

INTERNATIONAL COOPERATION IN ECOLOGY AND ENVIRONMENTAL PROTECTION



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RUSSIAN-GERMAN RESEARCH AND ACADEMIC COOPERATION IN THE ARCTIC



This article is dedicated to the stages of development of international research cooperation in the framework of research and education projects focusing on the study of marine and polar territories of the Russian Federation and the Federative Republic of Germany. The largest and most stable projects are the establishment of the Russian-German laboratory of polar and marine research named after the Russian polar explorer of German origin, Otto Schmidt, – OSL – on the premises of AARI, the Russian-German education project – the Applied polar and marine studies master's programme (POMOR) – implemented by the Russian and German partners at Saint Petersburg State University, and the Laptev Sea system research programme bringing together around 20 Russian and German organisations.

Key words: priorities in polar research, experience of academic cooperation of Saint Petersburg State University in the field of polar exploration, Applied polar and marine studies master's programme (POMOR).

The history of Russian-German cooperation in the fields of research and development stretches over 300 years. It has become systematic since Peter I founded the Russian Academy of Sciences and the Academic University (today's Saint Petersburg State University) and the Academic gymnasium under its aegis. The professors and masters invited from German universities to work at those institutions contributed to the development of the European type national higher education and research system. It is especially egregious in the case of geographical sciences, cultivated at the university and academy by the German professors Georg Wolfgang Krafft and Ch.-N. Wintzeheim, who authored the first Russian geography textbooks. In the 19th century, it was considered a good tradition among the graduates and scholars of Saint Petersburg University to pay an academic visit to one of German universities, and among German researchers (including those employed in Russia) to take part in expeditions over the vast lands of the largest empire in the world and to be active in the Russian geographical society. Even later, despite historical collisions, this cooperation developed in different forms re-

sponding to the challenges of the time. Many scholars of German origin made a significant contribution to the development of the Soviet science, including Arctic research.

One of the most serious challenges of the present are global problems, for instance, the environmental ones, including climate change and ensuing complications in the polar regions. The large Arctic and Antarctic ecosystems are under increasing anthropogenic pressure; its environmental consequences pay no heed to state borders. They affect the life and interests of all countries and peoples. At the same time, the Arctic and Antarctic are gaining economic and geopolitical significance for the interests of development of both contiguous countries and distant states (China, Republic of Korea). It generates international conflict potential of an undefined scope which we are already witnessing today. The Antarctic and especially the Arctic are becoming a hotbed of not only environmental but also other global problems.

All this requires joint international effort in the circumpolar regions not only from politicians but also from the unified national research and education potentials performing joint training of researchers and practitioners. Russian and German research and education centres, possessing considerable intellectual potential and corresponding historical traditions, are natural and mutually complementary partners in the solution of the problems mentioned, in particular, those of the Arctic. Especially propitious are joint international projects that make it possible to use advanced knowledge and recent technologies in the interests of individual countries as well as international interests. Let us focus on such projects which have been implemented in the framework of Russian-German cooperation bringing together several universities and research centres over the last 15 years.

In 1995, the Arctic and Antarctic Research Institute (AARI) in Saint Petersburg, the Alfred Wegener Institute for Polar and Marine Research in Bremerhaven, Germany (AWI), and the Leibniz Institute of Marine Sciences at Kiel University (IFM-GEOMAR) started to develop international research cooperation in the framework of projects covered by the agreement of cooperation in the field of marine and polar research between the Ministry of industry, science, and technology of the Russian Federation (today the Ministry of education and science) and the Federal Ministry of education and research of the Federative Republic of Germany. The largest and most stable project within the agreement is the "Laptev Sea system" programme, which combines the efforts of approximately 20 Russian and German organisations. A Russian-German research association was established to ensure the successful development of Russian-German cooperation. It gives both young and mature scholars and experts an opportunity to gain new knowledge about arctic geosystems, to improve their skills and exchange research results, to work on the analysis of data gathered from expeditions, to master modern information technologies and analytical equipment. The establishment of a research laboratory at AARI in collaboration with AWI required that the director of AWI, Dr. Jörn Thiede, sought the consent of the chancellor of the FRG, and on October 9, 1999, the agreement on the establishment



of the Russian-German Laboratory for Polar and Marine Research named after the Russian polar explorer of German origin, Otto Schmidt, on the premises of AARI in Saint Petersburg was concluded. The German branch of OSL is operating at the Leibniz Institute of Marine Sciences at Kiel University.

The Otto Schmidt Russian-German Laboratory for Polar and Marine Research celebrated its 10th anniversary in 2009. Today, the laboratory focuses, first of all, on the analysis and integration of various programmes within the "Laptev Sea System" programme. The principle activities of OSL are the coordination of research projects, monitoring studies in the Russian Arctic, including the analysis of the composition and properties of water, bed silt, biota components, and bed sediment, as well as an organisation of summer schools, workshops, conferences, and meetings on polar issues.

