

Grimm-Pitzinger/Weinold (Hrsg.)

16. Internationale Geodätische Woche Obergurgl 2011

Beiträge zur Tagung
vom 13. bis 19. Februar 2011



Wichmann

Higher Geodetic Education in Russia – Tendencies and Prospects

Vasily MALINNIKOV, Andrey MAYOROV and Victor LOBAZOV

On May 25, 2009, Moscow State University of Geodesy and Cartography (MIIGAiK) celebrated the 230th anniversary of its establishment. On that very day, professional training in the field of geodesy, cartography and cadastre began in Russia.

Today in Russia, 2 specialized higher educational institutions (MIIGAiK and Siberian State Academy of Geodesy – SSAG), 35 geodetic departments in various universities of Russia, and 5 specialized colleges train geodesists, photogrammetrists, cartographers and other experts of related fields.

MIIGAiK is the leading university in the field of geodetic education. On its basis, the Education and Methodological Association (UMS) in the field of geodesy and photogrammetry where 37 higher educational institutions of Russia training specialists in the field of geodesy works. High quality of the specialists trained in MIIGAiK, is recognized not only in Russia, but also in many countries of the world. Thousands of MIIGAiK graduates work at enterprises and construction sites of Russia, the scientists of MIIGAiK participate actively in creating and running high-accuracy government networks, developing and applying satellite navigation technologies, GIS – technologies and systems, etc. For the previous 10 years, 5 MIIGAiK professors got awards of the President of the Russian Federation in the sphere of education and 15 researchers of the University became winners of governmental awards in the field of science and engineering.

The MIIGAiK University Complex includes six full time (day) faculties, two colleges (Moscow College of Geodesy and Cartography, Kirov College of Construction, Economics and Law), night and correspondence faculties, a faculty for foreign citizens training, a faculty for improving the professional skill of higher educational institution instructors and retraining specialists, postgraduate courses and doctoral studies, scores of educational and research laboratories, including: laboratories of geodetic instrument making, satellite information processing, information technologies and distance education, ecological mapping, target language training, a quality management centre, the University placement centre, *Reprografiya* Field Study Center and the Russian cartographical centre, *Izvestiya Vuzov. Geodeziya i Aerofotosyomka* (News of higher educational institutions. Geodesy and air photography) Journal Publishing House, three training grounds, faculty computing centers, a training and geodetic museum, library, etc. The MIIGAiK training and geodetic museum established by Count M.N. Muravyov-Vilensky is one of the world's largest collections of this type.

Now, 7719 students and post-graduate students from Russia, the CIS countries as well as outside the Commonwealth of Independent States study in MIIGAiK. The yearly enrolment is 2000 students, 1200 out of them join the full-time training.

In 2010, MIIGAiK offers 124 licensed professional educational programs, among them: 8 programs for postgraduate training, 12 for secondary vocational training, 33 for higher

vocational training, 35 for secondary vocational training, 36 for primary vocational training.

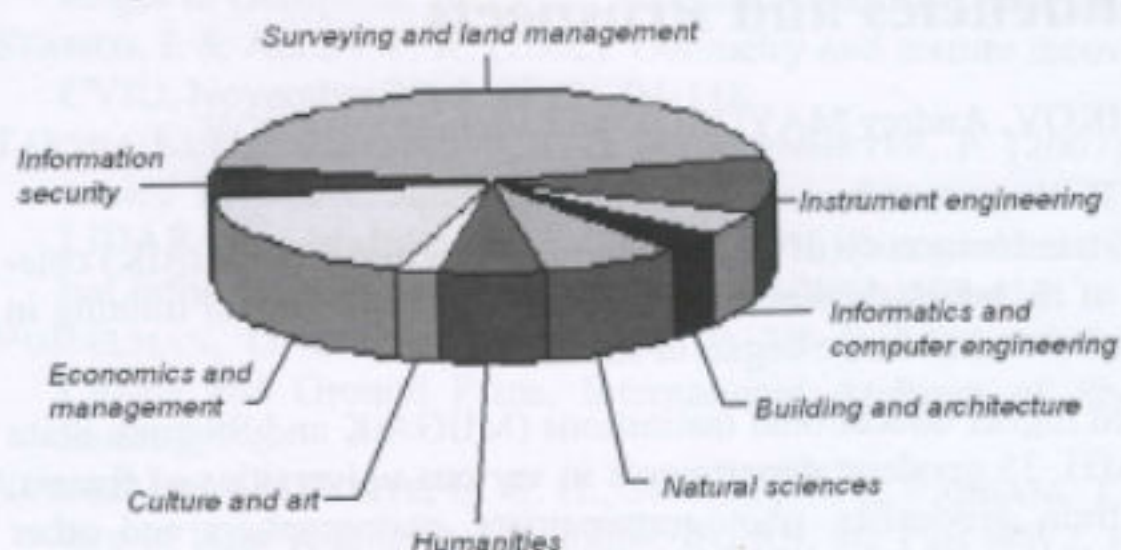


Fig. 1 (s. auch Farbtafel 7, S. 263)

A significant part of the MIIGAiK personnel's activity is devoted to research. About 70 projects yearly are fulfilled in MIIGAiK. The MIIGAiK scientists research both into fundamental and applied sciences, into the following cartographic and geodetic problems:

- the theory and methods of designing high-accuracy optico-electronic information and measuring systems, including laser ones;
- the theory, methods and information resources for high-efficiency processing of cartographic and geodetic and aerospace information;
- development of the methodology and unified geo-information space for modeling and electronic mapping of the Earth's physical fields, natural and atmospheric phenomena;
- the theory and methodology for establishing extensive regional and special geodetic networks on the basis of satellite positioning systems;
- photogrammetric methods for studying and mapping the Earth and celestial bodies from aerospace image systems;
- the theory and methods for creating fundamental cartographical products of topographic and thematic plans, maps and atlases;
- development of expeditious methods for remote sensing the natural resources and geoecosystems of the Earth;
- methods and means for multi-level protection of geospatial information and geo-information systems for different purposes;
- information and cadastral systems for managing land-property relations and rational land use;
- the theory and methods for processing radio navigation satellite measurements for geodetic referencing aerospace and ground surveys;
- quality management systems in the field of geodesy, cartography, and geoinformatics;
- new information technologies of distance learning in the field of geodesy, cartography, geoinformatics, and cadastre, etc.

