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Issue Article

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FEATURES OF CHANGES IN CLIMATIC CHARACTERISTICS OF THE REGIONS OF THE RUSSIAN ARCTIC ON THE LIFE OF INDIGENOUS PEOPLES

***Abstract**: in the article, the authors explore the features of the Arctic territories of the country, where more than half of the total number of indigenous peoples of the North live, the study of whose way of life becomes a separate object of scientific research. The purpose of this article is to study the development of scientific approaches to the study of the traditional economy of indigenous peoples of the North in the Arctic zone of the Russian Federation. The main research method was a comparative analysis of publications from the beginning of the 20th century to the present period of both domestic and international scientists studying the traditional types of economy of the indigenous peoples of the Russian Arctic. The analysis of publications was carried out in all available branches of scientific knowledge, not limited to a strictly economic focus, since the economy of the traditional economy of the indigenous peoples of the Arctic is inextricably linked with technology, technical and organizational equipment of farming and other areas. As a result of the study, high research activity on the topic under study was revealed, especially since the increased attention of government authorities to the development of the Arctic territories. However, it was determined that there is no comprehensive approach to studying the economic development of the economies of indigenous peoples living in the Russian Arctic.*

***Key words**: traditional economy, indigenous peoples, Russian Arctic, sustainable development, comparative analysis, indigenous peoples, Arctic aborigines, traditional way of life, types of traditional economic activities, Russian legislation, Association of Indigenous Peoples of the North, Siberia and the Far East of the Russian Federation.*

***Language**: English*

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Introduction

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The Arctic territory includes: A huge drifting ice shelf located in the Arctic Ocean, the northern waters of two oceans, the Pacific and the Atlantic, islands and archipelagos, including Greenland, the polar lands of North America and Eurasia, as well as many seas.

The official representative states on the shelf are: Russia, Canada, Denmark, Norway, USA. A fairly large part of the Arctic belongs to the Russian Federation.

The land territories of the Arctic zone of the Russian Federation are defined in accordance with the decree of the President of the Russian Federation dated May 2, 2014 No. 296 “On the land territories of the Arctic zone of the Russian Federation” and they are listed below, namely:

- Murmansk region (entirely).
- Nenets Autonomous Okrug (entirely).
- Chukotka Autonomous Okrug (entirely).
- Yamalo-Nenets Autonomous Okrug (entirely).
- Some territories of the north of the Komi Republic
- Some territories of the north of the Republic of Karelia (added by decree of the President of the Russian Federation of June 27, 2017 No. 287)
- Some territories of the north of the Republic of Sakha - Yakutia
- Some territories of the north of the Krasnoyarsk Territory
- Some territories of the north of the Arkhangelsk region
- Lands and islands located inArctic Ocean, specified in the resolution of the Presidium of the Central Executive Committee of April 15, 1926 “On declaring lands and islands located in the Arctic Ocean as the territory of the USSR” and other acts of the USSR.

Areas adjacent to the Atlantic and Pacific oceans are warmer and have more rainfall, while the climate of inland areas is colder and drier. In winter, the effects of cyclones from the Atlantic Ocean intensify in the Arctic regions. At this time, high air temperatures, strong winds, maximum precipitation and cloudiness. Anticyclones operate in the Siberian part of the Arctic regions.

Research shows that temperatures in the Arctic are rising twice as fast as in the rest of the world. This could lead to the extinction of many plant and animal species in the region. Warming also threatens the existence ofindigenous peoples of the Arctic. Arctic ice is of great importance for the Earth's climate system. Ice capreflects the sun's rays and thus prevents the planet from overheating. In addition, Arctic ice plays a large role inwater circulation systems in the oceans.

The activities of polar stations in the Arctic are the basis for monitoring natural processes in the environment: in the ocean and on land. These results are needed not only for direct use in current human activities in the Arctic, but also for accumulating and improving the base of long-term observations, which are necessary for studying natural processes that influence the climate, and therefore the prospects for human life throughout the globe.

Back in the 1870s, it became clear that the study of the territories of the Arctic zone of the Russian Federation by scattered expeditions could not produce results that would allow conducting fundamental research in the Arctic Ocean zone. In a word, the idea of creating some kind of permanently operating polar stations that systematically take readings was in the air.

When talking about Russian polar stations in the Arctic, people most often recall their rapid development during the Soviet period. However, Russia began to use them much earlier. During the First International Polar Year (1882-83), two Russian stations participated in research - Malye Karamakuly on Novaya Zemlya and Sagastyr in the Lena delta. In 1913-1915, 4 more polar stations began operating - Yugorsky Shar, o. Vaygach, Marre-Sale station on the Yamal Peninsula and on the island. Dixon. Due to harsh climatic conditions and a rather inaccessible location, weather stations are unfortunately not so common in the Arctic region. In the USSR, the Arctic zones were provided with much more polar stations than they are now. The number of polar stations in the Arctic decreased significantly in the 90s of the last century. Lack of funding and lack of interest in this sector in Russia has led to the closure of up to 50% of stations. Today, unfortunately, there are not many operating Arctic stations, namely.

- Arctic Research Station - Labytnangi, Yamalo-Nenets Autonomous Okrug.
- Belomorskaya biological stationMoscow State University - Primorsky village, Loukhsky district, Republic of Karelia.
- Valkarkay - Chaunsky district, Chukotka Autonomous Okrug.
- Willem Barents - Dikson, Krasnoyarsk region.
- Hydrometeorological station named after. M.V. Popova - Bely Island, Kara Sea.

- Dikson hydrometeorological station - Dikson village, Krasnoyarsk Territory.
- Yenisei ecological station "Mirnoye" - Mirnoye village, Turukhansky district, Krasnoyarsk region.
- Izvestia Central Executive Committee - Troinoy Island, Izvestiya Central Executive Committee Islands, Kara Sea.
- Lena-Nordenskiöld - Bank of the Bykovskaya channel of the Lena River, north of Tiksi, Yakutia.
- Malye Karmakuly - Yuzhny Island, Novaya Zemlya archipelago.
- Marre-Sale - North of Cape Marre-Sale, Yamal Peninsula, Yamalo-Nenets Autonomous Okrug.
- Cape Baranova (formerly Prima) - Cape Baranova, Bolshevik Island, Severnaya Zemlya archipelago.
- Cape Zhelaniya - Cape Zhelaniya, on the Northern Island of the Novaya Zemlya archipelago.
- Ernst Krenkel Observatory - Hayes Island, Franz Josef Land archipelago.
- Vize Island - Vize Island, Kara Sea.
- Wrangel Island - Rogers Bay, Wrangel Island.
- Golomyanny Island - Golomyanny Island, Sedov Archipelago, part of the Severnaya Zemlya archipelago.
- Samoilovsky Island - Samoilovsky Island, Lena River delta, Yakutia.
- Polar geocosmophysical observatory "Tiksi" - Tiksi village, Yakutia.
- North-Eastern Scientific Station - Chersky Village, Yakutia.
- Solnechnaya - Solnechnaya Bay, Bolshevik Island, Severnaya Zemlya archipelago.
- Stolbovoy - Stolbovoy Island, Laptev Sea.
- Stolbovoy Cape - South Island, Novaya Zemlya archipelago.
- Chelyuskin - Cape Chelyuskin, Taimyr, Krasnoyarsk Territory.

There are also drifting polar stations in the Arctic.

Therefore, in this regard, studies are being conducted on the life of indigenous peoples of the Russian Arctic in the context of industrial development. State policy in the field of subsoil use, hydrocarbon production, and the very presence of industrial companies in the Arctic regions today have a powerful impact on the livelihoods of northern aborigines, determining the need to adapt to existing conditions and, to a large extent, socio-economic and ethnocultural prospects. The world community is concerned about the situation of indigenous peoples and is looking for ways to solve their problems, ensure free development, preserve cultures and languages, use the achievements of modern society and modernization. This can be judged from a number of UN documents, numerous international conferences, and a large number of scientific studies. The main focus of the UN in 2013 was on the topic "Creating Indigenous Alliances: Compliance with Treaties, Agreements and Other Constructive Agreements." Its isolation from the entire spectrum of issues affecting indigenous peoples is not accidental. The living conditions, lifestyle, and worldview of these peoples place them in a special position, which the world community increasingly has to take into account. In the Russian Federation, the issue of "control over one's destiny" is also relevant for indigenous peoples. Indicative are the numerous discussions of this problem in the State Duma and the Federation Council and the adoption of such important documents as "Fundamentals of state policy in the Arctic for the period until 2035", "Strategy for the development of the Arctic zone of the Russian Federation and ensuring national security for the period until 2035"). state program "Socio-economic development of the Arctic zone of the Russian Federation for the period until 2035." The authors set themselves the following tasks: to study the interaction of indigenous peoples of the North and industrial companies in the context of international, national, corporate and customary law; consider the current economic and sociocultural practices of the Aboriginal people; identify risks associated with industrial development and propose ways to overcome them. This approach is new for domestic science and allows us to raise the question of responsibility for the Arctic, as well as consider the social and environmental policies of companies as a platform for establishing a dialogue with indigenous peoples. Today in the Russian Federation, indigenous organizations of indigenous peoples of the North demand the right to prior, informed and voluntary consent to carry out industrial activities in areas of traditional residence and to receive fair compensation for damage caused. Industrial companies have their own vision of this problem. In some regions, particularly where multinational corporations operate, interactions between indigenous peoples and businesses are established as part of broader social dialogue. Aboriginal protests are evidence of the existing contradictions between traditional and industrial environmental management, folk beliefs, skills and utilitarian-commercial knowledge and approaches to the environment and its resources. That is why achieving a genuine partnership between indigenous peoples and industrial companies in the Russian Arctic today is becoming one of the conditions not only for the social well-being of representatives of these peoples, but also for achieving stability in Russian society, as well as protecting the geopolitical interests of the state. In our book, we sought to reflect the positions of the main actors in the processes of interaction in the Arctic zone of Russia. For a detailed analysis, two Arctic regions were selected - the Yamalo-Nenets and Chukotka

Autonomous Okrugs. The authors drew up a research program that included interviews with different groups of aborigines (reindeer herders, fishermen, marine hunters, employees of agricultural enterprises, teachers, doctors), with representatives of government agencies and industrial enterprises. The work was carried out in Moscow, Salekhard, Anadyr, in regional centers and villages of the Yamalo-Nenets Autonomous Okrug and Chukotka Autonomous Okrug, as well as in the camps of reindeer herders, fishermen, and hunters. The formulation of questions and interpretations of answers were based on the authors' previous work experience in the North. Each ethnographic study allows us to take a different look at the problems from the point of view of new practices that arise in the process of industrial development of the Arctic, so we consider this book as an analysis of a certain stage of interaction between indigenous peoples and industrial companies. The choice of study regions was determined by a number of factors. First of all, the fact that large-scale industrial projects related to the development of natural resources are being developed and implemented in these autonomous okrugs. At the same time, nomadic reindeer herders, sea hunters and fishermen live there. Among them, the original features of ethnic culture have been preserved to this day in their most "pure" form. At the same time, against the backdrop of industrial expansion, the traditional way of life of the northern aborigines is being transformed. They were faced with a choice: either preserve and develop their unique culture, or abandon it and live like the vast majority of the country's citizens. The ethnic situation in the Yamalo-Nenets Autonomous Okrug has been the focus of attention of the authors since 2008. The Yamal and Tazovsky districts of the district became the base for our research. Their choice is due to the dominant population of indigenous peoples and active industrial development. Great attention to Yamal among scientists made it possible to attract additional information and take into account the positions of other authors on the topics raised in the work. Another region of the study was the Chukotka Autonomous Okrug. The impact of industrial development on the indigenous peoples of Chukotka has been studied to a lesser extent, although indigenous public organizations have accumulated some experience in interacting with mining companies. In 2023 Field research was carried out in the city of Anadyr and the Chaunsky, Anadyrsky, Bilibinsky, Providensky districts of the Chukotka Autonomous Okrug. As in the Yamalo-Nenets Okrug, this data was collected among indigenous communities, in various state and municipal government structures, and industrial companies. The subject of special consideration was the activities of the Kupol Fund, created by Kinross to financially support the most promising projects in the field of traditional environmental management, preservation of ethnic culture, and languages of the indigenous peoples of Chukotka. The role of public organizations of indigenous peoples in the formation of new relationships with industrial companies is shown.

Main part

Russia is the first country to use drifting polar stations. Each such station is a complex of station houses installed on a drifting Arctic ice floe, in which expedition participants live, and the necessary equipment. For the first time, such a cheap and effective way of exploring the Arctic was proposed in 1929 by Vladimir Wiese, a researcher who worked at the Arctic and Antarctic Research Institute. Thanks to this creation of drifting stations, Russian scientists were able to explore the Arctic all year round. The first drifting expedition, called "North Pole", landed at the pole on May 21, 1937. The data obtained during the expeditions expands scientists' knowledge of the processes occurring in the natural environment of the Central Arctic and will help explain the causes of global climate change. Weather conditions in different parts of the Arctic are quite different. Cyclones, melting glaciers, polar nights and even solar radiation play a role in their variability.

To carry out the study, it is necessary to create a database obtained from Arctic stations to track changes in the region. To study, we will consider two polar stations on the territory of the Russian Federation: Vise Island and the polar station of Valkarkay.

Station coordinates: Valkarkai station70°05′06″ n. w. 170°55′21″ E. d.;Vize island station79°30′ N. w. 76°54′ E. d.The distance between stations is 2,564 km.

Figure 1. Polar stations Valkarkay and Vize Island on the geographical map of the Arctic zone of the Russian Federation.