Today, the laboratory is participating in the "Laptev Sea System" programme, implementing the "Development of methods and methodologies for the assessment of geosystem changeability and environmental monitoring of the Laptev Sea region in collaboration with German research institutions" programme, and coordinating the programme of support for young scientists of the German Ministry of education and research. The programme brings together master, graduate research fellow and graduate students who cooperate successfully with experienced scholars from Russia and Germany and tackle the issues of mutual research interest. The analytical laboratory of OSL boasts modern equipment and is designed for the following types of analyses: granulometric, geochemical, hydrochemical, spectrophotometric, etc. The equipment of OSL includes more than 20 personal computers, Olympus microscopes, an ion chromatograph, a spectrophotometer, a granulometric composition analyser, biogenic elements, carbon, and nitrogen analysers and auxiliary equipment (an analytical electronic balance, muffle furnaces, a centrifuge and other devices).

The international relations experience, research potential and technical capacities of the laboratory are intensively used in education. Research contests in the framework of the OSL scholarship programme aimed to support young scientists have attracted researchers of many Russian research and educational institutions, including AARI, the All-Russian Research Institute for Geology and Mineral Resources of the World Ocean, Saint Petersburg State University, Russian State Hydrometeorological University, Moscow State University, Kazan State University, the Lena Delta Wildlife Reserve, the Institute of Oceanology of the Russian Academy of Science, the Institute of Lithosphere of the Russian Academy of Sciences, the Permafrost Institute of the Russian Academy of Sciences (Yakutsk) and others. OSL became a second home for many SPbSU graduates, especially those from the Faculty of Geography and Geoecology.

Among the wide range of problems of geography, hydrometeorology, ecology and nature management, special attention is paid to the functioning of polar eco- and geosystems, which implies the study of terrain, geological composition and the development of polar oceanic basins and their continental framing; the study of precipitation, living and non-living resources of the

ocean and land. Marine research is based on the knowledge of oceanography of open seas and coastal waters, inland waters, ice sheets and climate of the polar regions. Polar research also focuses on the problems of nature management, the issues of functioning and transformations of polar geosystems and ecosystems. The latter is closely connected with the management of coastal zones, the study of landscape systems of polar countries and the landscapes of polar territories in natural conditions and under anthropogenic pressure. The above mentioned priorities in polar research were identified in 2011 within the first version of a joint Russian-German education project.

Almost immediately after the establishment of OSL in 1999, the German colleagues undertook an initiative for the creation of an educational body of Russian-German cooperation in the Antarctic on the basis of the Faculty of Geography and Geoecology of SPbSU in the form of an international master's programme.

This programme, initially called *Polar and marine research* (POMOR) was developed by a Russian-German team of the academic and research staff of six universities and three research centres and was implemented at SPbSU from 2002 through 2006 within the *Hydrometeorology* field of study and was supported by the German Ministry of education and research. The partner Bremen University licensed this programme under the title *Applied Polar and Marine Geosciences*. At first, it was meant for the bachelors of the *Hydrometeorology, Geography, Geography and cartography, Ecology and nature management* fields of studies and specialists of the *Geography, Meteorology, Hydrology, Oceanology, Ecology, Nature management, Geoecology, Cartography, Applied informative and geography* fields of study available in the Faculty of geography and geoecology of SPbSU and other related fields and specialities. Over these years, the Faculty has brought up a new generation of polar Arctic researchers. They have gained experience from expeditions and got a rare opportunity to process the field data with support from AAIR, OSL, our German colleagues — polar researchers and teachers — H. Kassens, J. Thiede (since 2004, an honorary doctor of SPbSU), H. Auel, T. Bickert, E.-M. Pfeifer, M. Schultz, K. Tuschling, and other scholars from Kiel, Hamburg, Bremen, Bremerhaven, Rostock, and Potsdam.

In the last decade of the 20th and the beginning of the 21st century, Russia and the world saw radical political and economic changes, which could not but affect the trajectory and content of research and education activities, especially those relating to the introduction of the two-tier higher education system in Russia and Europe (the Bologna process). The Ministry of education and science of the Russian Federation, without diminishing the achievements of the national education system, carries out the transition to the two-tier system of higher education on the basis of the 1999 Bologna declaration and the 2003 Berlin conference. The third generation education standard project for geographical, hydrometeorological, and ecological fields of study was developed by the Russian university Educational and Methodological Associations for ecology and sustainable development and geography. In 2008, SPbSU gained the right to develop higher education standards independently on the basis of the state standard. Such standard was devel-



oped in the faculty for the *Ecology and nature management* and other fields of study and was approved by the Academic council of SPbSU in 2010. Alongside state standard, the mentioned documents formed the basis for the development of national and international master's programme in ecology, also for the "ecologisation" of the POMOR programme.

Since 2007, with the concurrence of German universities, this programme — entitled *Applied polar and marine studies* — has been offered at SPbSU within the *Ecology and nature management* state standard and still combines the experience of implementing education and research programmes of SPbSU and German research centres. Invaluable support has been offered by the German ministry of education and research, DAAD, AWI, IFM GEOMAR, the universities of Kiel, Bremen, Hamburg, and Potsdam, AARI, and, in particular, Otto Schmidt laboratory. On completion of the course, masters obtain two degrees — a Russian (SPbSU) and a German (until 2010 — of the Bremen university) ones. The title of the German award is the Master of Science in Applied Polar and Marine Geosciences, and the Russian one is that of Master in Ecology and Nature Management (Hydrometeorology until 2009) with the specification of master's programme.

