

FAR EASTERN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCES: HISTORY, STRUCTURE, AND A ROLE IN THE ASIA – PACIFIC REGION

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The world experience shows that sustainable social and economic development of any country is mainly determined by the level of its scientific and technological potential and the ability of industries to practically use the latest achievements in science, technology and management. Science is international by definition. Newly acquired knowledge about the world and the trends of the world development are quickly disseminated around the globe. But a country, in which a new discovery has been made, has evident advantages in gaining the first benefits from implementation of recent scientific developments. It should be emphasized that all countries will benefit from successful development of science regardless of a country's social system, religion or cultural peculiarities.

Up-to-date development of fundamental science needs considerable financial and material expenditures that are burdensome even for economically sustainable nations. That is why recent years have witnessed increasingly growing role of international cooperation in the development of large-scale R&D projects, such as fundamental investigations into nucleus structure, outer space, genetic engineering and biotechnology, and environmental conservation. Intellectual potential and material resources of the interested parties are united to pursue a joint task. Joint efforts will help to avoid parallel or similar investigations, cut expenses, shorten the time of a project implementation and make scientific and technological investigations more efficient.

SHORT DESCRIPTION OF THE RUSSIAN FAR EAST

Russian Far East is a unique region not only due to its geographical position but primarily due to its overwhelming mineral, raw and biological resources. It would be enough to say that more than 40% of tungsten, 60% of tin and zinc, 50% of gold and silver, practically 100% of fluorite and boron deposits are in the Russian Far Eastern Territory. There are major deposits of a number of other non-ferrous and rare materials (copper, bismuth, beryllium, molybdenum, zirconium, rhenium, etc.).

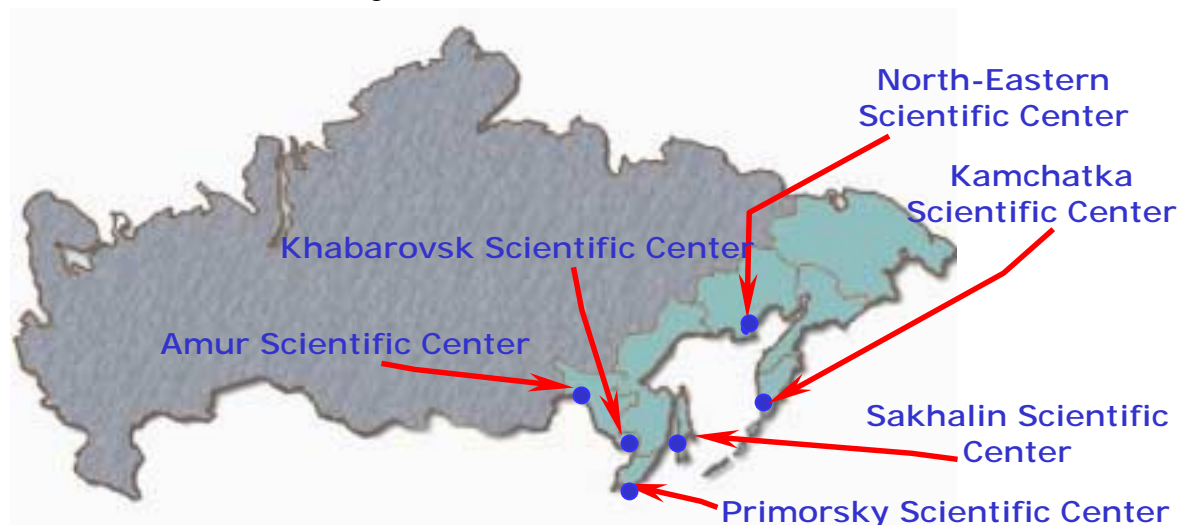
The Russian Far East accounts for nearly 80% of all amounts of fish and marine products. Its territory and the shelf zone of the adjacent seas are rich with fuel and energy resources.

The Far East of Russia possesses great scientific and technological potential. There are 35 research institutions of the Far Eastern Branch of the Russian Academy of Sciences (FEB RAS), several institutions of the Russian Agricultural Academy and Russian Academy of Medical Sciences, over 25 applied research and design institutions, a State University, three Technical Universities, Maritime University and over 30 other higher educational institutions. The total number of employees engaged in the scientific and manufacturing institutions is

about 35 thousand people. Russian scientists take an active part in realizing of many international projects.