Vize Island is located in the northern part of the Kara Sea, stretching from southeast to northwest for 22.5 km, the island has a width of 5.5 km. The coastline of the island is very slightly indented. Its shores are gentle and only near the sea, mainly in the northwestern part, in some places they form low sandy cliffs. The eastern cape is located 10 km from the station, the western (turning) cape, on which a navigation sign is installed. 2 km. The island of Vize is surrounded on all sides by a coastal rampart of stones and small pebbles ranging from 7 to 30 m wide. In some places the rampart is an embankment, in others there are separate piles of pebbles at varying distances from the water's edge. The territory of the island is completely covered with hills, the height of which reaches 15-30 m. The hills are separated by narrow hollows, which in the summer are the beds of streams and rivers. Closed depressions are filled with melt water, forming shallow lakes, most of which dry up in summer and freeze to the bottom in winter. Coastal lakes are usually salty. There are two lagoons in the southwestern and northwestern parts of the island's coast. The first is separated from the sea by sandy and rocky spits, the second by a wide isthmus.

The soil is sandy-clayey with inclusions of broken flagstone. The island is located in the Arctic tundra zone. There is almost no vegetation: reindeer moss grows in patches, there are isolated hummocks covered with lichens, a few colors. There are no settlements on the island; the delivery of necessary products is carried out during the navigation period by ship, using a helicopter.

The climate here is no less harsh. Weather features are determined by the island position of the station. The average long-term air temperature is -13.6 C. The average monthly air temperature in the warmest month. July is +0.5 C, at its coldest. March -26.9 C. The absolute minimum temperature is -52.0 C. The average long-term relative air humidity is 90%. In the station area, 242 mm of precipitation falls throughout the year. The prevailing wind direction is southeast with an average annual speed of 6.4 m/s. A stable snow cover forms in mid-September (13th), its final melting occurs at the end of June (26th). Summer is short and cold.

Since November 1, 1945, a hydrometeorological polar station, one of the northernmost in the world, has been operating on the southern coast of the island. The polar station is located on the southern coast of Vize Island in the Kara Sea. The Wiese marine hydrometeorological station began its work on November 1, 1945. Since September 1956, the station's program has included aerological sounding of the atmosphere. Since March 20, 1957, the duration of sunshine has been recorded using a heliograph. Actinometric observations have been carried out since September 1957. On October 28, 1958, observations of ice and frost deposits on an ice machine began. In September 1988, observations began using exhaust soil depth thermometers TPV-50 at depths of 0.2, 0.4 and 0.8 m. On July 18, 1993, the station used the BRS-1 mercury-free barometer.

Figure 2. Vize Island on the map of the Arctic Ocean.

Valkarkay is a remote polar station on the Arctic coast of the East Siberian Sea, within the Chaunsky district of the Chukotka Autonomous Okrug of Russia. Located on the spitpolar station of the same name·created in 1932. It is located on a spit separating the Valkarkay lagoon from the sea.The weather station is located behind a very swampy pass, which makes it extremely difficult to get there. In winter you can get to it by snowmobile, and in summer only by a powerful all-terrain vehicle like Trekol, and even then - without guarantees. There have been many cases where a car gets stuck in the middle of the road. However, the inhabitants of the station are accustomed to living independently and rarely travel to Pevek. But the main difficulty is that the station is located on the shores of the Arctic Ocean and is separated from Pevek Chukotka Plateau, with heights in this part up to700-1100 meters.Once a year, a ship docks at Valkarkai, unloading canned food, batteries and everything you need for life.

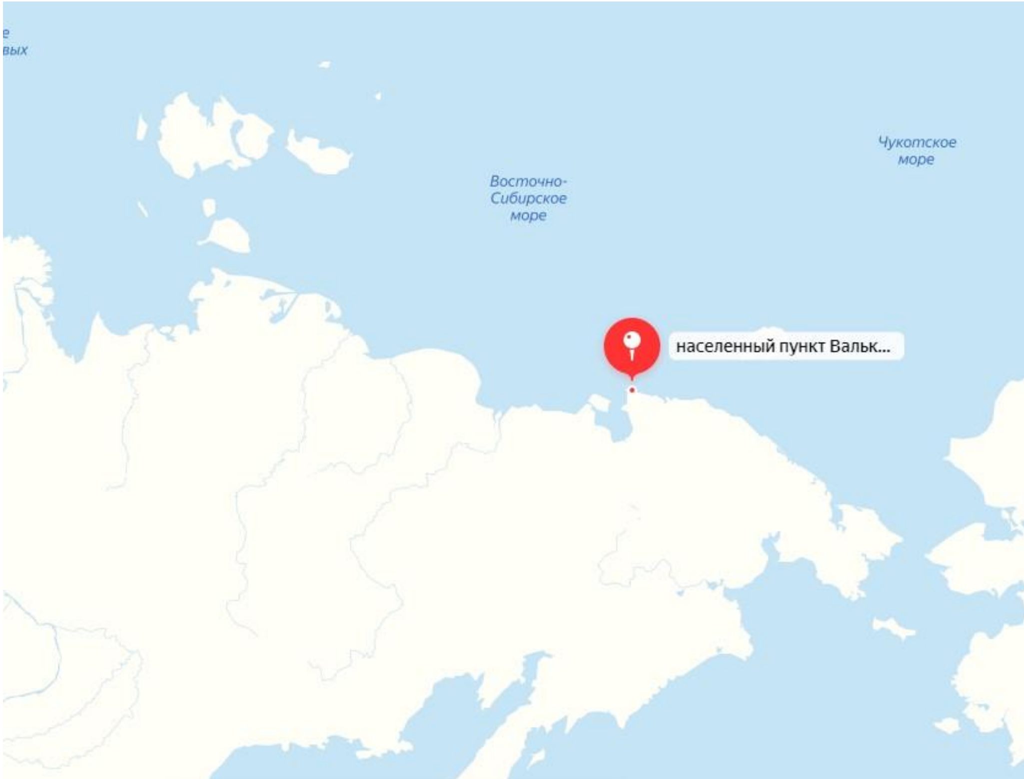


Figure 3. Valkarkay station on the geographical map of Russia.

The period from 2018 to 2023 was selected for the study. at the Valkarkai station and the Wiese Island station. Meteorological data on air temperature, atmospheric pressure, humidity, amount of precipitation and data on wind speed and direction for each day, selected from Internet resources, were used as initial data.

Table 1. Sorted atmospheric pressure data at Valkarkay station for each year by month.

March			April			May		
2018 -2019	2020-2021	2022-2023	2018-2019	2020-2021	2022-2023	2018-2019	2020-2021	2022-2023
758.6	755.8	772.9	759.7	757.0	757.0	758.9	755.5	760.5
765.6	756.4	763.9	756.7	754.7	755.5	762.8	754.6	763.4
761.2	757.0	763.0	755.8	755.8	754.9	763.0	752.3	766.3
761.7	756.1	759.4	758.4	756.5	751.0	757.0	754.3	765.3
762.7	758.5	743.2	762.0	752.7	753.6	754.7	758.7	761.2
762.0	759.0	741.1	764.3	754.1	760.8	757.4	762.4	756.7
761.0	751.6	757.8	767.5	756.2	761.5	758.5	761.3	757.1
765.2	746.8	759.1	769.0	761.2	764.8	762.4	757.6	756.6
761.8	753.2	762.1	769.0	764.7	768.4	761.2	759.1	758.4
763.0	759.5	769.6	767.2	765.0	770.4	757.5	759.9	768.1
764.0	767.9	770.2	768.5	762.1	764.5	756.7	758.5	767.9
764.9	772.0	769.6	769.5	758.2	764.0	756.2	762.5	762.6
762.1	765.0	757.3	763.8	753.8	759.1	756.6	763.5	763.3

765.7	766.3	751.5	762.3	751.0	768.7	757.0	761.9	764.2
764.1	770.9	756.2	758.0	752.4	760.4	754.6	763.0	759.8
762.4	770.8	761.0	757.3	759.1	762.1	753.1	760.2	762.8
769.5	765.1	759.5	756.1	764.4	763.3	754.6	759.4	765.1
768.1	763.3	761.8	755.8	769.0	761.0	757.9	755.8	768.7
771.7	761.4	764.8	770.3	772.2	758.9	764.0	761.8	765.3
771.1	759.1	766.6	767.1	768.1	757.3	765.3	760.0	758.3
758.8	763.5	764.9	763.1	761.5	758.0	765.2	759.5	756.4
747.7	771.4	757.9	758.8	754.9	758.4	761.5	761.2	760.0
755.6	767.5	754.4	763.6	764.8	761.2	758.8	757.7	766.2
759.1	761.8	754.1	761.9	769.3	765.1	759.1	759.7	768.4
770.4	765.5	757.3	758.2	773.0	766.0	761.8	760.8	759.7
776.8	765.9	761.5	754.0	774.1	762.8	763.2	766.6	763.0
778.4	764.1	760.6	754.1	773.9	762.1	764.1	764.0	763.0
775.9	768.2	755.1	756.1	773.9	763.9	762.2	760.2	762.2
770.3	761.7	762.8	756.6	775.0	767.6	758.8	757.0	761.2
773.7	746.5	759.7	754.6	771.7	769.0	758.1	760.8	761.8
776.7	758.5	750.2				759.9	761.1	761.1

To study the characteristics of temporal variability, the following methods of time series analysis were used in the work.

Arithmetic mean and standard deviation. The arithmetic mean value of the statistical series (X) characterizes its equilibrium point during various fluctuations. Calculated using the formula:

$$\bar{x} = \frac{1}{N}\sum_{i=1}^{n} x_i$$

The standard (or mean square) deviation (σ) characterizes the average dispersion of the values of a series from the arithmetic mean. Standard deviation is related to variance (D). Calculated using the formula:

$$\sigma = \sqrt{D}$$

Where D is variance

$$D = \frac{1}{N}\sum_{i=1}^{n}(x_i - \bar{x})^2$$

limits of the confidence interval of the mean value, in the case of 95%: x− 1.96 ×σ/n in the case of +95%: x + 1.96 ×σ/n

Also, between points with average values, you can calculate the correlation using the following formula:

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}}$$

And the significance of the correlation was determined based on the calculation of the standard

random error:

$$\sigma_r = \frac{1 - r^2}{\sqrt{n-1}}$$

Analysis of meteorological parameters at the station

Air temperature analysis

Let's consider data on air temperature in the period from March to February at two stations from 2018 to 2023.

Table 2 presents calculated data on the average temperature, minimum and maximum temperature, standard deviation of temperature for each month of the period under consideration at the Valkarkai station.

Table 2. Calculated air temperature data at Valkarkai station.

	Average °C	RMS	Min°C	max°C
		2018-2019		
March	-14.4	6.9	-29.6	3.4
April	-9.5	6.2	-23.4	2.2

May	-2.8	3.2	-13.4	5.5
June	1.7	2.8	-2.7	16.7
July	6.9	3.9	1.2	20.3
August	7.2	4.1	-1.3	20.2
September	2.5	2.2	-2.2	12.1
October	-3.5	4.6	-14.5	7.7
november	-9.0	6.3	-23.8	3.6
December	-15.7	6.7	-30.8	-2.7
January	-21.1	8.1	-34.1	3.1
February	-16.2	3.1	-23.4	-8.0
		2020-2021		
March	-24.5	7.1	-37.6	-3.0
April	-10.8	4.3	-20.2	0.3
May	-6.6	5.2	-20.5	2.1
June	1.2	2.5	-5.8	12.2
July	5.0	5.8	-0.9	23.3
August	3.6	4.4	-2.4	20.0
September	6.8	4.2	-1.1	19.5
October	-3.4	6.6	-18.6	13.4
	Average °C	RMS	Min°C	max°C
november	-16.9	5.9	-31.1	-5.4
December	-26.5	6.9	-36.4	-5.3
January	-25.3	3.5	-34.1	-12.0
February	-24.6	5.6	-38.2	-5.2
		2022-2023		
March	-22.0	6.1	-36.9	-8.7
April	-14.3	7.0	-28.3	2.5
May	-5.2	4.0	-15.8	4.8
June	2.6	3.7	-2.8	16.9
July	5.5	4.2	-0.8	21.9
August	4.4	2.9	-1.0	14.5
September	1.6	2.2	-4.1	9.4
October	-4.2	4.0	-17.2	1.7
november	-11.6	6.3	-27.2	0.1
December	-19.0	6.5	-32.9	-5.9
January	-23.9	5.8	-35.7	-0.5
February	-28.6	6.1	-39.8	-11.3

Based on the data, the lowest air temperature was recorded in February 2023 and amounted to -39.8°C, and the highest in July 2019 and amounted to 23.3°C. It should be noted that during this period at the Valkarkay station, the lowest temperatures were most often observed in February, and the highest temperatures in July. Let us graphically present the minimum, maximum and average air temperature values at the Valkarkai station and draw a trend line (Figure 4 a, b, c).

