospheric and Oceanic Optics* (since 1992) printed in both English and Russian by the Spektr Publishing House of the Institute of Atmospheric Optics.

For the same 30-year period the scientists of the Institute presented more than 7000 scientific reports, including more than 1000 reports at international conferences.

Institute of Atmospheric Optics as a founder of the Tomsk Scientific Center SB of the USSR AS (now SB of RAS)

Founding the first academic institute in Tomsk and being the first representative of the Presidium of the SB of the USSR AS in Tomsk and then the chairman of the Tomsk Scientific Center SB RAS, I clearly understood that my institute can evolve harmoniously only if other institutes do simultaneously exist. Recall that at the first stage only two academic institutes were opened in Tomsk: the Institute of Atmospheric Optics

and the Institute of Petroleum Chemistry. For this reason, already at the stage of formation of the Institute of Atmospheric Optics, it included the subdivisions which were planned to grow into independent institutes.

It was just the Institute of Atmospheric Optics that had laboratories of electronics and strength physics, which then grew into departments. From these departments the Institute of High-Current Electronics and the Institute of Strength Physics and Materials were founded. The directors of these institutes – Professor Gennadii Andreevich Mesyats and Professor Viktor Evgen'evich Panin – were the deputy directors of the Institute of Atmospheric Optics, then they became the corresponding members of the academy of Sciences and academicians.

Finally, the fifth institute of Tomsk Scientific Center is the Institute of Optical Monitoring. This institute was founded recently from the Special Design and Technological Institute "OptikaB (former Special Design Bureau "OptikaB). It is headed by my former student, now Corresponding Member of the Russian Academy of Sciences, Mikhail Vsevolodovich Kabanov.



Visit of Vitalii Ivanovich Vorotnikov, Chairman of the Soviet of Ministers of the USSR, to Tomsk Akademgorodok (1984).

On the contribution of Tomsk Scientific Center SB RAS to science and education in Tomsk

First of all, I would like to note that one of the argument used by opponents of foundation of the academic science in Tomsk is connected with the assumption that most famous and known scientists will leave higher education for academic science. Let me dwell on this point.

At the earliest stage of the development of academic science in Tomsk, it gained two doctors of science, namely, me and G.A. Mesyats. At the same time, we continued our work as professors at Tomsk State University and Tomsk Polytechnical Institute, respectively. Only once after the construction of the main building and experimental building of the

Institute of Atmospheric Optics had been completed, Professor Panin who was at that time in the Siberian Physico-Technical Institute was transferred to the Institute of Atmospheric Optics on his repeated request. The leadership of the Institute of Petroleum Chemistry was formed almost without participation of the Tomsk high education institutions.

Thus, the staff of doctors of the institutes at Tomsk Scientific Center was formed mostly due to training, rather than transferring. Below I present the data on the number of doctors in the institutes of the Tomsk Scientific Center SB RAS by 1999: Institute of Atmospheric Optics – 30; Institute of Strength Physics and Materials – 25; Institute of High-Current Electronics – 15; Institute of Petroleum Chemistry – 10; Institute of Optical Monitoring – 6, other small teams all together – 9. The total number of doctors in the Center is now really impressive – 94.

During 30 years, more than 50 doctor's theses were defended at the Institute of Atmospheric Optics. Six doctors who defended their theses here work now at Tomsk State University and two at Tomsk University of Control Systems and Radioelectronics.

Official recognition of the achievements of the academic science in Tomsk

It should be noted that the Tomsk Scientific Center SB RAS, in spite of its young age, occupies a high place among other centers by official recognition of its high achievements. There is no sense in comparing it with the Novosibirsk Center, because the latter is two to three times larger than all the others. Specifically, of the total number of RAS members in the SB RAS, 62 academicians and 64 corresponding members are in the Novosibirsk center, while in the other 11 Siberian cities there are 15 academicians and 24 corresponding members.

First let me give information to a reader on the number of academicians and corresponding members of SB RAS in scientific centers SB RAS in different Siberian cities, taking into account that the presence of RAS members itself is a high recognition. The first place is occupied by the Irkutsk Scientific Center, where there are 6 academicians and 7 corresponding members.

In five institutes of Tomsk Scientific Center there are three academicians and four corresponding members, and three of them, namely, M.V. Kabanov, S.D. Tvorogov, and V.V. Zuev, were my students. My fourth student – V.L. Mironov – was the deputy director of the Institute of Atmospheric Optics and Vice-chairman of the Tomsk Scientific Center in the period since 1979 till 1986. It should be also noted that the founder of the Institute of High-Current Electronics, Academician G.A. Mesyats was then the Chairman of the Ural Branch of the Academy of Sciences of the USSR; since recently he occupies the high positions of the First Vice-President of RAS and the Chairman of the Russian Attestation Commission.