FEB RAS ORGANIZATION, ITS BASIC OUTLINES OF RESEARCH MANAGEMENT AND ACTIVITIES

History of academic science in the Far East of Russia is not very long. The first academic institution had appeared here in 1932. Nowadays there are 35 research institutions, 63 research stations and stationeries, and there are three preserves in its structure. Our institutes are located in all regions of Far East from Chukotka to Primorsky region, and from Kamchatka to Amurskaia region.



Except scientific subdivisions in our structure we have scientific auxiliary institutions: transport, constructional, medical, educational, etc.

For ensuring scientific activity in seas and oceans we have own marine research fleet, consisting of 13 research vessels able to conduct expert research in biology, ichthyology, hydrophysics, hydrochemistry, underwater seismology and geology, etc. Most of them have an unlimited range of sailing.

Total number of employees in FEB RAS is more than 7500 people, and about 2500 of them are scientists.

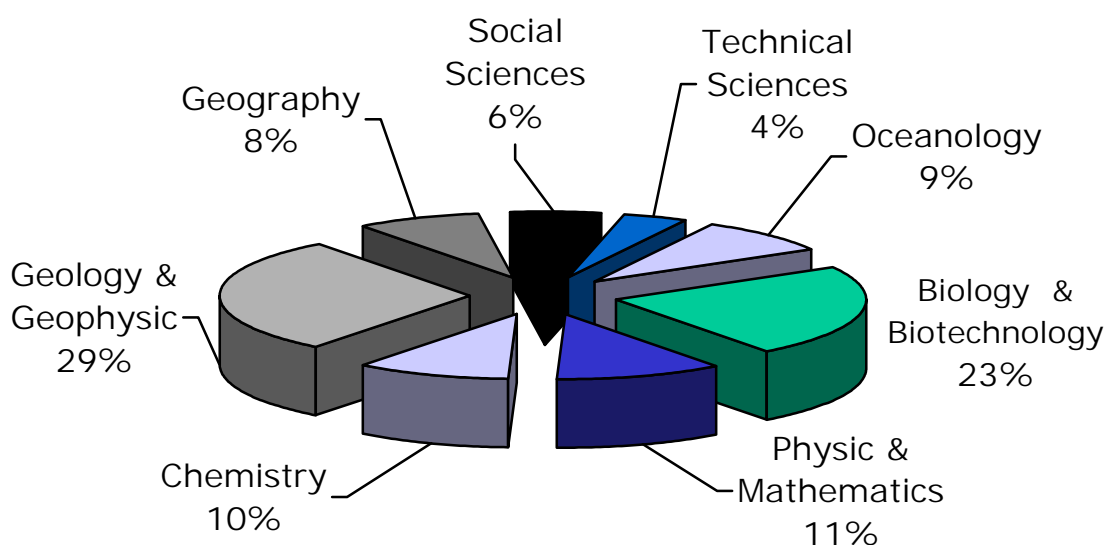
FEB RAS staff

16	Academicians
23	Corresponding members
328	Professors
1149	Ph. D.
2432	Scientists
7590	TOTAL

The fields of scientific activity of our Institutes are mathematics, physics, chemistry, biology, biochemistry, biotechnology, geology, geophysics, oceanology, history, economy, etc. However, distribution of our efforts between separate sciences is variable. On the first

place there are sciences about the Earth – geology, geophysics, seismology, geography, volcanology, oceanography; on the second place there are biological sciences – biology of plants and animals, biochemistry, biophysics, biotechnology, hydrobiology, marine biology, etc; on the third place there are physical and technical sciences – mathematics, computer sciences, physics, astrophysics and astronomy, metallurgy; on the fourth place there are chemical sciences, on the 5th place – oceanology and geography, and on the 6th - there are humanitarian sciences – history, economy, archeology and ethnography. Such distribution of our scientific activity is not accidental; it reflects the main interests of the Far–Eastern region, interests of its industry and agriculture.

FEB RAS Science Sectors *Ratio*



Applied research in the interests of social, scientific and technical progress of the Russian Far East and the Russian Federation in whole is of our constant activity as well as realization of actions earmarked for exposure and support of talented researchers, assistance to creative growth of young scientists.