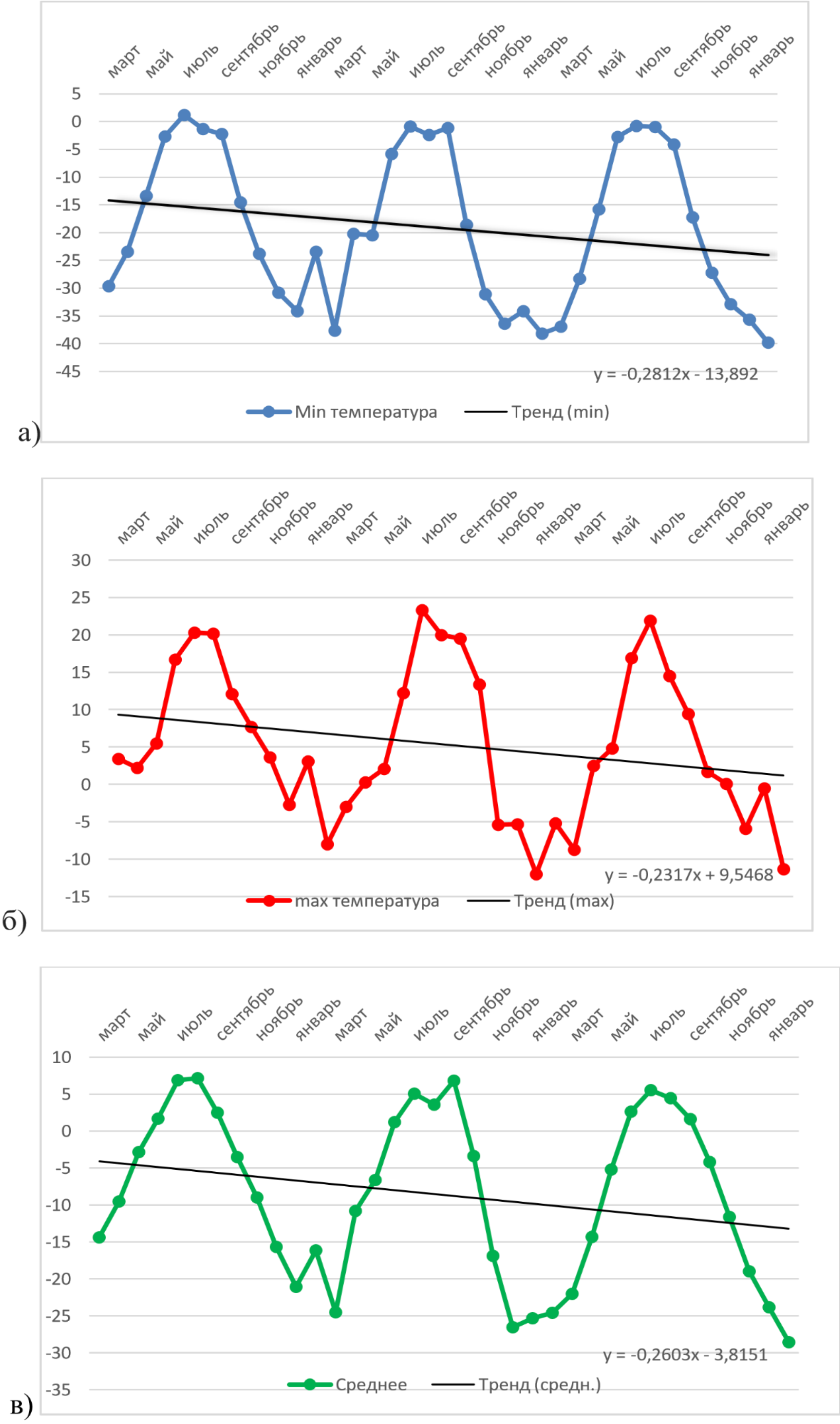


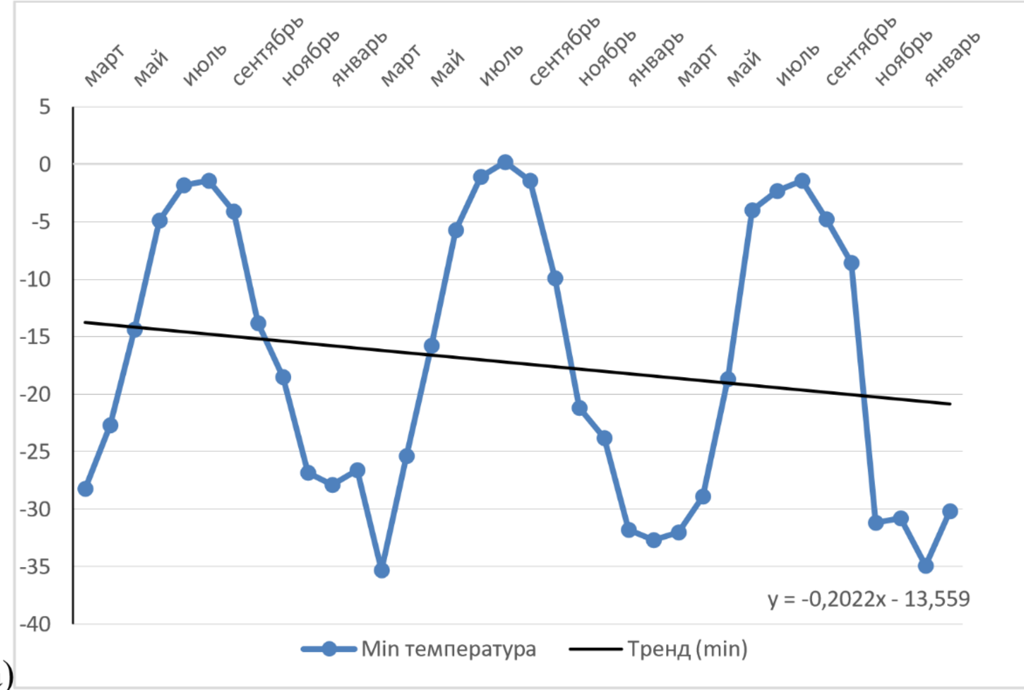
Figure 4. Minimum, maximum and average air temperature values at Valkarkai station, °C

Having analyzed the data obtained from Figure 2 (a, b, c), we can conclude that in all cases the slope of the trend line is almost identical. For minimum temperatures it is 15.71°, for maximum it is 13.05°, and for average it is 14.59°. Thus, in all cases it contributes to the formation of variability in the original series. Table 3 presents calculated data on the average temperature, minimum and maximum temperature, standard deviation of temperature for each month of the period under consideration at the Vise Island station.

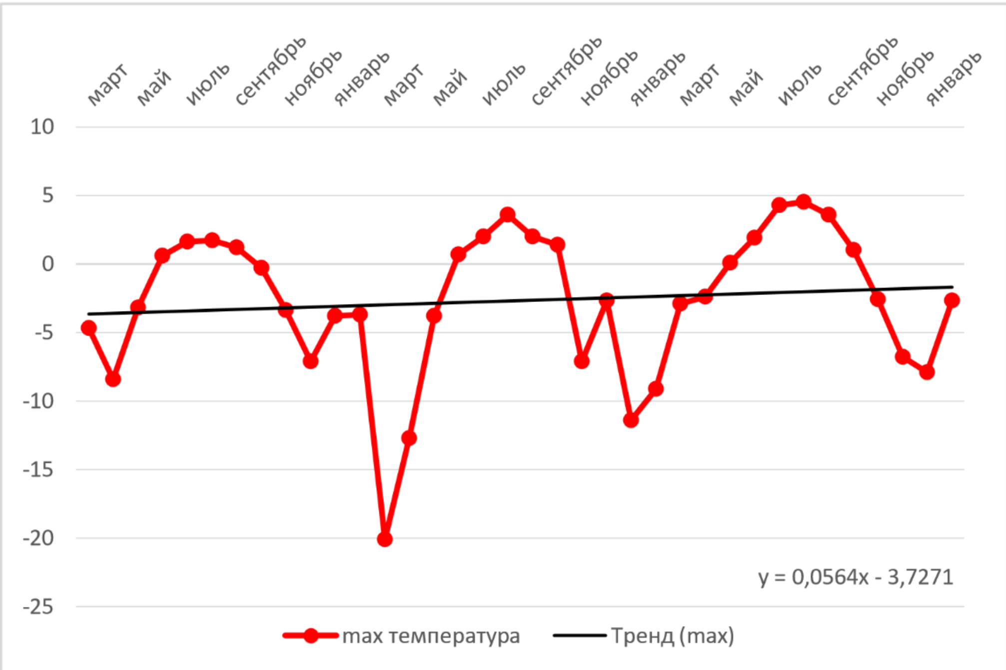
Table 3. Calculated data on air temperature at the Vise Island station.

	Average °C	RMS	Min °C	max °C
		2018-2019		
March	-19.4	6.8	-28.2	-4.7
April	-15.1	3.4	-22.7	-8.4
May	-10.1	3.2	-14.4	-3.2
June	-1.7	1.4	-4.9	0.6
July	-0.1	0.8	-1.8	1.6
August	0.3	0.9	-1.4	1.7
September	-1.1	1.4	-4.1	1.2
October	-5.5	3.4	-13.8	-0.3
november	-12.5	4.5	-18.5	-3.4
December	-19.4	4.8	-26.8	-7.1
January	-18.9	6.1	-27.9	-3.8
February	-17.4	6.7	-26.6	-3.7
		2020-2021		
March	-27.4	4.2	-35.3	-20.1
April	-19.2	3.2	-25.4	-12.7
May	-7.6	2.9	-15.8	-3.8
June	-0.8	1.5	-5.7	0.7
July	0.2	0.6	-1.1	2.0
	Average °C	RMS	Min °C	max °C
August	2.0	1.0	0.2	3.6
September	0.3	0.9	-1.4	2.0
October	-2.9	3.5	-9.9	1.4
november	-13.9	3.9	-21.2	-7.1
December	-12.9	6.4	-23.8	-2.7
January	-24.1	4.9	-31.8	-11.4
February	-23.3	6.8	-32.7	-9.1
		2022-2023		
March	-19.3	7.9	-32.0	-2.9
April	-16.3	6.1	-28.9	-2.4
May	-6.9	4.2	-18.7	0.1
June	-0.6	1.0	-4.0	1.9
July	0.6	1.2	-2.3	4.3
August	1.2	1.2	-1.4	4.5
September	-0.4	1.5	-4.8	3.6
October	-3.3	2.2	-8.6	1.0
november	-13.7	7.7	-31.2	-2.6
December	-20.9	4.1	-30.8	-6.8
January	-24.2	6.5	-34.9	-7.9
February	-16.7	7.8	-30.2	-2.7

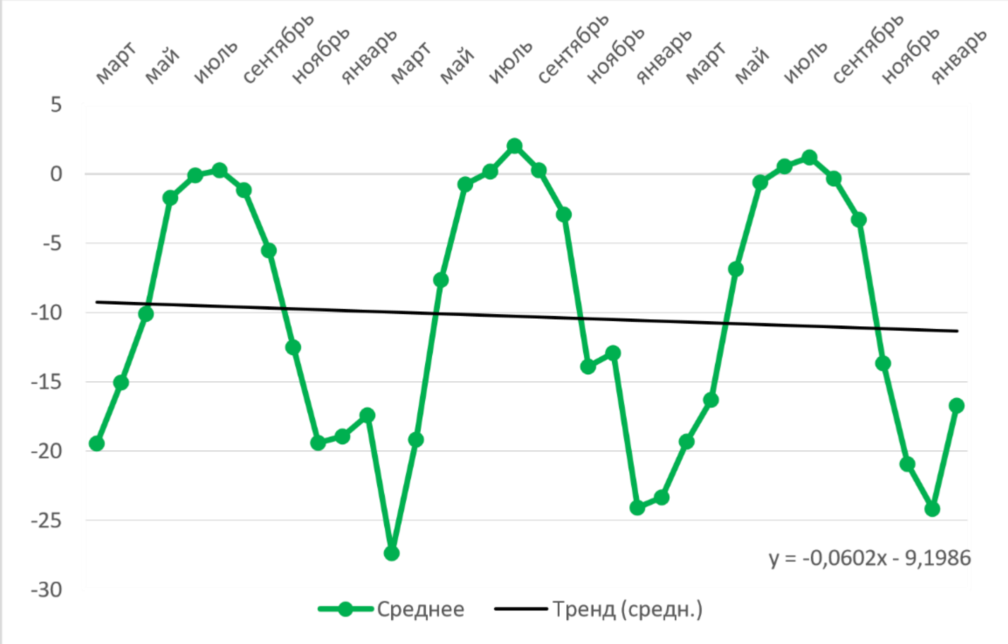
Based on the data, the lowest air temperature was recorded in March 2018 and amounted to -35.3°C, and the highest in August 2023 and amounted to 4.5°C. It should be noted that during this period at the Vise Island station, the lowest temperatures were most often observed in March, and the highest temperatures in July-August. Let us graphically present the minimum, maximum and average air temperature values at the Vise Island station and draw a trend line (Figure 5 a, b, c).



а)



б)



в)

Figure 5. Minimum, maximum and average air temperatures at the Vise Island station. °C

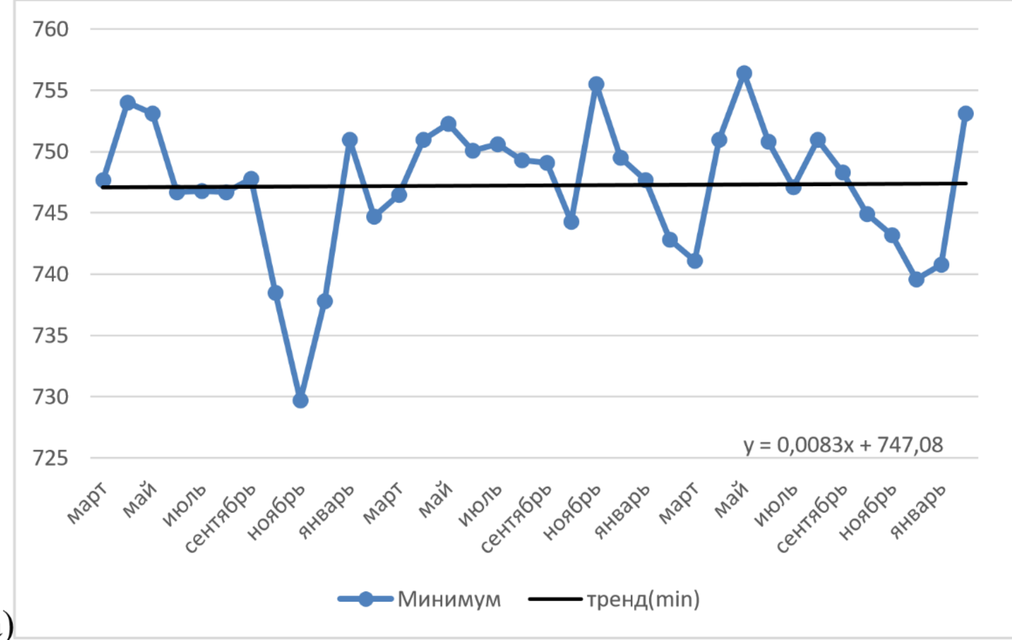
After analyzing the data obtained from Figure 5 (a, b, c), we can conclude that the trend lines have different slope angles. For minimum temperatures it is 11.43°, for maximum it is 2.86°, and for average it is 3.45°. In the case of maximum and average air temperatures, the slope of the trend is not significant, and in the case of minimum air temperatures, the trend contributes to the formation of the variability of the original series. In Table 4. calculated data on atmospheric pressure - maximum, minimum, average monthly atmospheric pressure and standard deviation for each month of the period under consideration at the Valkarkai station.