In the new education field and the POMOR project, the unit measure of knowledge is a credit — trust that develops both among the teachers and schools and universities and national educational systems. In Russia, increasing attention is paid to the European Credit Transfer and Accumulation System (ECTS) as a unified basis stipulating the rules of awarding credits within the educational programmes of European countries.

Today, the POMOR programme is functioning with the financial help of the German Ministry of education and research, German universities and research institutions, and SPbSU. A programme support centre with a paid staff of 3 was established in order to implement the programmes using German funding. For the first time, the project awarded degrees to masters in 2004 (18 of 20 people obtained dual degrees). All in all, in 2000—2009, dual degrees were awarded to 50 SPbSU graduates. In 2009, Russian degrees were awarded onboard the legendary Krasin icebreaker and the German ones in the Peter's hall of SPbSU. A number of graduates continued their studies in Germany and Russia, participated in international polar and marine expeditions and are working not only in Russia, but also in Germany and other countries.

A successful attempt to combine two different curriculum structures — first introduction of the ECTS at SPbSU and the retention of the state standard within the *Hedrometeorology* field of study — was taken in 2001—2002, in the course of development of the *Polar and marine studies* master's programme. The module system made it possible to concentrate on one topic within one module, without dedicating the whole semester to the course. The initial programme consisted of six modules: 1 — geological and geomorphological module; 2 — oceanological module; 3 — ecological module; 4 — resource module; 5 — coastal area management; 6 — polar geosystems. Students received Russian study allowance and German scholarships. The curricula consisted of 6 modules, 168 hours each (84 lecture hours delivered

by Russian and 84 by German professors). The seventh — so-called 'general' — module was introduced in 2007. Since then, all lectures have been delivered in the English language. The curricula include field (onboard research vessels after the completion of the first year in the Laptev Sea and other seas of the Arctic Ocean) and pregraduation (in Germany supervised by German professors) internship. Field practice often took place onboard the AARI vessels and was supervised by experienced polar explorers and employees of the Otto Schmidt laboratory. Lectures are scheduled for the third semester (the fourth semester is dedication to the preparation of master's thesis). Earlier, lectures were delivered in the Russian and English languages; since 2007, the only teaching language has been English. The subjects of master's thesis can be chosen among the topics of modules with the concurrence of the Russian and German parties.

The curricula stipulated that each semester included two modules. Each module accounted for 15 ECTS-credits. Since 2007, the programme has consisted of seven modules (12 credits each). ECTS credits for *individual disciplines* are determined in the framework of annual adjustment and planning procedure. In total, the disciplines taught over two years accounted for 90 credits. In 2006, the German degree awarded 6 credits for the oral final exam and 6 credits for the thesis defence. The preparation of the thesis accounted for 18 credits (as specified in the addendum). Thus, within two years, a student accumulated 120 credits.

A master candidate defends his/her thesis in the Russian language (English since 2009) at SPbSU and receives a grade and the Russian degree. Then the work is translated into English and sent to be reviewed to Bremen (since 2011 — Hamburg) university. If the review of the German opponent (holding a position of a full professor or higher) is favourable, the candidate is awarded the German degree. In the German degree, academic achievements are included in the supporting document explicitly (according to 6 assessment categories). Moreover, the average grade over the whole period of study — the final grade — is calculated. In 2006—2009, the programme graduates were awarded internationally recognised degrees in the English language alongside Russian degrees. In 2007, 15 candidates were admitted from 35 applicants. International students — from Slovenia, Mexico, and Columbia — also applied for the programme. In 2009, 25 new POMOR students — graduates of eight Russian universities — commenced their studies.

The Russian and German sides came to an agreement regarding the further development of the programme in 2009—2010 and 2010—2011 academic years. The latest POMOR curriculum is being applied in Russia and Germany. For the first time in the POMOR history, alongside the pregraduate internship, master candidates spend a semester (October-February) at one of German universities (Bremen, Hamburg, Potsdam, Kiel, etc) and attend courses of their own choice (30 ECTS-credits). These courses, as an integral part of the programme, are recognised by the Russian side according to the results of exams and are included in a special section of the new, bilingual SPbSU degree. The curricula should also be revised in accordance with the new educational standard in the *Ecology and nature management* field of study.



It is not an exaggeration to say that, thanks to the joint efforts of Russian and German universities and polar research centre, a unique circumpolar *international research and educational cluster* has emerged within the European educational and research space. One of its integrators is the Russian-German master's programme entitled *Applied polar and marine studies*. A new page in international interuniversity cooperation and programme development is the Russian-German project of polar research laboratory implemented at SPbSU since 2010 through combined efforts of the teachers from the Faculty of Geography and Geoecology and their German colleagues supervised by Prof. J. Thiede and A. N. Lastochkin.

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