Far - Eastern Branch of the Russian Academy of Sciences is also engaged in integration of academic, higher education and sectoral science for the purpose of global development and efficient strengthening of interrelationships between science, education and culture and pursuing of unified scientific and technical policy on the territory of the Russian Far East.

Russian scientists are also busy with the expansion of ties between science, industry and production input, participation in innovation and technological activities, in realization of the achievements of science and engineering, assistance to development of science intensive industries of the region.

On the whole, basic and applied researches at the FEB RAS institutes are conducted on more than 300 scientific and research subjects. And considerable part of fundamental studies

is conducted in association with scientists of many countries of Asia – Pacific Region within the framework of international scientific projects and programs.

INTERNATIONAL COOPERATION OF FEB RAS WITH THE ASIA – PACIFIC SCIENTIFIC AND BUSINESS INSTITUTIONS: SOME MOTIVATIONS FOR CLOSE AND INTENSIVE COOPERATION

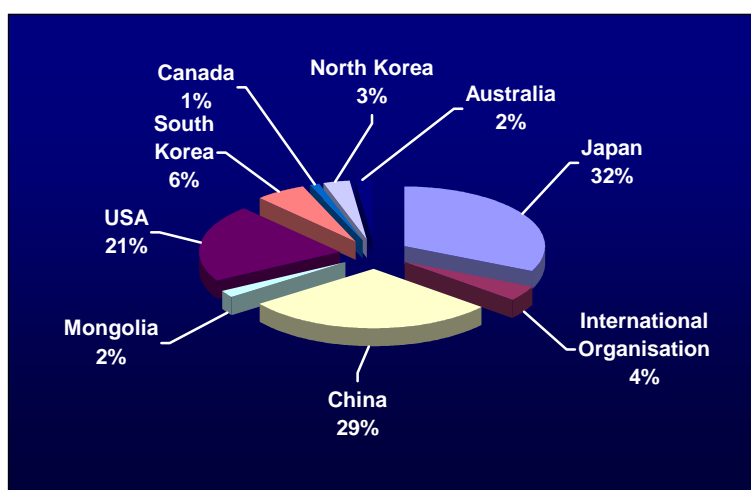
There is no doubt that the mankind progress is directly connected with the science development, with the process of creation and spreading of new knowledge and experience. The fact is that because of increasing the rates of the scientific development in the world, and involving in this process more and more gifted people in the increasing number of the countries we will meet the remarkable phenomena in the sphere of the science and technical progress.

Far Eastern Branch of the Russian Academy of Sciences successively solves the problems of the integration into the world scientific association, of participation in the international division of labor.

FEB RAS took an active part in a foundation of Asia Academies Association which has a significant role in consolidation of the Asian science.

Over past years FEB RAS continued to consolidate and develop scientific links with our foreign colleagues. The main attention is paid to widening of interaction with scientists of East and South - East Asia countries. In 2002 our research institutes cooperated with foreign institutions from above mentioned countries in the frame of numerous long-term international programs and bilateral agreements and contracts. 32% of them are related to Japan, 29% - to China, 21% - to the USA and 6% - to the Republic of Korea.

FEB RAS Cooperation with Asia-Pacific Countries



Russian and foreign scientists took part in joint expeditions and field researches. Most of them were conducted thanks to foreign financial support.

Our international science and technology cooperation have some levels. Today we have successfully mastered only the most simple and available – exchange of information and specialists. In the last years many foreign scientists and businessmen visited our institutes, as

well as Russian scientists were abroad. We have trainees at our institutes; some Russian trainees were accepted at foreign scientific and business institutions and centers.

The second level. It is a joint participation in the working out of the science and technological projects which have the mutual interest.

Nowadays foreign scientists, experts and businessmen (most of them from China, Japan, USA and Republic of Korea) visit Vladivostok, Blagoveshchensk, Khabarovsk, Petropavlovsk-Kamchatsky, Magadan and Yuzhno-Sakhalinsk and make acquaintance with our scientific projects which are acceptable for introduction into practice in their countries. There are about 2000 patents in the FEB RAS now, and only 10% of them are realized.