Table 4. Calculated data on atmospheric air pressure at Valkarkai station.

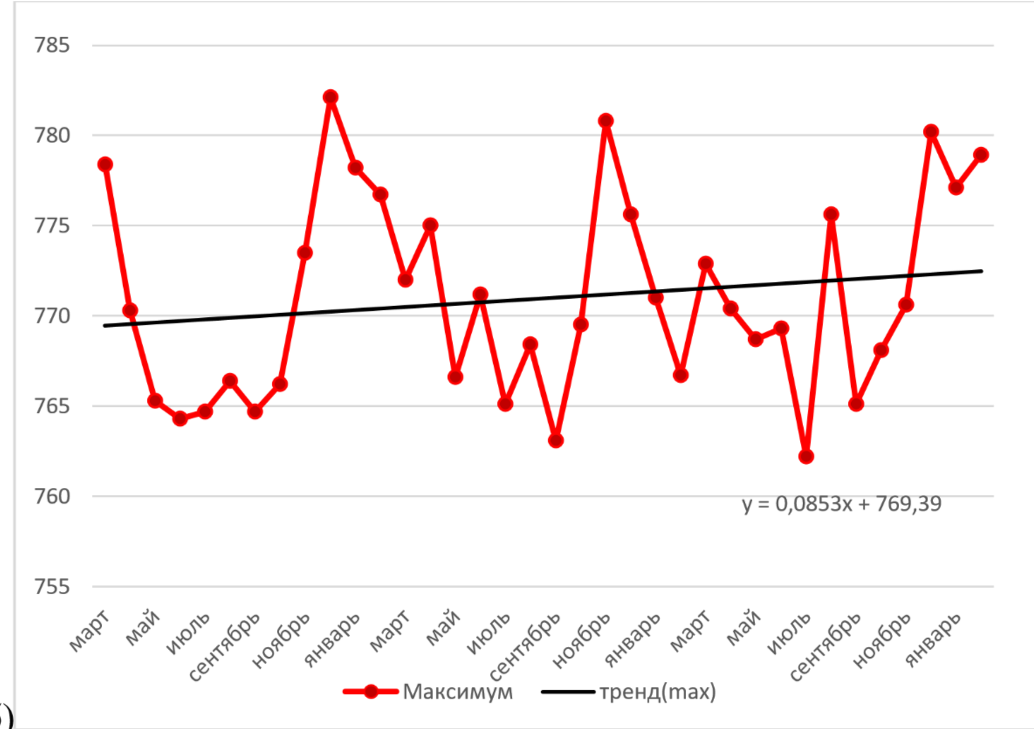
	Average (mm.Hg)	RMS	Min (mmHg)	Max (mm.Hg)
		2018-2019		
March	765.5	6.8	747.7	778.4
April	761.3	5.3	754.0	770.3
May	759.4	3.4	753.1	765.3
June	756.8	4.3	746.7	764.3
July	755.6	4.9	746.8	764.7
August	758.5	5.2	746.7	766.4
September	756.7	4.6	747.8	764.7
October	757.2	6.5	738.5	766.2
November	755.4	9.8	729.7	773.5
December	761.9	11.0	737.8	782.1
January	764.3	7.4	751.0	778.2
February	761.6	8.8	744.7	776.7
		2020-2021		
March	761.6	6.7	746.5	772.0
April	762.7	7.8	751.0	775.0
May	759.7	3.1	752.3	766.6
June	760.0	5.9	750.1	771.2
July	757.7	3.6	750.6	765.1
August	760.5	4.7	749.3	768.4
September	758.0	3.8	749.1	763.1
October	759.7	6.2	744.3	769.5

November	766.1	6.6	755.5	780.8
December	764.2	6.5	749.5	775.6
	Average (mm.Hg)	RMS	Min (mmHg)	Max (mm.Hg)
January	763.0	6.3	747.7	771.0
February	756.6	6.6	742.8	766.7
		2022-2023		
March	759.6	7.1	741.1	772.9
April	761.7	4.8	751.0	770.4
May	762.4	3.6	756.4	768.7
June	761.6	4.6	750.8	769.3
July	755.0	3.9	747.1	762.2
August	763.4	6.0	751.0	775.6
September	756.7	4.7	748.3	765.1
October	759.1	6.8	744.9	768.1
November	761.0	6.7	743.2	770.6
December	761.4	9.2	739.6	780.2
January	762.4	8.7	740.8	777.1
February	766.0	6.1	753.1	778.9

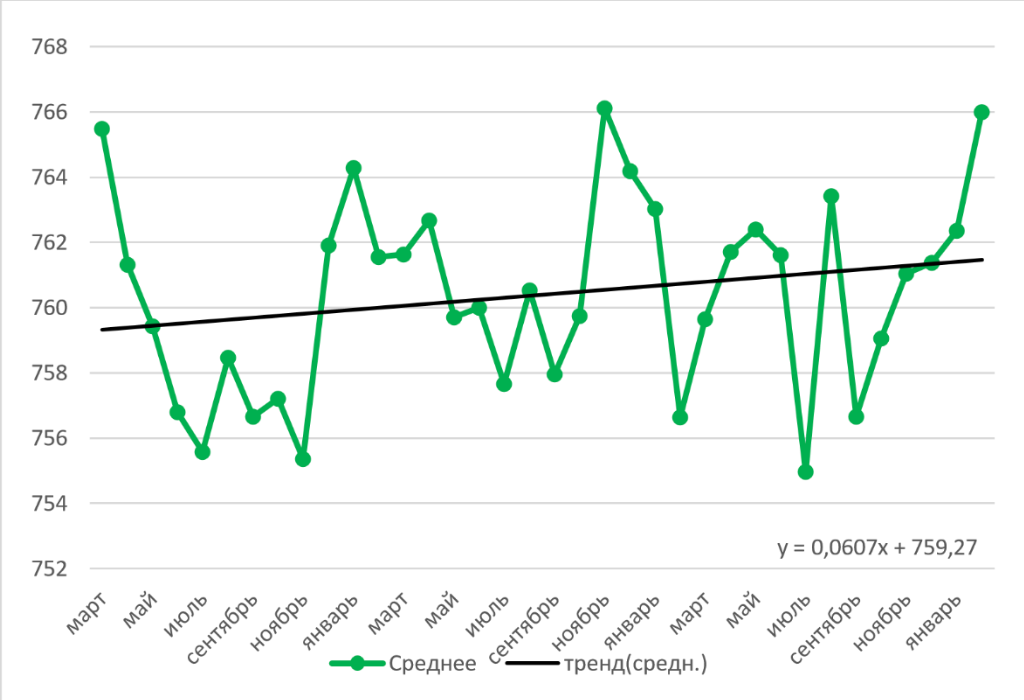
Let us graphically present the minimum, maximum and average values of atmospheric air pressure at the Valkarkai station and draw a trend line (Figure 6 a, b, c).


760
755
750
745
740
735
730
725
y = 0,0083x + 747,08
март
май
июль
сентябрь
ноябрь
январь
Минимум
тренд(min)

а)


785
780
775
770
765
760
755
y = 0,0853x + 769,39
март
май
июль
сентябрь
ноябрь
январь
Максимум
тренд(max)

б)



в)

Figure 6. Minimum, maximum and average values of atmospheric pressure at Valkarkay station.

Having analyzed the data obtained, we can conclude that the lowest pressure at the Valkarkay station for the entire study period is 729 mmHg. observed in November 2019 The highest pressure was recorded in December 2022. and amounted to 782 mmHg. The slope of the trend line is insignificant in all cases. For minimum values it is 0.48°, for maximum 4.86°, and for average 3.47°. Thus, in the case of minimum values of atmospheric pressure, the trend does not make any contribution to the formation of the variability of the original series.

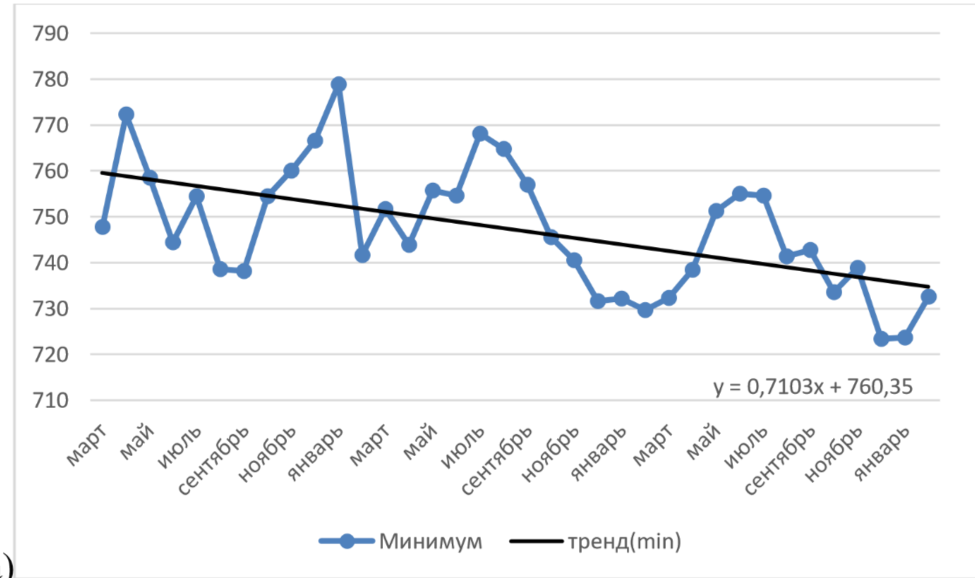
In table 5. calculated data on atmospheric pressure - maximum, minimum, average monthly atmospheric pressure and standard deviation for each month of the period under consideration at the Vise Island station.

Table 5. Calculated data on atmospheric air pressure at the Vise Island station.

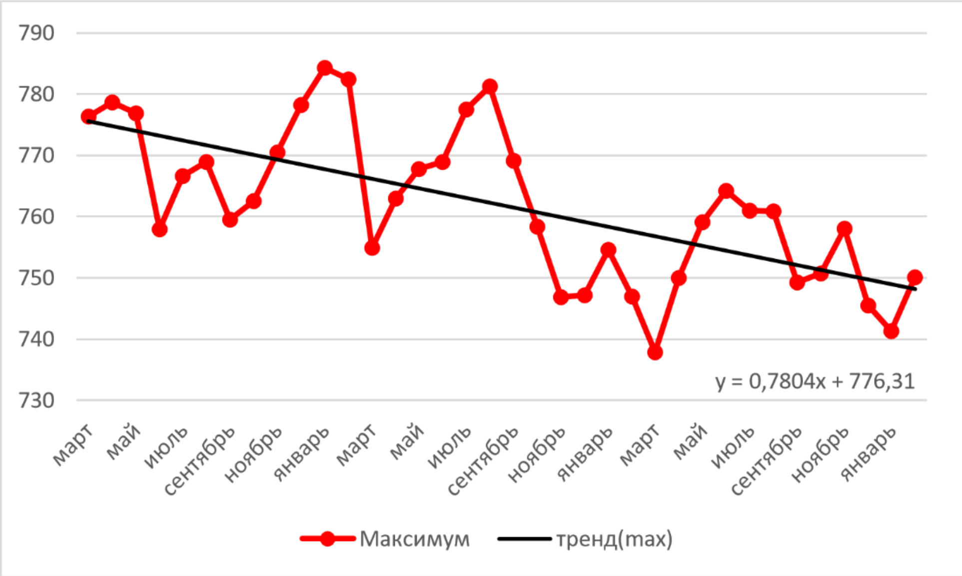
	Average (mm.Hg)	RMS	Min (mmHg)	Max (mm.Hg)
		2018-2019		
March	761.1	10.1	747,	776,
April	776.1	2.4	772,	778,
May	771.1	6.1	758,	776,
June	750.3	4.5	744,	757,
July	762.2	4.1	754,	766,
August	763.6	8.1	738,	768,
September	751.3	5.5	738,	759,
October	758.0	2.5	754,	762,
November	765.6	3.0	760,	770,
December	771.9	3.8	766,	778,
January	782.2	1.6	778,	784,
February	762.6	14.9	741,	782,
		2020-2021		
March	753.3	0.8	751,	754,
April	750.8	5.7	743,	763,
May	762.8	4.4	755,	767,
June	764.4	4.4	754,	768,

July	774.1	2.6	768,	777,
August	774.6	5.3	764,	781,
September	763.1	4.3	757,	769,
October	752.3	5.1	745,	758,
November	743.8	2.1	740,	746,
December	741.0	5.3	731,	747,
January	744.9	6.5	732,	754,
February	738.0	4.7	729,	747,
		2022-2023		
March	735.9	1.8	732,	737,
	Average (mm.Hg)	RMS	Min (mmHg)	Max (mm.Hg)
April	747.0	3.1	738,	750,
May	755.9	2.0	751,	759,
June	760.6	3.1	755,	764,
July	758.6	2.1	754,	761,
August	752.9	7.2	741,	760,
September	747.4	1.7	742,	749,
October	743.4	6.7	733,	750,
November	750.2	5.9	738,	758,
December	733.6	7.2	723,	745,
January	730.2	5.6	723,	741,
February	742.2	4.5	732,	750,

Let us graphically present the minimum, maximum and average values of atmospheric air pressure at the Vise Island station and draw a trend line (Figure 7 a, b, c).



a)



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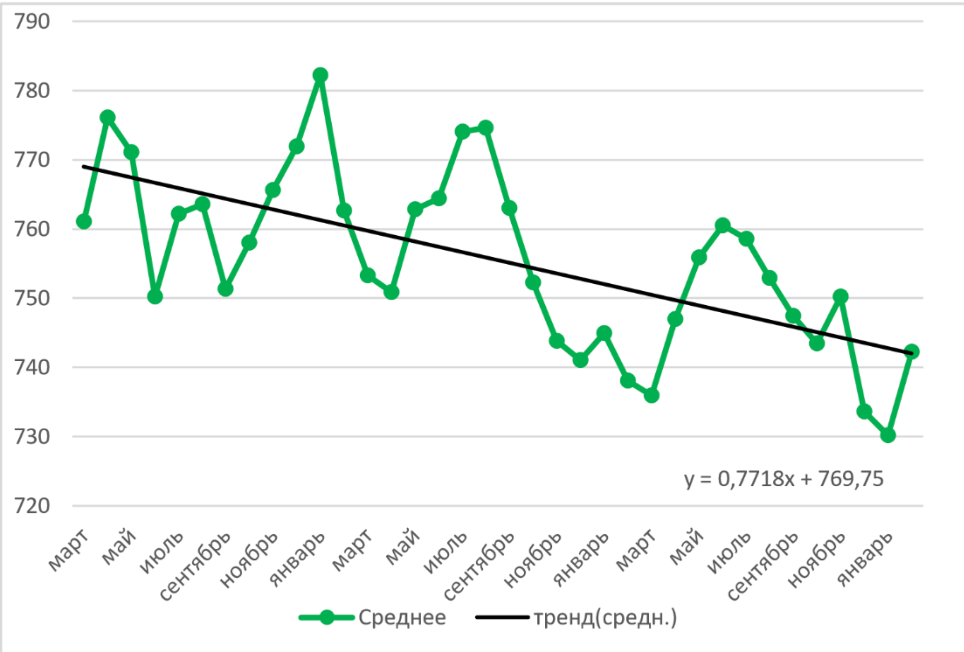


в)

Figure 7. Minimum, maximum and average values of atmospheric pressure at the Vise Island station.