MIIGAiK trains researchers and instructors of top qualification through postgraduate courses, doctoral studies and institute of competitors of scientific degrees. It is one of the major directions of technological activity of the University.

Post-graduate students can choose either full-time education or by correspondence, on budgetary and contractual bases, in three fields of science and 8 specialties: engineering science (specialty "Optical and optico-electronic devices and complexes"), economic sciences (specialty "Economics and national economy management: the economics, organization and management of an enterprise, industry, complex") and the Earth sciences (specialties: "Land management, cadastre and land monitoring", "Geodesy", "Cartography", "Aerospace exploration of the Earth, photogrammetry", "Geoinformatics", "Geoecology").

Future Doctors of Sciences are trained in five specialties: «Optical and opto-electronic devices and complexes», «Land management, cadastre and monitoring of the Earth», «Geodesy», «Cartography», «Aerospace exploration of the Earth, photogrammetry».

Now, in the Cartographic and geodetic industry of Russia, the need for science and production services based on new geo-information technologies (satellite positioning, digital photogrammetry, laser scanning, 3-d modeling of geospace objects, etc.) is dramatically increasing.

The important issue determining the future of the Russian cartographic and geodetic education is the reform of higher education, which is called for by Russia's joining to the Bologna Declaration in 2003. On September 1, 2011, all higher education establishments have to transfer to the two-level system of training "the Bachelor's degree – the Master's degree". The university community, many research-and-production organizations discussed seriously enough such a total transition. It resulted in preserving the training of engineers in a number of highly technological specialties. It is obvious that it is possible to train for 4 years a geodesist or cartographer with a Bachelor's degree who will be able to solve standard production problems, the issues of operating geodetic instruments and devices, to make standard maps, etc. But there are some highly technological specialties, for example, space geodesy and navigation, aerophototopography, exploration of natural resources by aerospace systems, optico-electronic devices and systems, etc., that demand for serious fundamental and practical training of graduates. For these specialties, it is of essence to keep training of engineers.

It goes without saying that transition to the three-level system (the Bachelor's degree – the Master's degree – the engineer) with training of bachelors on a mass scale will call for structural changes in universities. It is assumed that there will be established academic divisions to carry out general training of bachelors in the first and second years of their studies, with their following distribution into special faculties and departments. Due to tough qualifying requirements to the teaching staff who will be responsible for training under Master's degree programs it is necessary to intensify the training of top quality experts (candidates and doctors of sciences in geodesy, cartography, geoinformatics, etc.). We should notice that top professionals in geodesy, photogrammetry are trained at present only by MIIGAiK and SSAG.

Nowadays, MIIGAiK, SSAG and other higher educational institutions are changing considerably the current programs, curricula and courses. And it has found its way in the 3rd generation standards of education. The basic difference of the new standards, or we can say, the radical difference is their competence-oriented direction based generally on the experience of foreign higher education schools. The competence approach to the expected results of specialist training makes the conceptual kernel of the new standards. A competence is also the result of educational technologies, methods, organizational forms, academic

environment, etc. The accent carried over from the subject and discipline and content, which was characteristic of the previous generation standards, to the expected results of the educational process in the competence standards reflexes the world's major tendencies in the higher education development.

The optimum way to solve the problem of improving the education quality seems to be the joint work of large integrated research-and-production structures with universities (the industry research and education centers), i.e. creation of the corporate research universities intended for training experts for these structures. Such cooperation will make it possible to combine training on the basis of the fundamental knowledge received at the university, and field training of graduates in successfully working scientific and industrial organizations. Besides, it will allow the educational institution to expand substantially its material base that, unfortunately, leaves much to be desired in many universities. A majority of higher education establishments cannot afford to buy complete set equipment for modern geoinformation technologies because of its high cost and low self-repayment resulting from the peculiarities of university economy. It is necessary to revive the practice of establishing a network of basic special departments and industry research-and-production laboratories in leading enterprises of the cartographic and geodetic industry and, finally, to involve much more widely leading experts of the industry in the educational process on the contractual basis (to lecture, have classes, supervise field training, consult and supervise term, course and qualification papers, write teaching materials, etc.). Each department of a university should consider it to be normal to have leading representatives of their science field and industry on the staff.

The implementation of such an innovative scenario of developing the system of vocational training for the cartographic and geodetic industry will make it possible to begin training professionals of a new type, who will have an open mind for innovations, modern highly-qualified cartographic and geodetic vocational training, and competences in the sphere of modern geo-information technologies, means and methods of remote sensing, economics and management. It is this type of professionals who will be able to raise greatly the efficiency of the cartographic and geodetic industry and create the resource potential that is necessary for burning structural changes of the industry. At the same time, it is essential to train and re-train experts of the new type on a mass scale to develop the hi-tech sectors of the industry. The complex solution of these two problems corresponds to the long-term interests of Russia, they consisting in creating the cartographic and geodetic industry of an innovative type integrated into the Eurasian geo-information space.