

## REVIEWS AND REPORTS

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### The Arctic Business Trip of the President of the Russian Academy of Sciences A.M. Sergeev to Yakutia: the Main Results and Prospects for Russian Science Development \*

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**Abstract.** The analytical review is devoted to the progress and results of the three-day business trip (March 17–19, 2021) of the President of the Russian Academy of Sciences, Academician A.M. Sergeev, to the Republic of Sakha (Yakutia) as part of a large group of scientists from the Russian Academy of Sciences and its Siberian branch. During this period, he visited more than 20 scientific and educational objects in Yakutsk and Tiksi village, met with their leaders, got acquainted with the main directions of their activities. The article reveals and analyzes numerous meetings of the President of the Russian Academy of Sciences with scientists, his speeches at conferences and round tables, where his key positions and assessments regarding the role of science in the development of Russia and Yakutia are outlined in the light of the requirements of the decree of the President of the Russian Federation “On measures to improve the efficiency of state scientific research and technical policy”. Special attention is paid to the results of meetings with the leadership of the Republic of Sakha (Yakutia), the Academy of Sciences of the republic, visits to the Federal Research Center “Yakutsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences” and its institutions, North-Eastern Federal University named after M.K. Ammosov, scientific and educational laboratory “Agrokub”, the Polar Geocosmophysical Observatory, the station of rocket sounding of the atmosphere and the wind-diesel complex. The article contains innovative material on a comprehensive development plan for the Tiksi village. Speaking about the importance of a business visit to the Republic of Sakha (Yakutia), the author notes that this trip took place in the Year of Science and Technology in Russia, on the eve of the Russian Federation's chairmanship in the Arctic Council, and thus emphasized the importance of the region in the Arctic state policy and gave a good impetus for further development of scientific organizations and science in Yakutia. According to the results of work in Yakutia, the President of the Russian Academy of Sciences A.M. Sergeev highly appreciated the scientific and technological potential of the region, noted the most promising areas of fundamental and applied research that can ensure breakthrough development of the region.

**Keywords:** *the Arctic, science, Russian Academy of Sciences, RAS, Republic of Sakha (Yakutia), Yakutsk Scientific Center, NArFU, Polar Geocosmophysical Observatory, Roshydromet, Tiksi, President of RAS A.M. Sergeev.*

#### Briefly about Arctic Yakutia

The Republic of Sakha (Yakutia) (hereinafter — RS (Ya)) is the largest region of the Russian Federation. Over 40% of the republic's territory is located beyond the Arctic Circle. Yakutia is located within three time zones; their difference with Moscow time is +6, +7, +8 hours.

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Yakutia is one of the most isolated and inaccessible regions in the world: more than 85% of the territory is accessible only by seasonal modes of transport (river, sea, winter roads). Aviation is the only year-round type of conveyance.

The share of RS (Ya) reserves in the mineral resource potential of Russia is the following: 82% for diamonds, 17% for gold, 61% for uranium, 82% for antimony, 5% for iron ores, 5% for coal, 28% for tin, 8% for mercury. There are significant reserves of rare earth elements, silver, lead, zinc, tungsten, and many other ones, up to the last elements of the periodic table. The Republic of Sakha (Yakutia) economy is based on industry, the development of which is primarily associated with the development of the richest natural resources. Diamond mining occupies the leading position in the mining industry. The Yakut diamondiferous province is the largest in Russia, accounting for 90% of reserves and 95% of production. Fuel and energy raw materials (coal, gas, oil, condensate), found in more than 20% of the continental territory of Yakutia, are of great strategic and economic importance. Today, there are 900 explored deposits of hard coal, brown coal, coking coal, and coal shows.

The main document establishing the strategic goals for the Arctic zone of RS (Ya) development is the "Strategy for the socio-economic development of the Arctic zone of the Republic of Sakha (Yakutia) for the period up to 2035", approved on August 14, 2020, by the Decree of the Head of the Republic No. 1377.

On December 1, 2020, the Order of the Government of RS (Ya) No. 1111-p approved the unified action plan for the implementation of the "Strategy for the socio-economic development of the Arctic zone of the Republic of Sakha (Yakutia) for the period up to 2035" and "On the main directions of state policy of RS (Ya) in the Arctic zone of RS (Ya) for the period up to 2024".

The Arctic zone includes 13 transpolar regions of Yakutia. Only 67.5 thousand people, or 7% of the republic population, live in 97 settlements on the area that occupies more than half of the entire republic territory.

The Arctic regions have decentralized power supply based on low-power sources of electricity, mainly diesel power plants. All districts have problems in the social sphere: high depreciation of facilities, undeveloped engineering infrastructure, lack of accessible Internet connection.

The promising socio-economic development of the Arctic zone of the Republic of Sakha (Yakutia) is based on five development vectors: social, industrial, transit, environmental and innovative.

### ***RAS President Sergeev A.M. in Yakutia. The first day of work (March 17, 2021)***

From 17 to 19 March, a representative delegation of the Russian Academy of Sciences headed by its president, academician Aleksandr Mikhaylovich Sergeev, visited the Republic of Sakha (Yakutia). The delegation also included the administration of the Siberian Branch of the Russian Academy of Sciences (SB RAS), headed by the chairman, academician V.N. Parmon. During

these three days, he held several critical working meetings, took part in scientific events, got acquainted with the institutions and objects of science of the SB RAS.