Having analyzed the data obtained, we can conclude that the lowest pressure at the Vise Island station for the entire study period is 723 mmHg. observed in December 2021 The highest pressure was recorded in January 2023. and amounted to 784 mmHg.

The slope of the trend line, in all cases, is quite large and significantly affects the variability of the original series. For minimum values it is 35.3°, for maximum 37.9°, and for average 37.6°. It is also worth noting that every year the values of atmospheric pressure decreased, which is very clearly visible in the graphs.

Table 6. Data on the amount of precipitation (mm.) for each month of the period under consideration at the Valkarkai station.

	2018-2019	2020-2021	2022-2023
March	2.3	4.3	14.5
April	1.8	1	4.4

May	0.5	3.1	4.7
June	12.6	0.9	18.5
July	10.9	14.7	50.5
August	11.3	8.8	35.5
September	25.5	9.6	29.8
October	35.4	13	10.8
November	20	22.2	5.1
December	27.1	2.1	10.3
January	6.6	8.4	10.4
February	24.1	11.2	5.1
In a year	178.1	99.3	199.6

Figure 8 graphically shows the amount of precipitation for each month in the period from 2018-2023.

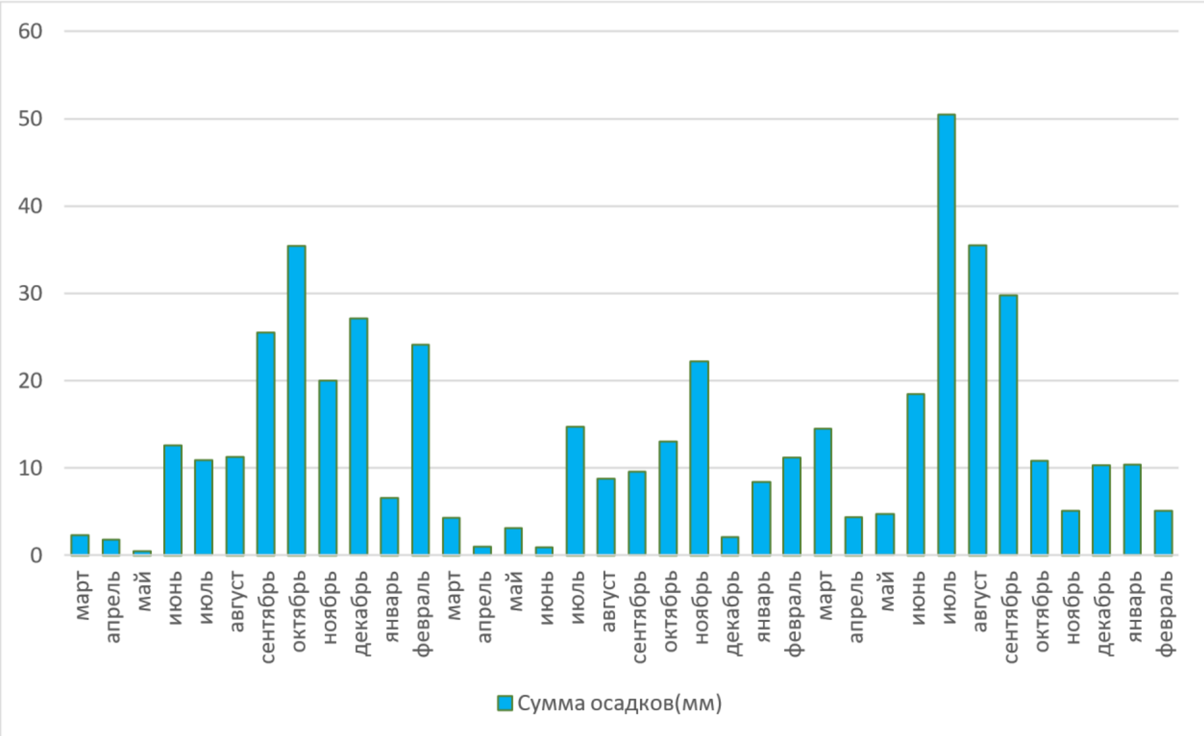


Figure 8. Total precipitation at Valkarkai station for each month.

The lowest level of precipitation at Valkarkay station was observed in May 2019 and amounted to only 0.5 mm. per month. The highest level of precipitation was in July 2022; for the month the amount of precipitation was 50.5 mm.

Having carried out the analysis, we can say that the driest months for the entire study period are April-May, the amount of precipitation during this period of time does not exceed 4.7 mm. The greatest amount of precipitation falls mainly in September-October. The driest period was 2021-2022, with 99.3 mm of precipitation per year.

Table 7. Data on the amount of precipitation (mm.) for each month of the period under consideration at the Vise Island station.

	2018-2019	2020-2021	2022-2023
March	11.6	5	16.5
April	11.3	11.4	9.3
May	11.1	10.6	11.8

June	13.1	8	31.5
July	14.2	43.3	18.2
August	108.9	26.9	31.4
September	18.8	34.8	63.7
October	23.2	29.3	124.3
November	17.9	25.2	8.9
December	15.6	24.6	27.8
January	23.1	11.7	8.1
February	21	12.6	18.5
In a year	289.8	243.4	370

Figure 9 graphically shows the amount of precipitation for each month in the period from 2018-2023.

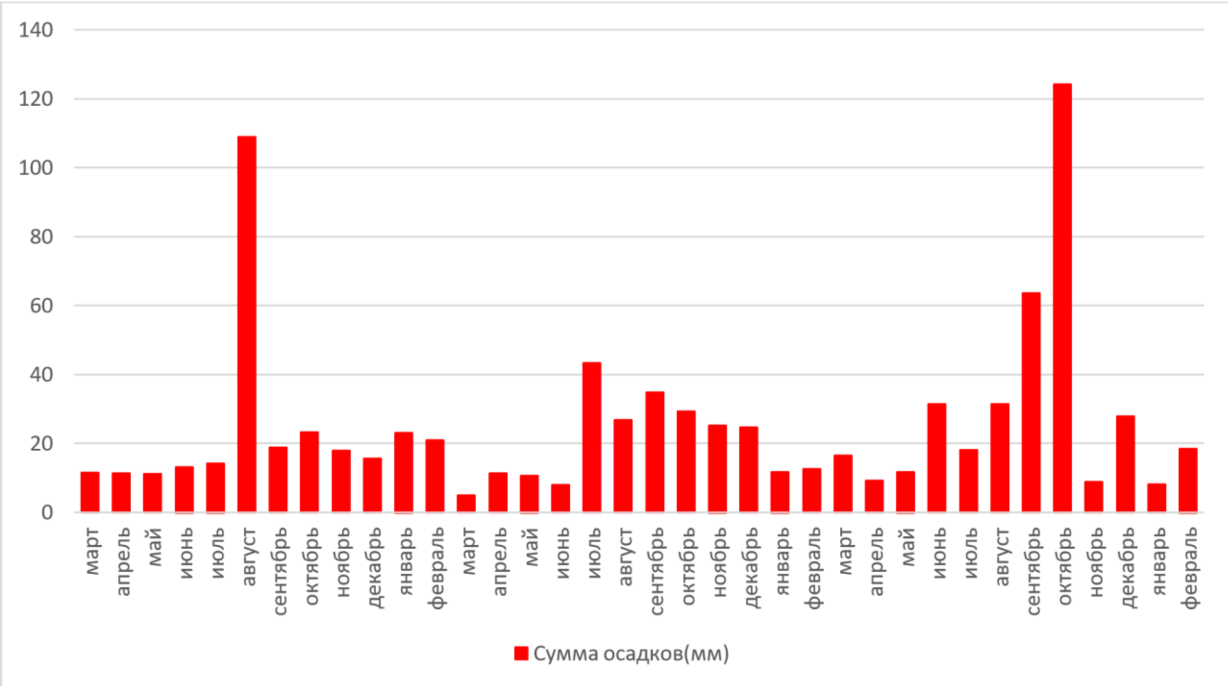


Figure 9. Total precipitation at Wiese Island station for each month.

The lowest level of precipitation at the Vize Island station was observed in March 2018 and amounted to 5 mm. per month. The highest level of precipitation was in October 2022; for the month the amount of precipitation was 124.3 mm. Having carried out the analysis, we can say that the driest months at the Vise Island station for the entire study period are April-May, the amount of precipitation during this period of time does not exceed 11.8 mm. The greatest amount of precipitation falls mainly in August-October. The driest period was 2020-2021, with 243.4 mm of precipitation per year.

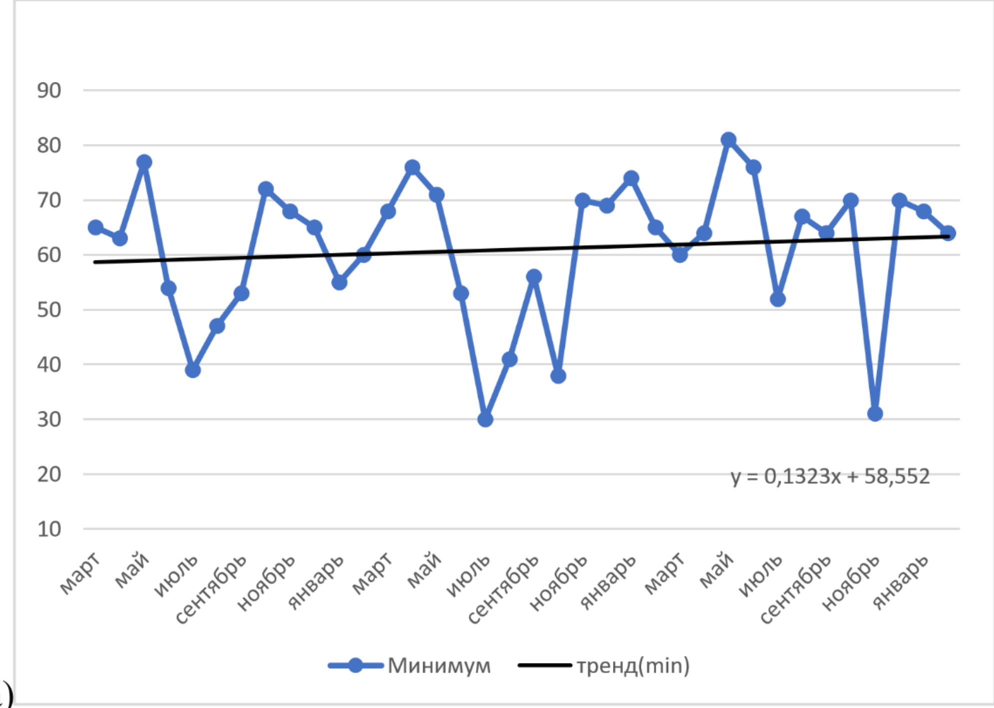
In Table 8, calculated data on relative humidity - maximum, minimum, average monthly humidity and standard deviation for each month of the period under consideration at the Valkarkay station.

Table 8. Average monthly relative humidity values at Valkarkai station.