International Scientific Ties of FEB RAS

Activity / Year	2001	2002	2003
Participation of FEB RAAS Institutes in Long-term International Programs	55	66	63
International Cooperation Based on Bilateral Agreements	119	139	144
Number of Conducted International Scientific Events	19	22	20
Total Number of Overseas Field Trips of FEB RAS Scientists	372	258	270
Number of Foreign Scientists Visits to FEB RAS	401	558	606
Participation of FEB RAS Scientists in Overseas Conferences	176	238	190

We are creating database of projects, which are ready for implementation. All Internet users may be acquainted with some of them on FEB RAS web-site. Projects often need modification, engineering, and such elements that our foreign colleagues are able to use so well. That is why we consider it is necessary to establish close relations with both scientists and specialists working in laboratories of firms and companies.

At the state of mastering is the third level – a joint participation in the engineering projects, the goal of which is a pilot and experimental examination of the new technologies, construction of the pilot samples of the new equipment, goods and service on the base of the latest scientific developments.

And finally, the fourth level is practically not mastered. It is a joint mutual innovation activity, which proposes establishing new high technological and knowledge – intensive production, new goods and services of the 21st century.

Such scheme of international cooperation is minimizing the financial risk of the both sides, and at the same time is opening the possibility for the development of the wide links between scientists, businessmen and the ordinary people of our countries.

If to take into account the considerable experience, both positive and negative, we think that purposeful movement to the way of expansion of contacts in the field of science and technology is impossible to achieve without establishing the cooperative boards or committees, which would appoint prior directions of work, would prepare proper

recommendations for Russian and foreign sides, would present itself as expert and coordinator in working out the short and long – term plans of cooperation.

Russian scientists and businessmen need information about foreign laws of rights of intellectual property, about licensing, transmission of scientific projects to other part, information about organization of joint business, production and so on.

FEB RAS has not only played the role as the national center for S&T research but has also worked to attain international renown in Asia. It is striving to strengthen its research capabilities and its networks with individual scholars and organizations worldwide so that it can respond more effectively and efficiently to the Russian science and community.

**SOME EXAMPLES OF FEB RAS SCIENTIFIC OUTCOMES AND FRUITFUL COOPERATION WITH FOREIGN SCIENTIFIC CENTERS AND UNIVERSITIES.
PROPOSALS FOR THE FUTURE JOINT ACTIVITIES**

Last years have witnessed a lot of world level results. Some Russian and world level achievements are: the unique elaborations of Institute of Marine Technology Problems in the field of automated underwater robots with artificial intellect. Using these devices enables to conduct unique geological, biological and engineering studies and experiments in the open sea at the depth of 6,000 – 7,000 meters. Creation of such devices demands the work out of the scientific problems which are as complex as problems of cosmos exploration. This Institute had and has contracts with American, Korean and Chinese companies and scientific institutions to fulfill this or that work on this issue in the interest of these contractors.



Automated underwater robot with artificial intellect

Scientists of Institute of Biology and Soil Sciences have founded the way of obtaining transgenic ginseng. Its strains were patented and we can say: there is no any difference between cultivated and wild ginseng – they have the same gene.

Pacific Institute of Bioorganic Chemistry, one of the most famous world centers in the field of marine biotechnology, obtains unique medical preparations with cardioprotector and hepatoprotector effects. They are also drugs for ophthalmology, for vast burn surfaces treatment, active immunomodulators and immunostimulators. Most of preparations passed the clinical trials and got permission for application of drugs in practical medicine.



Medical preparations developed in Pacific Institute of Bioorganic Chemistry

Now we are busy with the problems of possessing the foreign patents or certificates for using this or that concrete drug, good or invention abroad. For example, we have a Russian license for using in practice the above mentioned drug for vast burn surfaces treatment. In 2001 the Russian sailor from fishery vessel died in the Japanese hospital in Hokkaido also because of impossible usage of this drug which unfortunately has no foreign license for its use in medicine practice in Japan.

Scientists of Institute of Chemistry created unique technologies of complex mineral raw materials processing, technology of metallic construction protection from corrosion and biodamage in sea water, as well as effective technology of dangerous industrial waste purification.