On the first day of work, the president of the Russian Academy of Sciences, A.M. Sergeev, held a working meeting with the head of the Republic of Sakha (Yakutia) A.S. Nikolaev, where topical issues of science and scientific research in the region were discussed. It was noted that the administration of the republic pays special attention to interaction with the Russian Academy of Sciences, as well as with the Siberian and Far Eastern branches of the Russian Academy of Sciences.

Together with his colleagues, academician A.M. Sergeev took part in the grand opening of the memorial plaque "Memorable places of great expeditions of the Russian Academy of Sciences of the 18th century". It should be noted that the first scientific landing in these regions (the Great Siberian Expedition, organized by the Imperial Academy of Sciences and Arts) started in 1733 and reached Yakutia in 1736, even though the Imperial Academy itself was formed in 1724. A.M. Sergeev is the 22nd president of the Academy of Sciences in its entire history, the 10th elected president, and the 3rd one in recent history.

Then the RAS president held a working meeting, heard the reports of the administration of the Federal Research Center "The Yakut Scientific Center of the Siberian Branch of the Russian Academy of Sciences" (hereinafter — FRC "YSC SB RAS"). The event was attended by the leadership of the republic, representatives of the SB RAS. Today it is the largest complex research institution in the northeast of Russia, employing more than 2.2 thousand people, a quarter of whom are scientific employees. It currently includes seven institutes: Institute for Biological Problems of Cryolithozone, Yu. G. Shafer Institute of Cosmophysical Research and Aeronomy, V.P. Larionova Institute of the Physical-Technical Problems of the North, N.V. Chersky Mining Institute of the North, Institute of Oil and Gas Problems, Institute for Humanitarian Research and North Indigenous Peoples Problems, M.G. Safronov Yakut Scientific Research Institute of Agriculture.

After the meeting, the RAS president, answering journalists' questions, drew attention to the fact that Yakutia had great potential due to the scientific and technological development of the region. He emphasized that the conversation with scientists showed that they were aimed to obtain new results to make science a real driving force of the economy. According to the academician, at meetings with the head of the republic, administration of the Yakutsk scientific center, scientific institutes, the participants exchanged views and outlined the formation of several new projects and programs together with the region, which should have a socio-economic effect. "First of all, it involves new approaches to studying and exploiting of the mineral resource base. Over the past 30 years, state exploration of mineral resources has not been carried out properly. Both the old data, which have been available since the Soviet time, and the new data show promising min-

eral deposits in Yakutia. Therefore, it is important to combine the efforts of both investors and authorities”<sup>1</sup>.

On the same day A.M. Sergeev visited the scientific complex of the North-Eastern Federal University named after M.K. Ammosov (hereinafter referred to as NEFU), the test center of the Institute of Engineering and Technology, the Faculty of Geology and Survey laboratories, the international center for the development of promising competencies "Future Skills: NEFU", the Mammoth Museum. He particularly highlighted the high level of the Yakut Federal University in medical and Arctic research. “The fact that one of the laboratories has managed to genetically isolate a mutation that cause a hereditary genetic disorder, which is represented in Yakutia more than in the rest of the world, is the achievement of the highest level. Moreover, if you (researchers and physicians) suggest treatment methods, this will be a top-notch result. It makes a strong impression.” At the same time, the President of the Russian Academy of Sciences noted that the university's achievements are related to the needs coming from the region<sup>2</sup>.

The president of the Russian Academy of Sciences then visited the Geological Museum named after N.V. Chersky of Diamond and Precious Metal Geology Institute SB RAS and the Federal Cryostorage of Plant Seeds of the Melnikov Permafrost Institute SB RAS. That made a strong impression on the members of the delegation.

In the evening, a meeting with the scientific community of Yakutia and the administration of the Academy of Sciences of the Republic of Sakha (Yakutia) was held<sup>3</sup>. At the round table “Issues of preservation, development and scientific support of the linguistic and cultural diversity of the peoples of the Russian Federation”, the head of the RS (Ya) A.S. Nikolaev and the RAS president A.M. Sergeev made an introductory statement, which highlighted the status of the languages of the indigenous small-numbered peoples of the North in the Republic of Sakha (Yakutia) and the importance of preserving and developing the linguistic and cultural diversity of the peoples of the Russian Federation. It was emphasized that the scientific, educational, methodological, and informational potential of the republic is actively used in the implementation of the language policy. The director of the Institute for Humanitarian Research and Indigenous Studies of the North SB RAS N.I. Popova made a report on the scientific support of the functioning of the state and official languages of the Republic of Sakha (Yakutia). The deputy director for Science of the Institute of Modern Languages and International Studies of NEFU L.S. Zamorshchikova presented a report on

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<sup>1</sup> Aleksandr Sergeev: Rukovodstvo Yakutii zainteresovano v razvitii nauki [Aleksandr Sergeev: The leadership of Yakutia is interested in the development of science]. URL: <https://www.sakha.gov.ru/news/front/view/id/3265069> (accessed 25 March 2021).

<sup>2</sup> Prezident Rossiyskoy akademii nauk Aleksandr Sergeev posetil SVFU [President of the Russian Academy of Sciences Aleksandr Sergeev visited NEFU]. URL: <https://www.sakha.gov.ru/news/front/view/id/3265212> (accessed 25 March 2021).