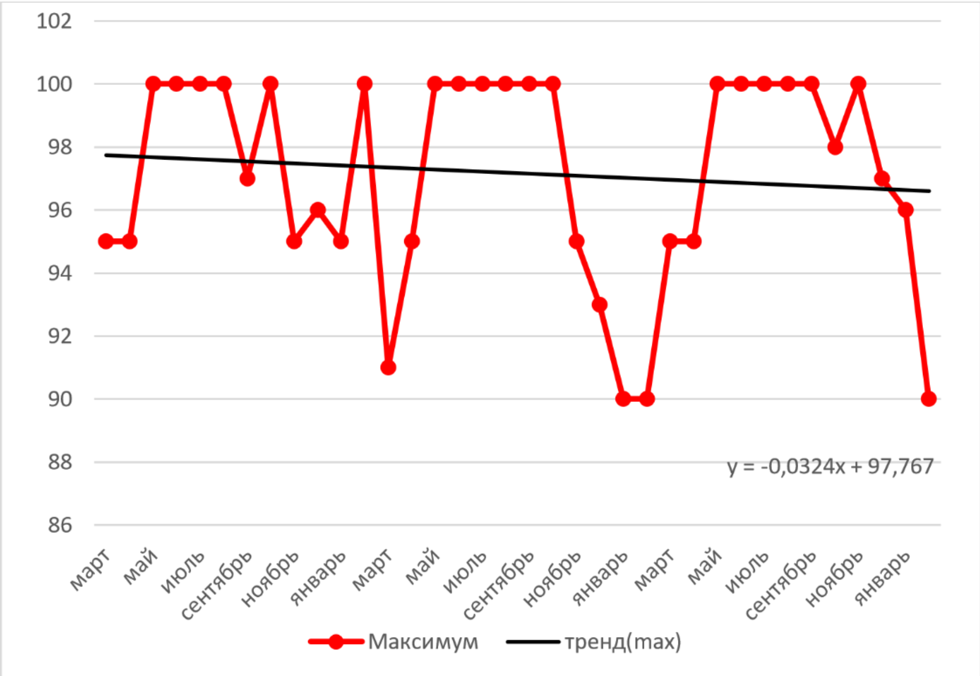
	Average %	RMS	Min%	Max %
		2018-2019		
March	87	8.6	65	95
April	87	8.4	63	95
May	92	5.4	77	100
June	90	10.5	54	100
July	81	14.9	39	100

August	81	16.3	47	100
September	84	10.1	53	97
October	88	7.4	72	100
November	88	6.8	68	95
December	86	7.6	65	96
January	83	8.8	55	95
February	88	7.8	60	100
		2020-2021		
March	80	6.9	68	91
April	89	5.4	76	95
May	90	7.6	71	100
June	91	12.3	53	100
July	84	16.4	30	100
August	90	16.5	41	100
September	86	14.4	56	100
	Average %	RMS	Min%	Max %
October	86	13.1	38	100
November	85	6.8	70	95
December	79	7.5	69	93
January	82	4.6	74	90
February	80	6.4	65	90
		2022-2023		
March	78	6.8	60	95
April	84	6.6	64	95
May	92	4.1	81	100
June	92	6.9	76	100
July	90	11.6	52	100
August	96	6.8	67	100
September	91	9.1	64	100
October	87	7.1	70	98
November	83	13.8	31	100
December	84	7.2	70	97
January	78	6.6	68	96
February	73	7.4	64	90

Let us graphically present the minimum, maximum and average values of air humidity at the Valkarkai station and draw a trend line (Figure 10 a, b, c).


90
80
70
60
50
40
30
20
10
y = 0,1323x + 58,552
март
май
июль
сентябрь
ноябрь
январь
март
май
июль
сентябрь
ноябрь
январь
март
май
июль
сентябрь
ноябрь
январь
Минимум
тренд(min)

а)


102
100
98
96
94
92
90
88
86
y = -0,0324x + 97,767
март
май
июль
сентябрь
ноябрь
январь
март
май
июль
сентябрь
ноябрь
январь
март
май
июль
сентябрь
ноябрь
январь
Максимум
тренд(max)

б)

в)

Figure 10. Minimum, maximum and average humidity values at Valkarkai station (%).

Having analyzed the data obtained, we can conclude that the lowest humidity value at Valkarkai station for the entire study period - 31% was observed in November 2019. 100% humidity in this region is observed mainly in the summer months. The slope of the trend line for minimum values is 7.54°, for maximum values 1.84°, and for average values 4.25°. Consequently, the maximum significant trend lines do not make any contribution to the formation of the variability of the original series.

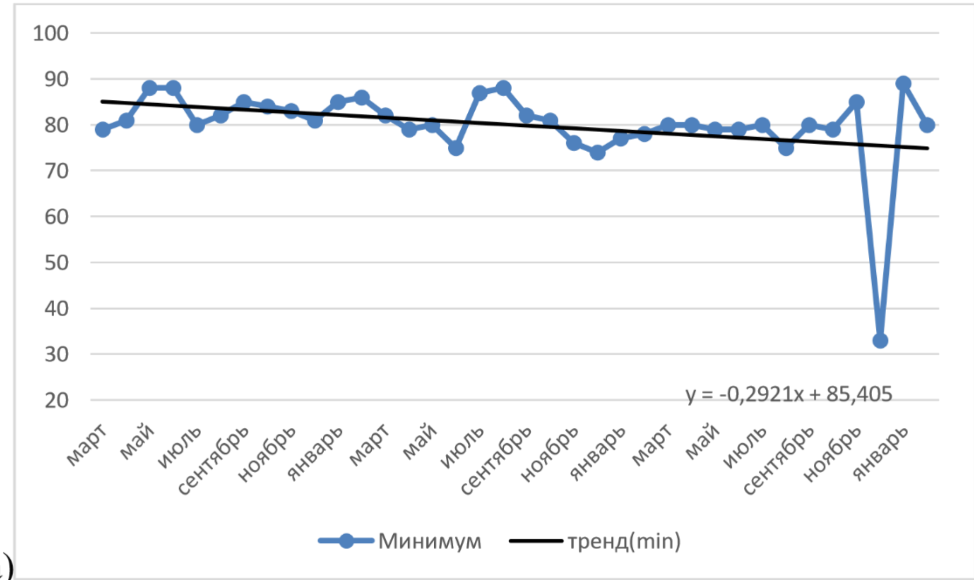
Table 9 contains calculated data on relative humidity - maximum, minimum, average monthly humidity and standard deviation for each month of the period under consideration at the Vise Island station.

Table 9. Average monthly relative humidity values at Wiese Island station.

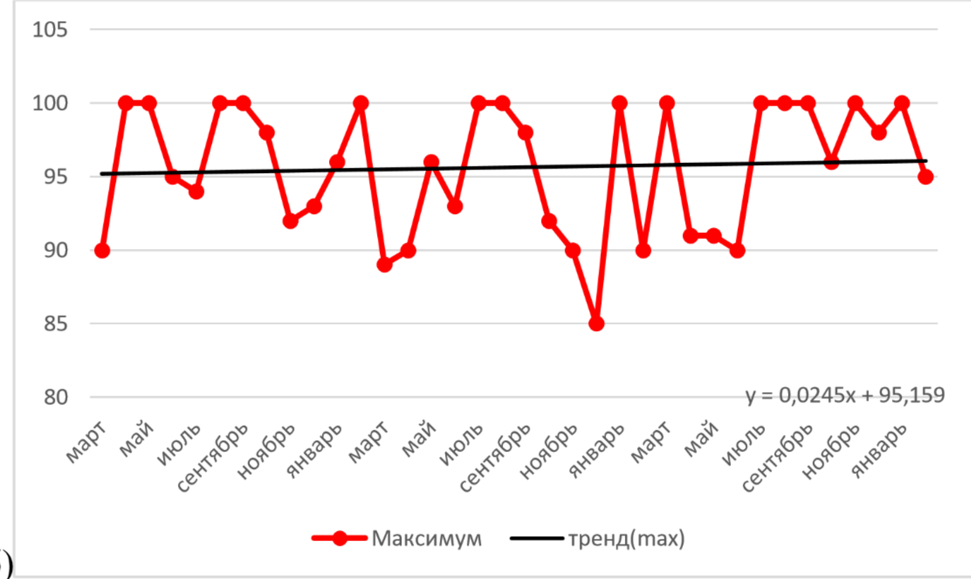
	Average	RMS	Min (%)	Max (%)
		2018-2019		
March	84	3.4	79	90
April	89	7.0	81	100
May	96	3.9	88	100
June	92	2.4	88	95
July	86	4.0	80	94
August	88	4.3	82	100
September	97	3.7	85	100
October	93	3.3	84	98
November	88	3.0	83	92
December	87	3.6	81	93
January	90	3.8	85	96
February	96	4.0	86	100
		2020-2021		
March	85	2.4	82	89
April	85	3.3	79	90
May	86	4.8	80	96
June	83	5.6	75	93
July	92	4.3	87	100
August	95	3.2	88	100
September	90	5.1	82	98
October	85	3.3	81	92
November	80	4.7	76	90

December	80	3.5	74	85
January	86	6.3	77	100
February	84	3.2	78	90
		2022-2023		
March	92	5.6	80	100
April	87	3.1	80	91
May	86	3.2	79	91
June	83	3.2	79	90
July	94	4.9	80	100
August	86	5.1	75	100
September	87	6.1	80	100
October	87	5.6	79	96
November	92	4.7	85	100
December	91	11.7	33	98
January	94	3.5	89	100
February	91	4.0	80	95

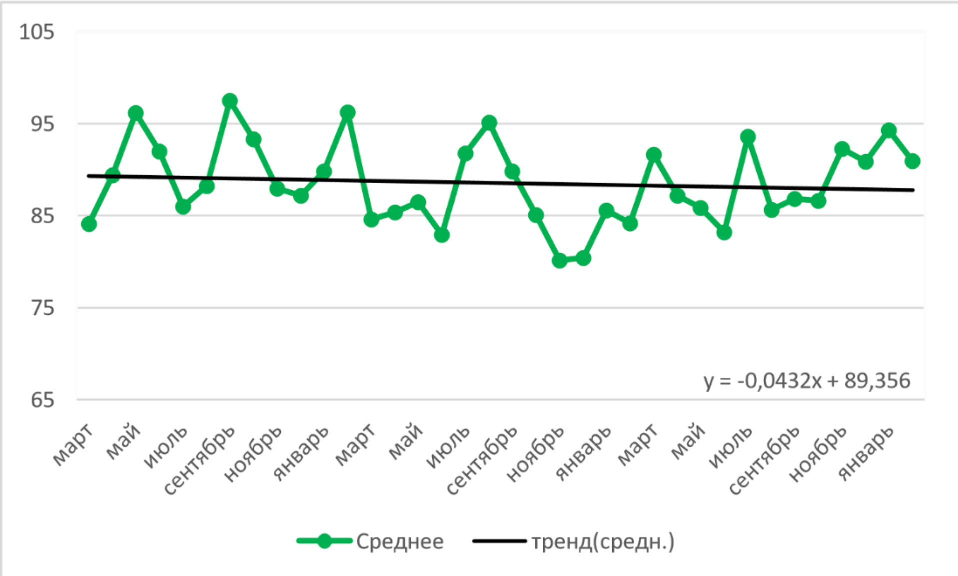
Let us graphically present the minimum, maximum and average values of air humidity at the Vise Island station and draw a trend line (Figure 11 a, b, c).



a)



б)



в)

Figure 11. Minimum, maximum and average humidity values at Vise Island station (%).

Having analyzed the data obtained, we can conclude that the lowest humidity value at the Vise Island station for the entire study period - 33% was observed in December 2019. 100% humidity in this region is observed almost every season. The slope of the trend line for minimum values is 16.2°, for maximum values 1.4°, and for average values 2.47°. Consequently, the trend line of maximum values does not make any contribution to the formation of the variability of the original series.

Table 10. Maximum wind speeds at Valkarkay station in the period from 2018-2023.

	2018-2019	2020-2021	2022-2023
March	19	10	12
April	10	11	9
May	10	10	13
June	12	12	12
July	12	10	12
August	11	12	10
September	10	11	13

October	15	12	14
november	21	7	20
December	13	13	14
January	16	12	12
February	13	19	16

According to Table 10, the highest wind speed was recorded in November 2019 and amounted to 21 m/s.

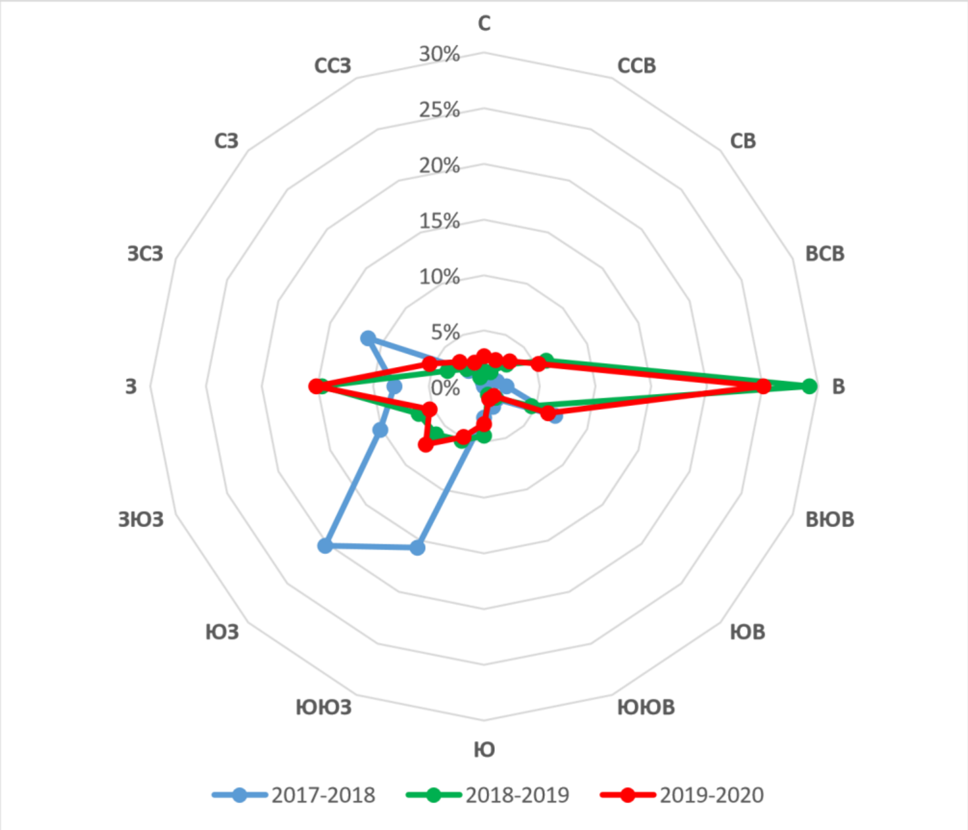


Figure 12. Distribution of wind directions by year at Valkarkai station.