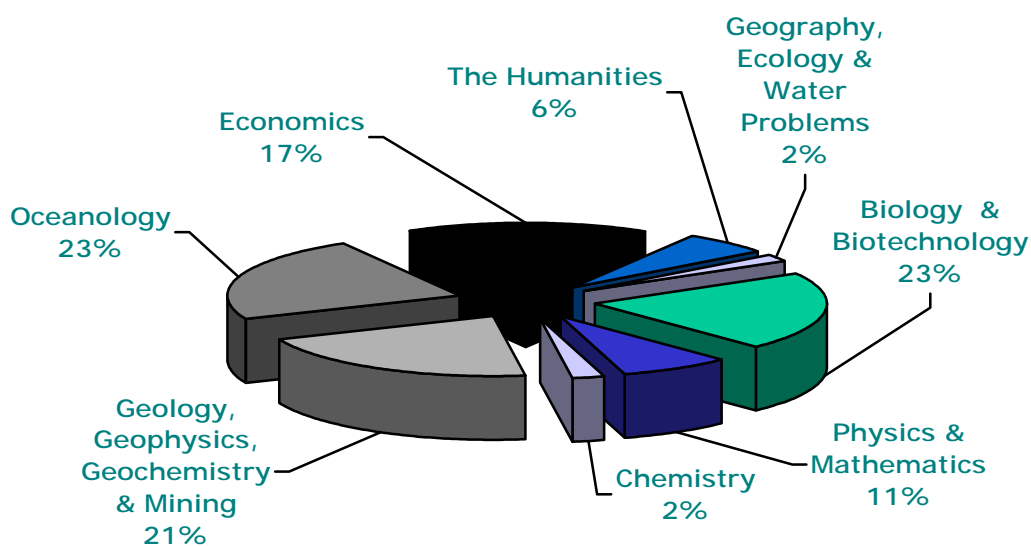
Institute of Automation and Control Processes is creating a fundamental base for obtaining the most high technology materials for electronics.

There are a lot of breakthroughs and discoveries in the field of applied mathematics, new materials, mechanics, geology, volcanology, oceanology, and other studies.

Great experience has already been accumulated in scientific cooperation between scientists of Asia countries first of all. This experience resulted not only in new findings but also in respectful, friendly and trustful relations between scientists.

Some examples. Institute of Cosmophysical Research and Radiowave Propagation (Kamchatka) cooperates with Communications Research Laboratory, Japan Ministry of Posts and Telecommunications in the fields of solar – terrestrial physics, magnetospheric physics, and atmospheric physics. Under the agreement the Communications Research Laboratory has installed in Paratunka (Kamchatka) the measurement complex to gathering, processing and transferring geophysical data through INMARSAT system. Russian and Japanese sides were agreed to install the equipment for ionospheric sounding and for registration of the Earth magnetic field parameters in Magadan region and Chukotka. This joint experiment is conducted within the framework of the 210-degree Magnetic Meridian International Project.

Cooperation of FEB RAS Institutes With Japanese Scientific Institutions



Collaborative investigation on ophiolite and associated formations of peripheral regions of the Eastern Sea was performed in 1998 – 2000 by the Far Eastern Geological Institute, FEB RAS and the Faculty of Science, Kanazawa University.