<sup>3</sup> Prezident RAN Aleksandr Sergeev posetil Akademiyu nauk respubliki [RAS President Aleksandr Sergeev visited the Republic's Academy of Sciences]. URL: <https://www.sakha.gov.ru/news/front/view/id/3265186>; O vstreche s prezidentom Rossiyskoy akademii nauk A.M. Sergeevym [About the meeting with the President of the Russian Academy of Sciences A.M. Sergeev]. URL: [https://www.s-vfu.ru/universitet/rukovodstvo-i-struktura/instituty/unesco/news\\_detail.php?ELEMENT\\_ID=149248](https://www.s-vfu.ru/universitet/rukovodstvo-i-struktura/instituty/unesco/news_detail.php?ELEMENT_ID=149248) (accessed 25 March 2021).

the preservation of linguistic and cultural diversity and sustainable development of the Arctic and Subarctic of the Russian Federation, as well as the head of the UNESCO International Chair of NEFU A.V. Zhozhikov had a speech about the digitalization of the linguistic and cultural heritage of the indigenous peoples of the Arctic<sup>4</sup>. It was noted that language, reflecting the surrounding reality, reacts vividly to changes. Migration, urbanization, various social interactions, contacts, rapid and intense rhythm of life, massive flow of information lead to frequent switching of language codes, to a language shift.

The president of the Academy of Sciences of the Republic of Sakha (Yakutia), Corresponding member of the RAS V.V. Filippov informed the president of the Russian Academy of Sciences about the activities of the highest scientific organization of the region. It was noted that the future of the Academy of Sciences of the republic is associated with the development and implementation of strategic projects, the creation of a system of scientific and methodological support for regional projects. At the end of the meeting, the participants discussed the implementation of the second stage of the Program of Comprehensive Scientific Research in the Republic aimed at the development of its productive forces and social sphere for 2020–2022, as well as the Development Program of the Scientific and Educational Center of the Republic of Sakha (Yakutia) “North: Territory of Sustainable Development”. At the end of the meeting, A.M. Sergeev noted the high scientific and technological potential of the region, support for science, funding of fundamental and applied research by the republic, and highly appreciated the work carried out by the leadership of Yakutia together with academic and university science to preserve and develop the diversity of languages and culture.

### *The second day of work (March 18, 2021)*

On March 18, the Russian Academy of Sciences president, A.M. Sergeev, took part in the meeting, where the issues of the integrated development of the Arctic territories of the Republic of Sakha (Yakutia) and the Krasnoyarsk Krai were discussed. The participants outlined the prospects for the development of the mineral resource base and the possibilities of developing new deposits, where strategically important minerals are concentrated<sup>5</sup>. It was emphasized that, unfortunately, this area has been underdeveloped: most of the geological research was carried out back in Soviet times. Serious work in this direction is just beginning. A.S. Nikolaev noted that the volume of exploration work in the Arctic of Yakutia should be increased by a factor of 10 and instructed the regional cabinet of ministers to prepare a list of relevant proposals with the involvement of federal departments. He stressed that JSC Rosgeologia, which signed a cooperation

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<sup>4</sup> Uchenye SVFU predstavili proekty prezidentu RAN Aleksandru Sergeevu po voprosam sokhraneniya i razvitiya rodnykh yazykov [Scientists from NEFU presented projects to the President of the Russian Academy of Sciences Aleksandr Sergeev on the preservation and development of native languages]. URL: <https://www.sakha.gov.ru/news/front/view/id/3265371> (accessed 25 March 2021).

<sup>5</sup> V Arkticheskoy zone Yakutii mogut uvelichit' ob'em geologorazvedochnykh rabot v 10 raz [In the Arctic zone of Yakutia, the volume of geological exploration can be increased by 10 times]. URL: <https://www.sakha.gov.ru/news/front/view/id/3265241> (accessed 25 March 2021).

agreement in 2019, will also take part in this work. The RAS president noted the great potential of the republic and announced the readiness of the Russian Academy of Sciences to participate in the comprehensive development of the Arctic zone.

As part of a working visit to Yakutia, the president of the Russian Academy of Sciences A.M. Sergeev visited the scientific and educational laboratory “Agrokub” on the basis of the Khatasskaya secondary school named after P.N. and N.E. Samsonovs (the village is located on the territory of the urban district “Yakutsk city”). School principal N.V. Sleptsov spoke about the work of the laboratory, the progress and the four-year results of its activities. The delegation visited the laboratories of biotechnology and agrobiotechnology, where technologies and features of growing horticultural crops are being developed. The conditions have been created here for schoolchildren to master modern agricultural technologies, including biotechnology and robotics. A.M. Sergeev noted that it is necessary to increase the interest of children in modern agriculture in order to make a promising scientific and technological career in the future <sup>6</sup>. The visit to this laboratory by the RAS president, in our opinion, was not accidental. It was fed on the necessity to overcome the agrarian crisis in Yakutia and the transition of the republic's Arctic agro-industrial complex to dynamic development with the participation of the state, local authorities and business, as well as the entry of scientific and educational institutions into it <sup>7</sup>.

A.M. Sergeev took part in the representative scientific forum “Universities and the development of geostrategic territories of Russia” <sup>8</sup>. The event was held at the North-Eastern Federal University with the support of the Ministry of Education and Science of the Russian Federation, the Russian Academy of Sciences and the Government of Yakutia. The forum was held in face-to-face and distance format. The participants discussed the problems of sustainable development of geostrategic territories in Russia, as well as the implementation of the program of fundamental scientific research in the Russian Federation for the long term (2021–2030). The moderator was A.S. Fedotov, Permanent Representative of the Republic of Sakha (Yakutia) under the President of the Russian Federation. Deputy Prime Minister in charge of science and education in the Republic of Sakha (Yakutia) S.V. Mestnikov in his report spoke about the national project “Science” and the established scientific and educational center “North — Territory of Sustainable Development”, which united the institutes of fundamental academic science and universities in partnership of five constituent entities of the Russian Federation: Yakutia, Kamchatka, Magadan Re-

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<sup>6</sup>Prezident RAN posetil nauchno-uchebnyu laboratoriyu «Agrokub» [The President of the Russian Academy of Sciences visited the Agrokub scientific and educational laboratory]. URL: <https://www.sakha.gov.ru/news/front/view/id/3265449> (accessed 25 March 2021).