Having analyzed the wind rose, we can conclude that in the period from 2018 to 2019. winds were predominantly observed in a southwesterly direction, their share amounted to 20%. The diagram shows that in the period from 2018-2023. At the Valkarkay station, winds from the east were predominantly observed, their share in 2019-2021. amounted to 25%, and from 2022-2023. 29%. It is also worth noting that there are practically no winds from the north, their share does not exceed 2.7%.

Table 11. Maximum wind speeds in m/s at the Vise Island station in the period from 2018-2022.

	2018-2019	2020-2021	2022-2023
March	12	13	12
April	14	11	10
May	11	11	10
June	15	15	13
July	10	16	12
August	13	11	1
September	15	14	12
October	14	12	12

November	11	16	12
December	15	15	15
January	12	12	13
February	12	16	17

According to the table, the highest wind speed was recorded in February 2020 and amounted to 17 m/s.

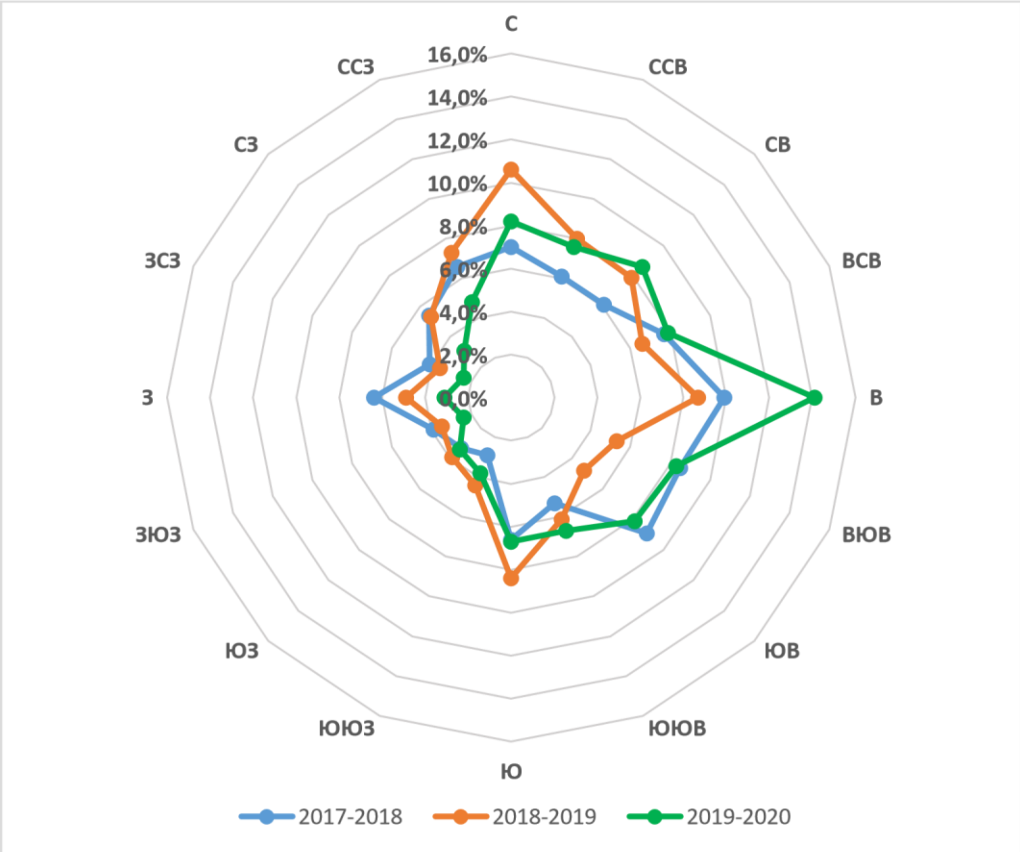
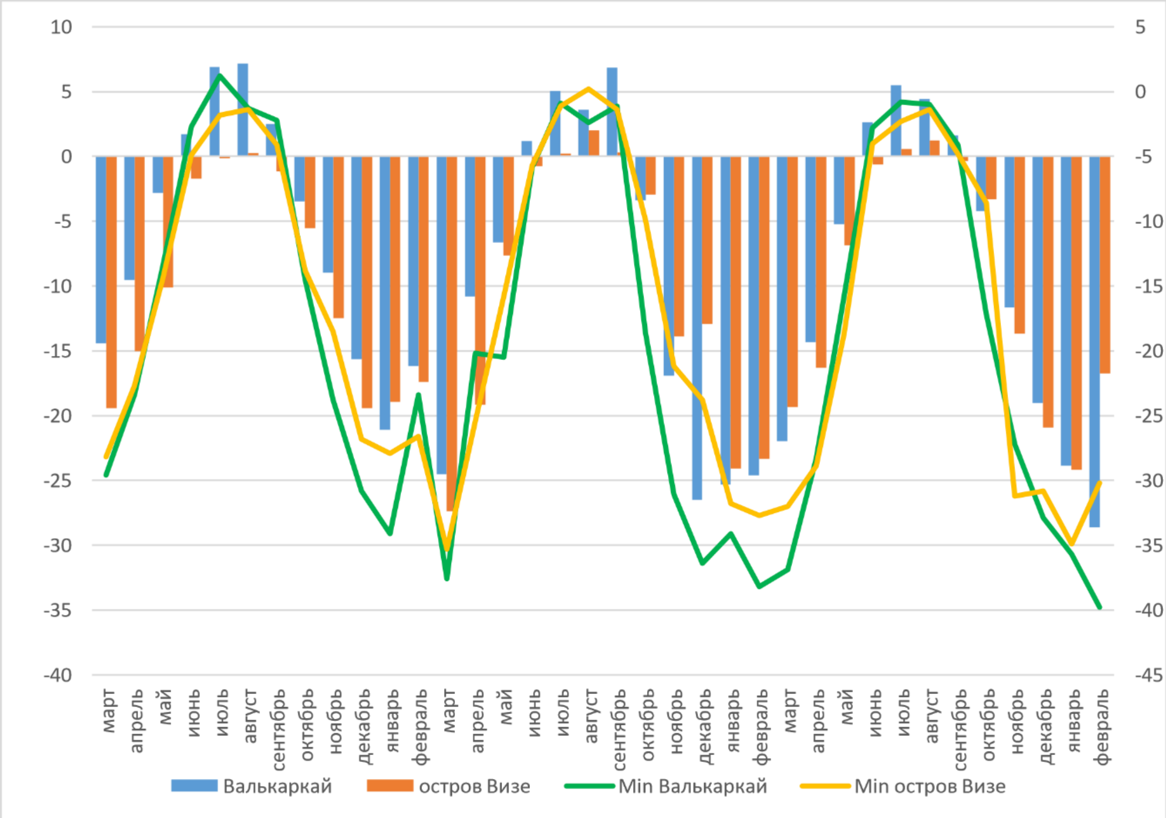
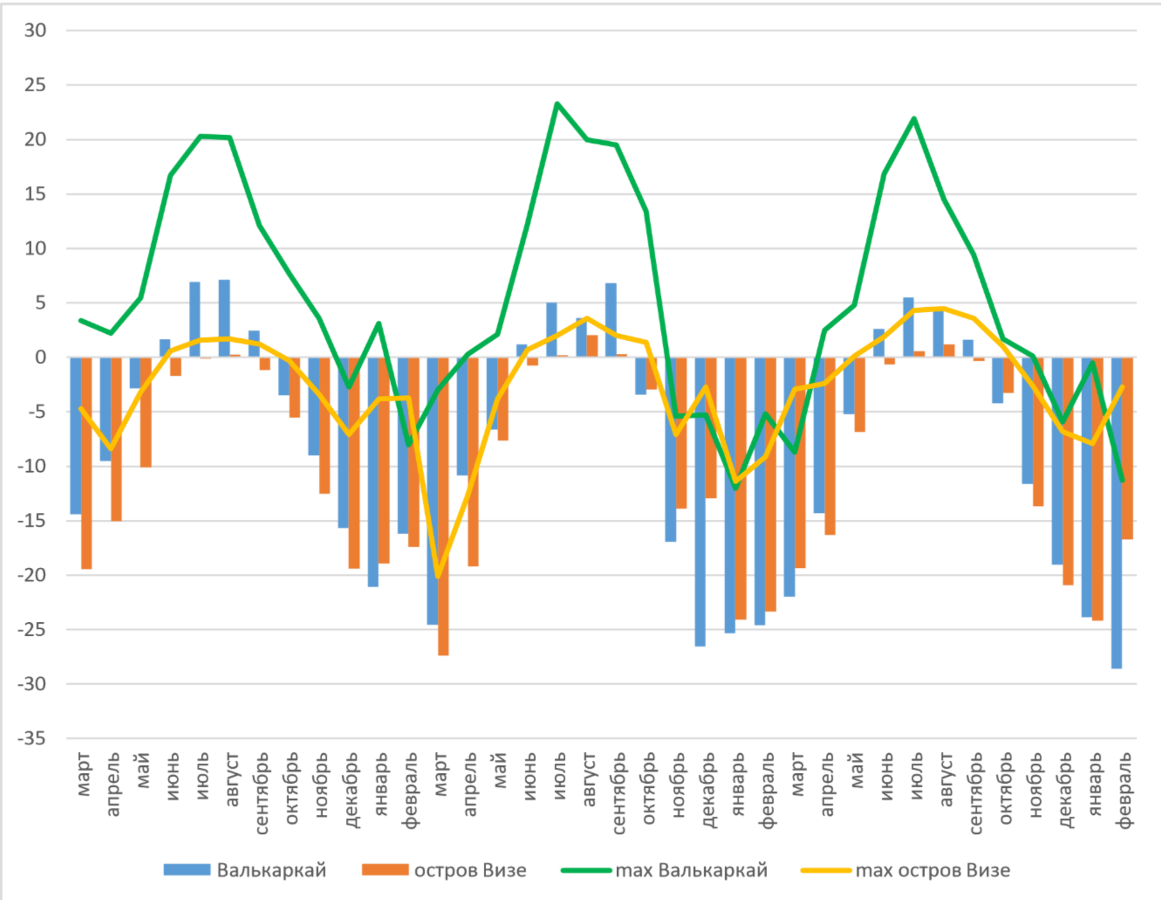


Figure 13. Distribution of wind directions by year at the Vise Island station.

After analyzing the wind rose, we can conclude that the wind directions at the Vise Island station are distributed quite evenly, but still, over the entire period under study, winds in the eastern direction mainly predominate. Winds from southwestern directions blow the least in this region, their share does not exceed 4.4%. We examine the results of air temperature obtained at the stations of Valkarkay and the island of Vize in the period from 2018. until 2023 Figure 14 (a, b) shows how average monthly temperatures, maximum and minimum temperatures change between two stations over the entire study period, by month.



a)



b)

Figure 14. Graph of changes in average, maximum and minimum temperatures between two stations.

Considering the average monthly temperature values at two stations simultaneously, we can say that the lowest temperatures occur in January-March. The greatest range of values occurs in the summer months. On the island of Vize, the maximum temperature in the summer season did not exceed +3.6°C, when at the Valkarkai station the maximum temperature in July every year reached +20°C and above (the maximum temperature at Valkarkai for this period was recorded in July 2019 was +23,3°C).

It is worth noting that the average monthly temperatures at the Valkarkai station and the Vise Island station are quite close in value, this is confirmed by the calculation of the correlation coefficient which is equal to 0.96.

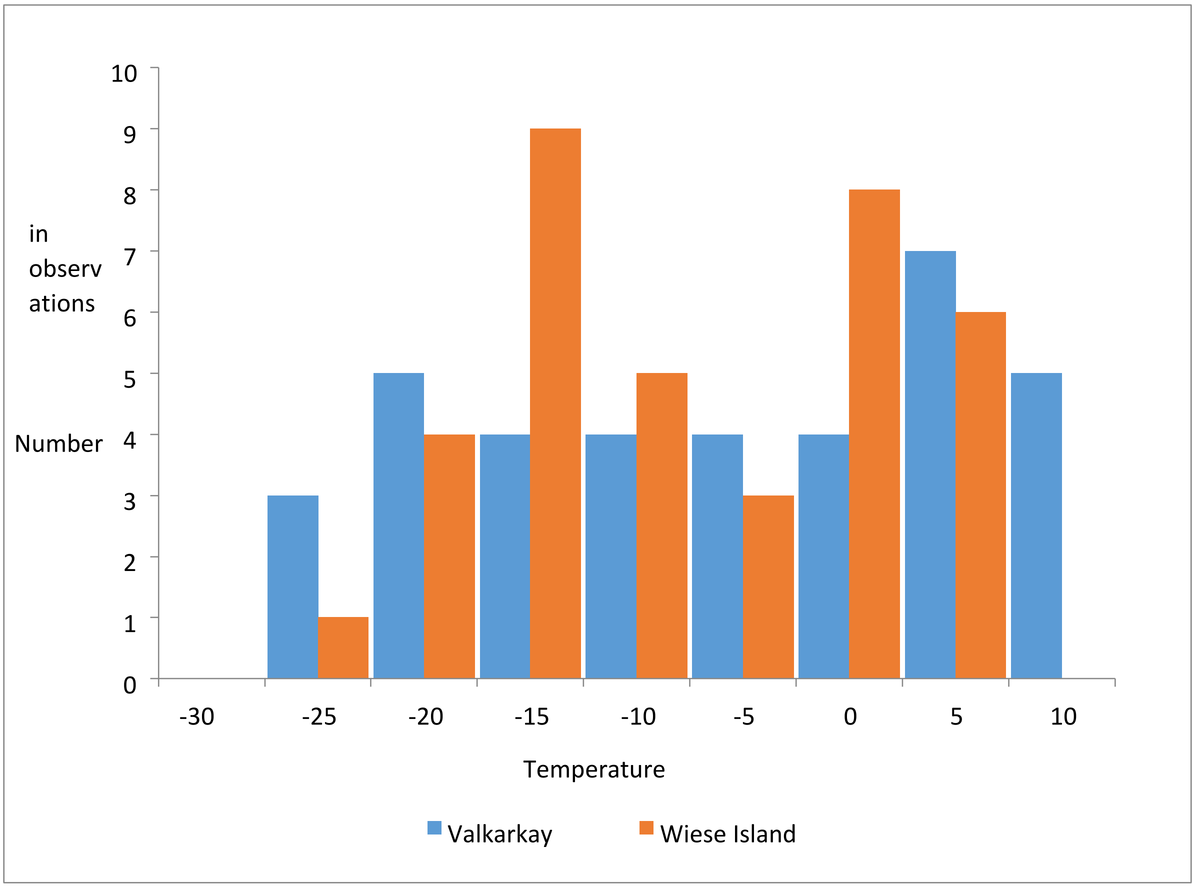


Figure 15. Distribution of average monthly temperatures at two stations.