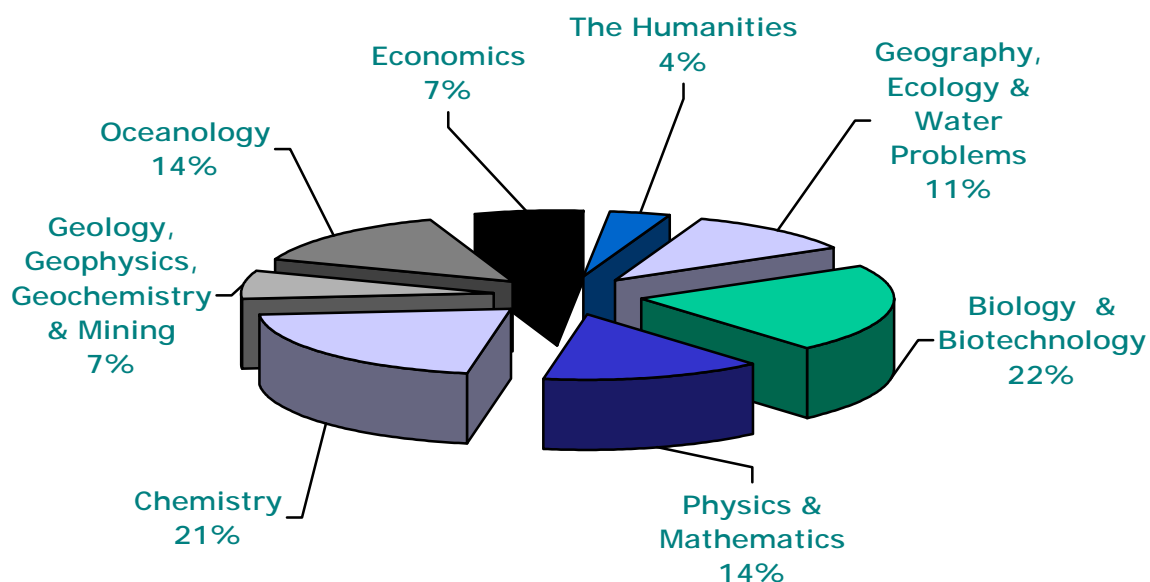
Beginning from 1998 Pacific Oceanological Institute of FEB RAS together with Toyama National College of Technology, and later Faculty of Pharmaceutical Sciences, Kanazawa University, cooperate in studying air pollution and perform the air sampling in the region Continent – Eastern Sea (Sea of Japan) – Japan. Since 2003 the scientists from Republic of Korea and China join this project.

Presidium of FEB RAS and Science and Technology Committee of the Chinese city Qingdao have signed an agreement on cooperation in the sphere of marine biotechnology and bioengineering, environment conservation and improving ecological situation of marine regions, conservation and reproduction of marine biological resources.

In 2002 the Chinese – Russian industrial park of science and technology was established in the city of Loyan, Henan Province for promotion the science and technology exchange between China and Russia and enhance implementation of up-to-date scientific projects in Chinese industry.

Institute of Marine Geology and Geophysics (Sakhalin) continues its research works in the frame of agreement with Seoul National University, Republic of Korea.

Cooperation of FEB RAS Institutes With Chinese Scientific Institutions



Russian and American scientists closely cooperate in the sphere of Oceans and Polar Studies. In October 2002 the Vitus Bering Laboratory was established in Vladivostok to creating an opportunity for collaborative research on fisheries, oceanography, climate changes etc. in the Bering Sea.

Short analysis of existing and expanding scientific contacts demonstrates that efforts of officials and increasing relations between scientists have created favorable environment for further decisive steps towards facilitating cooperation between scientists and experts of Asia – Pacific Region. We are to take steps to improve and upgrade our relations. Private contacts and short – term cooperation should be shifted to long – term and large – scale relations in many fields of science and technology.

In addition it is necessary to add that FEB RAS institutes are ready to realize the research and investigation works as well as development works by contracts with foreign companies and firms. We are ready to help our projects forward to Asian market, to assist the innovation activity in the field of knowledge – intensive production, to offer licenses for sale, to render consulting service, etc. It is possible to conduct joint marine expeditions using technical means of FEB RAS (scientific – research vessels and special equipment, including deep – water uninhabited apparatus with elements of artificial intellect). FEB RAS can render assistance in organization of scientific tourism in the Russian Far East.

And at last, our proposals for a long – term scientific and technical collaboration:

- Complex processing of mineral raw materials.
- Utilization of agricultural waste.

- Obtaining of particularly pure organic and inorganic products.
- New biotechnologies.
- Development of acoustical methods of resource monitoring and exploring of the Asian seas.
- Research of biodiversity and protection of environmental in the North – East Asia.
- Study of geological structure of the Pacific Ocean transition to the Eurasian continent.
- Investigation of oil – gas content of the North – East Asia territory.
- Purification from radioactive waste.

CONCLUSIONS

Asia – Pacific Region increases its role in world economics from year to year. This region is important consumer of scientific achievements and high technology. It is obvious that countries of APR are very important, long – range and valuable partners for regions of Russian Far East.

That is why it is important for Far Eastern Branch of the Russian Academy of Sciences to maintain and develop long – term and settled international connections, and to participate in international division of labor. Our activities are aimed at application of talent and experience of Russian scientists for common welfare and accelerated development of all countries of Region.