<sup>7</sup>Rodnina N.V. O merakh po razvitiyu Arkticheskoy zony Yakutii [On Measures for the Development of the Arctic Zone of Yakutia]. *Akademicheskij vestnik Yakutskoy gosudarstvennoy sel'skokhozyaystvennoy akademii* [Academic Bulletin of the Yakutsk State Agricultural Academy], 2020, no. 10 (15), p. 26-30; Rodnina N.V. O prodovol'stvennom obespechenii Arktiki Yakutii [On the Food Supply of the Arctic Yakutia]. *Akademicheskij vestnik Yakutskoy gosudarstvennoy sel'skokhozyaystvennoy akademii* [Academic Bulletin of the Yakutsk State Agricultural Academy], 2020, no. 10(15), p. 47–50.

<sup>8</sup>V Yakutske obsudili voprosy razvitiya nauchno-tekhnologicheskogo potentsiala regionov [In Yakutsk, issues of developing the scientific and technological potential of the regions were discussed]. URL: <https://www.sakha.gov.ru/news/front/view/id/3265245> (accessed 25 March 2021).

gion, Sakhalin, and Chukotka. The president of the Academy of Sciences of the Republic of Sakha (Yakutia), Corresponding member of the RAS, V.V. Filippov, made a report about the interaction of the regional science of Yakutia with the Russian Academy of Sciences and its regional branches — Siberian and Far Eastern.

The RAS president A.M. Sergeev began his speech by saying that the regions of the Russian Federation, including the Republic of Sakha (Yakutia), can become engines of the country's scientific and technological development. He noted that “this thesis is important because we are tired of waiting for our serious scientific and technological advancement and are accustomed to ascertaining our not very leading position on this parameter in the world. There is an index of innovative development, which is calculated through serious formulas and indicators. This index is recognized all over the world. According to this index, Russia has not improved its position over the past ten years. We are in the 42nd place. This shows that we either have to admit that we will not be able to be scientifically and technologically oriented, or we have to take a new look at the situation and make some suggestions and measures to find out how we can move forward. In addition to the general statement that the innovation situation is unsatisfactory for all of us, we have internal figures that do not suit us. Of course, the first figures are the volume of GDP that goes into science, which is still around 1%, although we have been saying for many years that we need more. Let me remind you that in the first edition of the Law on Science, which was adopted in 1996, there was a figure of 4% as a guideline.”<sup>9</sup> He further pointed out that at the beginning of the 2000s, this point was removed from the law, and now the percentage of funds allocated for science is either slightly less or slightly more than one percent. He drew attention to the importance of allocating funds for science from business. According to him, business representatives all over the world understand that a suitable investment in science is an opportunity to increase added value regularly. The investments in science predetermine new knowledge that is not yet on the market: “If you can get it into the market fast, you are the king. Why does it not work? Now the question of stimulating business investments is being raised very seriously”. In the final part, he spoke about the increased attention to the Arctic territories as a zone of economic interests around the world, about the potential of Yakutia in science, cryo-storage facilities and about “what is the Arctic without Yakutia?”.

The chairman of the Yakutsk Scientific Center SB RAS, corresponding member of RAS, M.P. Lebedev, spoke about fundamental scientific research in the interests of sustainable development of the northern and arctic territories of the Russian Federation.

The rector of the North-Eastern Federal University named after M.K. Ammosov, A.N. Nikolaev, made a report on the topic “The scientific and innovative potential of the university is a driver of sustainable development of the northern territories”, in which he noted that the mission of NEFU is the formation of a new generation of professionals realizing the values and goals of sus-

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<sup>9</sup> Regional'nyy vektor liderstva [Regional Leadership Vector]. URL: <https://scientificrussia.ru/articles/regionalnyj-vektor-liderstva> (accessed 25 March 2021).

tainable development of the North and the Far East, influencing the solution of global problems of humanity.

At the event, the director of the Melnikov Permafrost Institute SB RAS, M.N. Zheleznyak, spoke about the implementation of the program of fundamental scientific research in the field of geocryology. The director of the Yakutsk Scientific Center, A.N. Romanova, informed the participants of the forum about the indicators of scientific activity, fundamental scientific research, which are carried out on its basis. The head of the Diamond and Precious Metal Geology Institute SB RAS V.Yu. Fridovskiy presented the results of scientific research on the geology of solid minerals in the Verkhoyansk-Kolyma fold area and the Siberian craton.

Within the framework of the forum, the chairman of the SB RAS Academician V.N. Parmon took part in the round table “Science, Universities and Youth”, where participants discussed ways to attract young people to science, problems of developing higher education in Russia and its regions. According to him, there are five main factors that attract young people to science. The first is interesting scientific work. There is a lot of such work in the Siberian branch, and one can always find a good advisor. The second factor, which is weakened in the regions, is the availability of modern research equipment; world-class scientific research is impossible without it. The third necessary factor is affordable housing. V.N. Parmon emphasized: “There should be modern comfortable and inexpensive rental housing for graduates of universities and postgraduate studies.” The fourth factor is a decent salary, which allows science to be fully invested and does not waste precious time and energy on part-time work. The fifth factor is the opportunity to realize not only scientific interests but also the interests of a young family, and hobbies — sports, culture, theaters, the ability to communicate with friends, etc.<sup>10</sup>

The event made a significant contribution to understanding the challenges that will contribute to the development of science and education in the Arctic zone of the Russian Federation.