Mikhail Vsevolodovich Kabanov, Cor. Member of RAS, director of the Institute of Optical Monitoring



Stanislav Dmitrievich Tvorogov, Cor. Member of RAS, head of the laboratory at the Institute of Atmospheric Optics



Valerii Leonidovich Mironov, Cor. Member of RAS



Vladimir Vladimirovich Zuev, Cor. Member of RAS

For comparison: in the four institutes and Special Design Bureau "NaukaB of the Krasnoyarsk Scientific Center SB RAS there are three academicians and two corresponding members; in Yakutsk center there are two academicians and four corresponding members; in Barnaul in the Institute of Water and Ecological Problems SB RAS there is one academician; in Tyumen' Scientific Center there are three corresponding members, and three more are in Kemerovo and Buryatskii Centers.

In the last five years 13 doctor's and 19 candidate's theses were defended in the IAO SB RAS, tens of scientists were awarded various prizes (in competitions of young scientists; for the results they achieved in basic and research studies) and State scientific stipends to famous scientists of Russia. Winners of the Prize of the Tomsk Regional Administration in science and technology are Academician V.E. Zuev (1996), Corresponding Member S.D. Tvorogov (1997), Corresponding Member V.V. Zuev (1998), Doctor of Physics and Mathematics V.P. Lukin, Candidate of Physics and Mathematics I.Yu. Makushkina (1996), Doctor of Technology G.S. Evtushenko (1997), Candidate of Physics and Mathematics I.V. Ptashnik (1997), and Candidate of Physics and Mathematics S.A. Terpugova (1998).

In the period from 1995 to 1997 four doctor's and one candidate's theses were successfully defended by scientists from other cities in the doctor's council of the Institute of Atmospheric Optics. Researchers of the IAO won five State Prizes of the USSR, two prizes of the Soviet of Ministers of the USSR, two State Prizes of the Russian Federation, three prizes of the Young Communist League, and the title of Honored Scientist of the Russian Federation.

Conclusion

First of all, I would like to emphasize that in the Tomsk Scientific Center we succeeded to create, for a short time, the worthy collectives with the worthy material basis.

Then I would like to express my gratitude to all who contributed significantly into the formation and development of the Institute of Atmospheric Optics,

Tomsk Scientific Center, and Akademgorodok, namely, E.K. Ligachev, Academician M.A. Lavrent'ev, Academician M.V. Keldysh, Academician V.A. Kirillin, Academician M.A. Prokhorov, Academician V.D. Kuznetsov, who played the decisive role in creation of the Tomsk Scientific Center SB AS USSR (now SB RAS), as well as Academician G.I. Marchuk, Academician Yu.S. Osipov, Academician V.A. Koptuyug, and Academician G.A. Mesyats, who made much for our center in the process of its development until present days.

I am also grateful to Chairman of the Regional Executive Committee A.E. Vysotskii and the Governor of Tomsk Region V.M. Kress, rectors of Tomsk State University Professor A.I. Danilov, Professor A.P. Bychkov, Professor Yu.S. Makushkin, and Professor G.V. Maier, directors of the Siberian Physico-Technical Institute Assistant Professor M.A. Krivov, who headed the Institute for 25 years, and Professor A.G. Kolesnik, Chairman of the Tomsk Scientific Center V.A. Krutikov, directors of the institutes of the Tomsk Scientific Center Academician V.E. Panin, Corresponding Member of RAS S.P. Bugaev, Doctor of Chemistry E.E. Sirotkina, Doctor of Chemistry L.K. Altunina, and Corresponding Member M.V. Kabanov for the effective co-operation in formation of the academic science in Tomsk; my fine teachers Professor N.A. Prilezhaeva, Professor V.M. Kudryavtseva, Professor M.A. Bol'shanina, Professor A.V. Sapozhnikov, Professor P.P. Kufarev, Assistant Professor E.N. Araviiskaya, Assistant Professor V.N. Zhdanova, Assistant Professor A.G. Tuganov, Assistant Professor V.A. Zhdanov, Assistant Professor E.D. Tomilov, Assistant Professor A.M. Venderovich, Assistant Professor Yu.V. Chistyakov, my closest friends from the student's days Mikhail Bobrovnikov, Vladimir Detinko, Veniamin Fadin, Nikolai Shcheglov, Vasili Filonenko, Feliks Tarasenko, my first students Corresponding Member of RAS M.V. Kabanov and Corresponding Member of RAS S.D. Tvorogov, as well as Professor S.S. Khmelevtsov, and the friend of our institute Academician Rem Viktorovich Khokhlov.

More detailed information on the history of the Institute of Atmospheric Optics can be found in my book *History of Formation of the Academic Science in Tomsk* (Publishing House of the Siberian Branch of the Russian Academy of Sciences, Novosibirsk, 1999).