### ***The third day of work (March 19, 2021, Tiksi)***

On March 19, 2021, Yakutia celebrated the “Day of the Arctic”. A.M. Sergeev and a large group of scientists flew to Tiksi, where they visited the Polar Geocosmophysical Observatory of the Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy SB RAS, Federal Research Center “Yakutsk Scientific Center SB RAS”, station of rocket monitoring of the atmosphere, wind-diesel complex. The RAS vice-president, the chairman of the SB RAS academician V.N. Parmon, the chairman of the Federal Research Center “YSC SB RAS”, the corresponding member of the RAS M.P. Lebedev, the permanent representative of the Republic of Sakha (Yakutia) under the President of the Russian Federation A.S. Fedotov, acting First deputy chairman of the Government of the Republic of Sakha (Yakutia) D.D. Sadovnikov, the minister for the Development of the Arctic and Affairs of the Peoples of the North of the Republic of Sakha (Yakutia) V.N. Chernogradskiy and

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<sup>10</sup> Rukovodstvo RAN i SO RAN plodotvorno porabotalo v Yakutii [The management of the RAS and SB RAS fruitfully worked in Yakutia]. URL: <http://www.sbras.info/articles/sciencestruct/rukovodstvo-ran-i-so-ran-plodotvorno-porabotalo-v-yakutii> (accessed 25 March 2021).



other heads of scientific, educational and industrial structures were working in Tiksi<sup>11</sup>. The purpose of the trip was to get acquainted with the system of organizing academic science in Yakutia, with the possibilities of creating new scientific and testing sites and scientific stations in the Arctic zone.

First of all, the delegation visited the wind farm built in 2018 by RusHydro and the Japanese company NEDO. According to the head of the Bulun power grids of JSC Sakhaenergo A.N. Kozakov, the station is part of a wind-diesel complex with a capacity of 3 MW plus a 1 MW battery. Now the whole complex is being tested together with Japanese specialists. The station generates electricity to the typical grid in the village. According to him, everything works fine, and there are no special comments<sup>12</sup>.

Further, A.M. Sergeev visited the Polar Geocosmophysical Observatory (PGO), designed to carry out continuous geophysical measurements in the meridional chain of complex points — geomagnetic field variations, auroral absorption of radio waves, ionosphere characteristics, optical glow of the night sky and auroras, and intensity of cosmic rays. The observatory includes a scientific instrument park, as well as an atmospheric rocket sounding station.

During the visit, the guests showed a genuine interest in the history of the creation and formation of the PGO and the research conducted there. The M-211 atmospheric rocket sounding station, equipped with the latest MR-30 geophysical rocket complex, which allows making experiments at altitudes from 50 to 300 km, was of particular interest. The president of the Russian Academy of Sciences, academician A.M. Sergeev expressed gratitude to the observatory staff for their dedicated work in the harsh Arctic. In the discussion, recommendations on possible options for integrating PGO research into large Russian scientific projects were given<sup>13</sup>.

It should be noted that the Arctic Hydrometeorological Observatory was created within the framework of a specialized international project of the national meteorological services of the Russian Federation, the United States of America, and Finland as a key link in the system of international hydrometeorological observations and scientific research in the Arctic. It fills a severe observational gap in the Arctic Asia region that existed before its discovery<sup>14</sup>.

A.M. Sergeev took part in the round table “Climate test site in the Arctic and the development of alternative energy”. Electricity supply to the Arctic territory of Yakutia became the main topic of the round table. According to the minister for the Development of the Arctic and the Af-

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<sup>11</sup> Prezident RAN Aleksandr Sergeev posetil v Tiksi Polyarnuyu geokosmofizicheskuyu observatoriyu [RAS President Aleksandr Sergeev visited the Polar Geocosmophysical Observatory in Tiksi]. URL: <https://yakutia.info/article/198837> (accessed 25 March 2021).

<sup>12</sup> Prezident RAN v Den' Arktiki posetil Bulunskiy rayon Yakutii [The President of the Russian Academy of Sciences visited the Bulunskiy District of Yakutia on the Day of the Arctic]. URL: <https://www.sakha.gov.ru/news/front/view/id/3265489> (accessed 25 March 2021).

<sup>13</sup> Efremova M. Otmetit' Den' Arktiki — v Arktike! [Celebrating Arctic Day in the Arctic!]. URL: <http://www.ras.ru/news/shownews.aspx?id=059b7fd8-6a94-4054-895b-3e583e68b89a#content> (accessed 30 March 2021).

<sup>14</sup> Reshetnikov A.I., Makshtas A.P. Arkticheskaya gidrometeorologicheskaya observatoriya «Tiksi» [Arctic Hydrometeorological Observatory "Tiksi"]. *Trudy Glavnoy geofizicheskoy observatorii im. A.I. Voeikova* [Proceedings of the Main Geophysical Observatory named after A.I. Voeikov], 2012, no. 567, p. 268.

fairs of the Peoples of the North of the Republic of Sakha (Yakutia) V.N. Chernogradskiy, “The Arctic regions of Yakutia belong to the zone of decentralized power supply, except for the village of Cherskiy, Nizhnekolymskiy ulus. Local power engineering is based on low-power sources of electricity, mainly diesel power plants. There is no year-round land transport system connecting the Arctic zones with neighboring territories and settlements. Seasonal modes of transport are used for freight transport — winter roads and inland waterways. Climatic conditions, significant infrastructural restrictions cause increased resource intensity and rise in price in its extreme arctic form”<sup>15</sup>.

In these conditions, according to the opinion of the delegation members, alternative energy in sparsely populated, inaccessible polar territories is of great interest for study in isolated energy systems, as well as the construction of new sources of electricity and heat — mini-nuclear power plants, thermal power plants on local fuel, power plants on liquefied natural gas. It will contribute to the development of the Northern Sea Route, change the logistics of the northern delivery, make it possible to realize the industrial potential of the Yakut territory, and will significantly reduce the costs of supporting life of Arctic villages.

The presentations highlighted the importance of supporting the Research and Education Center “North”, which is the main strategically important project for integrated development of the Arctic region, solving social and economic problems, preserving national identity, strengthening and developing the potential of the Arctic zone of Yakutia. The scientific community is tasked with increasing the effectiveness of scientific approaches and making specific proposals. The main feature of this project is the creation of a growth point in priority areas of the socio-economic development of the Arctic<sup>16</sup>.

### *Upon returning to Moscow*

The general results of the visit to Yakutia were summed up on April 2, 2021, in Moscow, where the president of the Russian Academy of Sciences, A.M. Sergeev, held an online press conference at the International Multimedia Press Center of the MIA “Russiya Segodnya” with the participation of the head of the Republic of Sakha (Yakutia) A.S. Nikolaev. The head of the Republic of Sakha (Yakutia) said that the republic is ready to co-finance a comprehensive scientific expedition to explore the north-west of Yakutia. About 60 million rubles will be allocated for these purposes in 2021. The expedition will have not only scientific objectives but also the task of a comprehensive study of a huge territory, comparable in size to India, as well as contributing to the maximum

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<sup>15</sup> Energeticheskiy potentsial Arktiki stal glavnoy temoy kruglogo stola v Tiksi s uchastiem prezidenta RAN [The energy potential of the Arctic became the main topic of the round table in Tiksi with the participation of the President of the Russian Academy of Sciences]. URL: <https://www.sakha.gov.ru/news/front/view/id/3265556> (accessed 25 March 2021).

<sup>16</sup> Rossiyskaya akademiya nauk okazhet sodeystvie realizatsii krupnykh nauchnykh proektov v Yakutii [The Russian Academy of Sciences will assist in the implementation of large scientific projects in Yakutia]. URL: <https://www.sakha.gov.ru/news/front/view/id/3266213> (accessed 05 April 2021).

preservation of the environment and to the improvement of living standards of people who live in the harshest natural and climatic conditions<sup>17</sup>.

The RAS president expressed the opinion that 2021 is a geopolitically important year: Russia becomes the chairman of the Arctic Council for the next two years and should propose various initiatives in science related to the Arctic region. He spoke about possible projects in the field of cryopreservation of plant seeds, research of paleontological fauna, study of permafrost, prospects of Yakutia as a center for creation and testing of new materials in extreme natural conditions, study of the properties of mechanisms and engineering structures.

During an online press conference, the president of the Russian Academy of Sciences, A.M. Sergeev, proposed to initiate the creation of an international cryostorage of seeds in Yakutia since the Spitsbergen cryostorage is collapsing due to the permafrost thawing. Yakut scientists made a small cryostorage of plants several years ago, which contains about 10 thousand specimens. It is located at a depth of 12 meters, where the temperature is maintained at about minus 10 °C all year round<sup>18</sup>.

#### ***The role of science in the development of Russia and Yakutia: key positions and assessments of the RAS President A.M. Sergeev***

“The competitive future of our country should definitely be formed through scientific and technological development, through the development of scientific and technological outposts. Yakutia can become one of them. There are several important reasons: first, it is an infinite store-room of mineral resource base. Second, the cold for Yakutia is not only its symbol, its complexity, but also its wealth. It can be seen that now many technologies are connected precisely with the fact that we should test materials and living systems in extreme conditions. Third, it is necessary to provide people with comfortable social conditions and the circumstances in which they want to make an economic breakthrough. People need to see opportunities for creativity.

Yesterday I studied the social and demographic parameters of the republic and was surprised that the population is growing at a reasonably good rate. In Yakutia, social, linguistic, and cultural issues are resolved in the right way. These three factors make Yakutia a geostrategic outpost in terms of scientific and technological development.

Over the past ten years, Russia has not improved its position in the global ranking of innovative development of countries, including due to insufficient funding.

The head of Yakutia is working to ensure that the republic has scientific and technological development. He understands that the republic can develop only on the basis of science and tech-

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<sup>17</sup> Aleksandr Sergeev o perspektivakh kompleksnoy nauchnoy ekspeditsii po issledovaniyu severo-zapadnykh rayonov Yakutii [Aleksandr Sergeev on the prospects for a comprehensive scientific expedition to explore the northwestern regions of Yakutia]. URL: <http://www.ras.ru/news/shownews.aspx?id=9c0d2ccc-c1a8-4d4b-a7c3-1dc41c82a761&print=1> (accessed 05 April 2021).

<sup>18</sup> Glava RAN predlozhit sozdat' v Yakutii al'ternativnoe vsemirnomu khranilishche semyan [The head of the Russian Academy of Sciences proposed to create in Yakutia an alternative to the world seed repository]. URL: [https://news.ykt.ru/article/118345?news\\_recent\\_main=](https://news.ykt.ru/article/118345?news_recent_main=) (accessed 08 March 2021).

nology. This is my primary impression that the authorities of Yakutia are interested in science. If science and government work together, then everything will succeed.

Many great scientists were educated in Yakutia and work in academic institutes, the university, and the Academy of Sciences of the Republic of Sakha (Yakutia). Its own national Academy of Sciences is also very important.

The wealth of Yakutia is the cold that preserved the oldest artifacts. About 75% of all mammoth burials known globally have been found in Yakutia and have become the object of biological and paleogenetic research today. Yakutia's scientists first grew grass, the seeds of which were found in the remains of mammoths. Now the mammoth from a symbol of antiquity, eternity, and paleontology can become a symbol of modern science, which promotes Yakutia. So it's not just a tourism brand, it's a scientific brand.

Yakutia has significant prospects in the development of wind and diesel energy. This is an area of powerful winds in the Arctic, where there is so much energy, and it could be at the center of the modern trend of transferring the world's industry to hydrogen energy. Yakutia can become a testing ground for the creation of the latest energy industry.

Outwardly, Tiksi now looks like a deserted city. In the 1970s and 1980s, Tiksi was the capital of the Soviet Arctic, but then the outflow of people began, the military left. This was not a positive development. Now we see abandoned five-story buildings, but we see new developments as well. It is good that Tiksi will now be mastered entirely. Scientific development is equally important."

### *Tiksi*

The seaport of Tiksi, built in the 1930s, serves as a base port in the North-Eastern sector of the Arctic from the beginning of the Northern Sea Route operation. The village of Tiksi has been selected as a preliminary area for creation a model of the Arctic territories development.

The comprehensive development plan for the village of Tiksi includes seven projects<sup>19</sup>:

- Project No. 1 "Renewal of social infrastructure, provision of the Internet access. Development of cooperation with the Russian Ministry of Defense on social issues";
- Project No. 2 "Energy-efficient settlement of the Arctic";
- Project No. 3 "Proving ground of REC "North: Territory of Sustainable Development";
- Project No. 4 "Tourist cluster "Russian Arctic North";
- Project No. 5 "Creation of an emergency rescue unit and an Arctic crisis management center in the village of Tiksi";
- Project No. 6 "Modernization of transport infrastructure (seaport Tiksi, airport, land transport, including seasonal), ensuring the delivery of goods";

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<sup>19</sup> These are the data of the report of the Permanent Representative of the RS (Ya) under the President of the Russian Federation A.S. Fedotov on March 4, 2021 at the plenary session of the VI International Conference "The Arctic: Off-shore Projects and Sustainable Development of Regions" (Moscow).

- Project No. 7 “Eco-friendly settlement of Tiksi — cleaning Tiksi from scrap metal”.

The vast improvement of the village of Tiksi will significantly contribute to the implementation of the Russian Arctic development strategy and ensure the advancement of a reliable national security base. Units of the new anti-aircraft missile regiment, equipped with S-300 systems, are stationed in the north of Yakutia. Together with the missile men, the wireless observer units and air direction centers, deployed on the mainland coast of the Laptev Sea and on Kotelniy Island, have entered combat duty<sup>20</sup>.

The development of the port infrastructure of Tiksi is impossible without a stable cargo base. As of the beginning of 2021, 24 licenses for hydrocarbons production inland and on the continental shelf of the Republic of Sakha (Yakutia) were issued. In the western sector of the Arctic zone of the Republic of Sakha (Yakutia), the development of the Tomtor rare earth metal deposit is an anchor project; in the eastern sector, two large mining projects for tin and gold extraction are planned for implementation.

The industrial development of Eastern Siberia leads to the formation of new cargo types in the form of hydrocarbon and solid mineral projects. For example, in 2020, a unique operation was carried out on the transshipment of oversized cargo for the Irkutsk Polymer Plant of Irkutsk Oil Company<sup>21</sup>.

The activity of large oil and gas companies PJSC Rosneft Oil Company and PJSC Surgutneftegaz, as well as work under the state contract of JSC Rosgeologia, the Tomtor rare earth metal deposit project, may lead to the discovery of new deposits and attract venture capital investments in exploration of deposits through oil and gas processing projects.

Favorable conditions have been created for investors in the Yakut Arctic projects. Thus, licenses for prospecting and exploration of minerals can be obtained without auctions for up to 7 years based on applications alone, and the tax regimes of residents of the Arctic zone of the Republic of Sakha (Yakutia) are close to the tax conditions of projects in priority development areas.

As a result of the comprehensive development plan implementation, Tiksi will become the hallmark of the Russian Federation as a model of polar, environmentally friendly, and energy efficient village.

### **Conclusion**

It should be noted that the three-day Arctic trip of the RAS president, academician A.M. Sergeev became a momentous event for the Russian Academy of Sciences, higher education in Russia, and the Republic of Sakha (Yakutia). The President of the Russian Federation, V.V. Putin,

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<sup>20</sup> Podrazdeleniya novogo zenitnogo raketnogo polka RF razmestili na severe Yakutii [Units of the new anti-aircraft missile regiment of the Russian Federation were deployed in the north of Yakutia]. URL: <https://yk24.ru/index/obshhestvo/podrazdeleniya-novogo-zenitnogo-raketnogo-polka-rf-razmestili-na-severe-yakutii> (accessed 10 December 2020).

<sup>21</sup> V otkrytom more zavershilas' perevalka krupnogabaritnykh gruzov s morskikh sudov na barzhi dlya Irkutskogo zavoda polimerov [Transshipment of oversized cargo from sea vessels to barges for the Irkutsk Polymer Plant has been completed on the high seas]. URL: <https://baikal24.ru/text/31-07-2020/056/> (accessed 25 March 2021).

declared 2021 the Year of Science and Technology in Russia, and on March 15 he signed a decree “On Measures to Increase the Effectiveness of State Science and Technology Policy”. It almost coincided with his business visit to Yakutia. A.M. Sergeev visited Yakutsk, Tiksi, held a lot of important and necessary meetings on the integrated development of the Arctic regions, alternative energy, activities of scientific centers, met with scientists at the Academy of Sciences of the republic, expressed support for the scientific and educational center “Sever”, visited the northernmost region of Yakutia, Bulunskiy district, where he saw how people live beyond the Arctic Circle. As the analysis shows, the joint work of the heads of the federal and regional levels of the Russian Academy of Sciences during these days has made it possible to develop very important areas of joint activity and cooperation in the use of scientific achievements in the social and economic development of the Republic of Sakha (Yakutia), to determine new areas of work of scientific institutions.

The primary purpose of the RAS delegation visit was to work out a number of strategic issues for the regional science development, implementation of large scientific projects, acquaintance with the work of the Federal Research Center “YSC SB RAS”, branch scientific institutions of the SB RAS, interaction with NEFU named after M.K. Ammosov, Academy of Sciences of the Republic of Sakha (Yakutia). Last time the RAS president, Academician Yu.S. Osipov, visited the region 25 years ago. According to the results of work in Yakutia, the RAS president A.M. Sergeev highly appreciated the scientific and technological potential of the region, noted the most promising areas of fundamental and applied research that can provide breakthrough development. These are mineral resources, the study and use of cold, as well as the socio-demographic potential of Yakutia.

The current visit took place on the eve of Russia's chairmanship in the Arctic Council and emphasized the importance of this region in the Arctic policy of the state. It provided a good impetus for the further development of scientific organizations and science in Yakutia. We would like the RAS delegations to visit other subjects of the Russian Arctic in the next two years and decide on the spot on their scientific and technical development.

Today, the Academy of Sciences of the Republic of Sakha (Yakutia) accumulates all available scientific potential of the republic, among the advantages of which are the development of scientific schools, promising areas of fundamental and applied research, stable interaction with the regions and the compliance of the research with their needs, a high level of integration with universities, state academies of sciences, communication with sectoral science, federal research centers. At the same time, as the results of the RAS work showed, its activities have significant reserves for further development.

A significant result of the business visit of A.M. Sergeev in Yakutia in terms of the development of the Arctic and support of science was the order of the Government of the Russian Federation of March 22, 2021 No. 716-r, which approved the development program of the Northern (Arctic) Federal University for 2021–2035 (Rector — professor E.V. Kudryashova). In the next 3 years, the university will receive 1.5 billion rubles from the federal budget for the implementation of the program: 500 million rubles annually. Within the framework of its development program, the im-

provement of research and innovation activities will be carried out, including updating of the scientific and instrumental base.

The Institute of Europe of the Russian Academy of Sciences team contributes to the study and development of the Arctic. In 2020, 33 scientific articles were published, including 3 publications (of which 2 are foreign) in journals of Scopus and Web of Science databases, 3 articles in RCSI journals; 8 papers in journals approved by the Higher Attestation Commission, 5 publications in journals indexed in the RSCI, chapters in monographs, articles in collections — 14 ones. Employees took part and made presentations at 10 scientific forums, including 3 international conferences and one all-Russian with international participation, and participated in the expert work of the State Duma Committee on Ethnic Affairs, The Council for the Arctic and Antarctic under the Federation Council and the newly created Project Office for the Development of the Arctic.

In their activities in the Arctic, they used the possibilities of successful interaction with the Northern (Arctic) Federal University named after M.V. Lomonosov, Peter the Great St.Petersburg Polytechnic University, National University of Oil and Gas “Gubkin University”, USA and Canada RAS Institute, the University of the Arctic (in terms of participation in Arctic events in European countries).

Scientific articles and reports on conferences and round tables following the research focused on the study:

- the activities of the Arctic Council and Iceland's chairmanship in it, the further transformation of the Arctic strategies and policies of European states at the present stage;
- peculiarities, difficulties, and prospects of international cooperation between Russia and the countries of Europe, Asia, and North America in the Arctic after 2014;
- the results of the implementation of the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security for the Period up to 2020;
- the content of the Fundamentals of State Policy of the Russian Federation in the Arctic for the period up to 2035 dated March 5, 2020 and the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security for the Period up to 2035;
- the activities of the security forces of the Russian Federation to protect the national interests and sovereignty of Russia, to oppose the NATO bloc in the Arctic region;
- the state and development prospects of the Arctic zone of the Russian Federation and the Northern Sea Route (economy, education, health care, transport, climate change, scientific research, indigenous peoples of the North, ecology, demography, icebreaker fleet, etc.).

There is an understanding that the Arctic requires constant special attention of the state. The specific conditions of the Arctic require new approaches to its development: from the identification of individual goals and objectives to the development of fundamentally different economic mechanisms based on the results of scientific research.

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