From the above graphs it can be seen that at the Valkarkay station the largest number of average monthly temperature values fall in the range from 0°C to 10°C, at the Vise Island station from -10°C to -20°C. In general, the bulk of average monthly temperature values at Valkarkay station fall in the range from 0°C to -15°C. And on the island of Vize the average monthly temperatures are quite unevenly distributed. Let us consider the results of atmospheric air pressure obtained at the Valkarkai and Vize Island stations in the period from 2018 to 2023. Figure 16 shows how atmospheric pressure changes between two stations over the entire study period, by month.

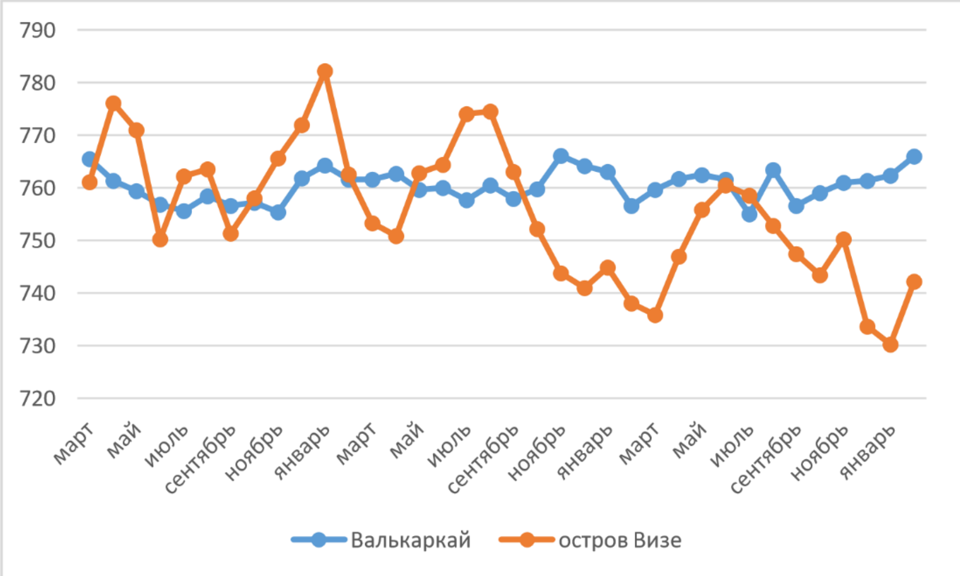


Figure 16. Graph of changes in atmospheric pressure between two stations (mmHg).

Having analyzed the graph, we can say that at the Valkarkai station the atmospheric pressure values are more uniform and do not fall below 750 mmHg. and do not exceed 770 mm Hg. this indicates that the pressure in this region is within normal limits. At the Vise Island station, throughout the entire study period, large fluctuations in average monthly atmospheric pressure values are visible. It is also worth noting that starting from mid-2019, pressure has been trending downward. The nature of the variability of atmospheric pressure at the Valkarkay station and the island of Vize is very different, this is also indicated by the calculation of the correlation coefficient, which is equal to -0.13, this determines the presence of an opposite connection. A comparison of precipitation data is shown in Figure 17.

Figure 18 shows data from two stations on the amount of precipitation for each month from 2018 to 2023.

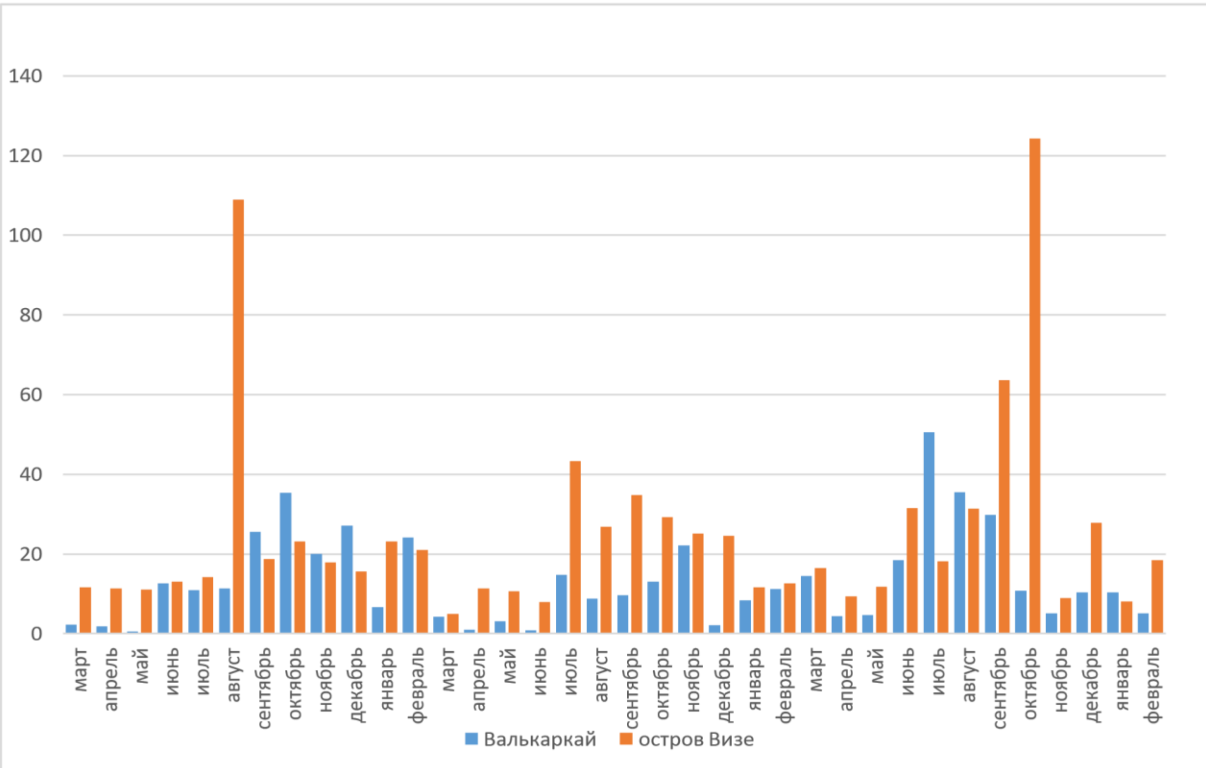


Figure 17. Total precipitation for each month at two stations.

The graph shows that at two stations the greatest amount of precipitation falls in the summer and autumn seasons. On the island of Vize, precipitation is more abundant, the maximum level reached 124.3 mm, the minimum level of precipitation for each month did not fall below 5 mm, when at the Valkarkai station in the spring months the precipitation level does not exceed 4.7 mm.

Two stations have fairly low precipitation levels, but Valkarkai station has a more evenly distributed average monthly precipitation and a drier climate. The correlation coefficient between stations is 0.13, the relationship between the indicators is very weak.

A comparison of relative humidity data is shown in Figure 18.

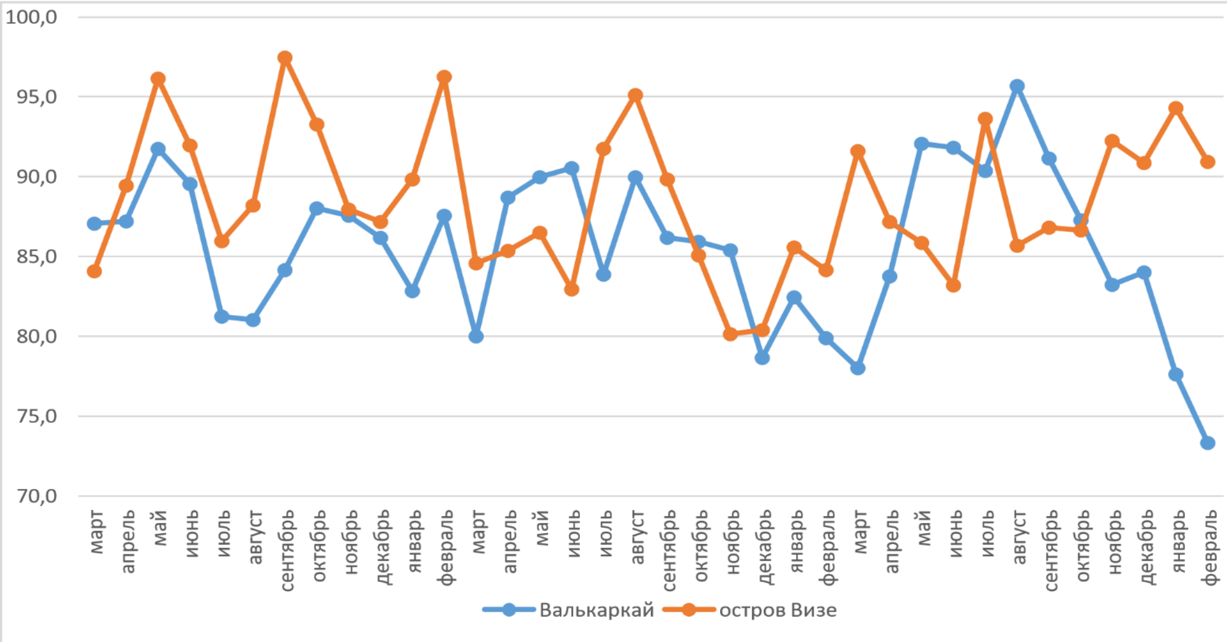


Figure 18. Data from two stations on relative humidity for each month from 2018 to 2023.

The graph shows that at Valkarkai station the humidity for the entire period was only in August 2019. exceeded 95%; in other months it did not exceed 92%. The humidity on the island of Vize is higher, this is due to the conditions of the marine climate. The correlation coefficient between stations is negative and equal to -0.01.

Wind data comparison

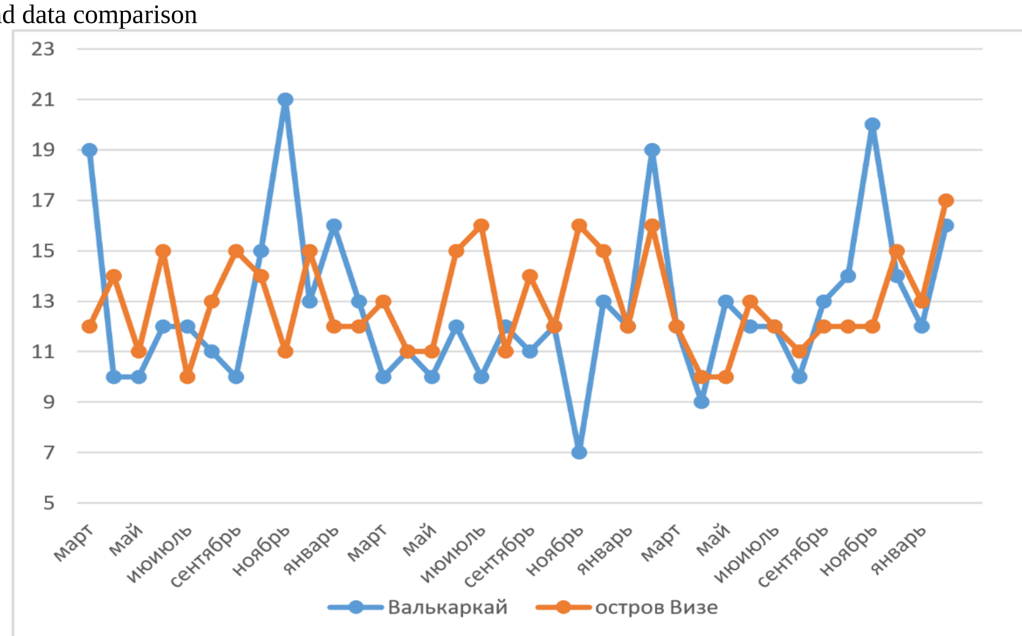


Figure 19. Maximum wind speeds at two stations in the period from 2018 to 2023.

From the graph data, it is clear that the maximum speeds at the Valkarkai station reach 21 m/s, while on the island of Vize the maximum speed does not exceed 17 m/s. The relationship between wind speeds between stations is insignificant, which is confirmed by a very weak correlation, the coefficient of which is 0.005.

It is also worth noting that at the Valkarkai station, winds in the eastern direction mainly predominate, and winds in the northern directions are observed very rarely, their share is only 4% for the entire observation period. On the island of Vize, wind directions are more evenly distributed, but still more easterly directions were observed.

Conclusion

In the process of globalization, large-scale changes are taking place in the economic activities and lifestyle of the indigenous inhabitants of the Arctic. Today, Aboriginal people choose different development strategies, but for most of them, industrial development has become the most important factor in modern life. The activities of enterprises bring huge amounts of money to regional budgets, part of which goes to finance targeted development programs for indigenous peoples of the North, to help the agro-industrial complex, to support indigenous communities, and to compensate for losses caused during the development of territories. Overall, this has a positive impact on the well-being of indigenous and local populations. Modern infrastructure is developing in the Arctic: roads are being built, modern means of communication and energy are being used, residential buildings and social and cultural facilities are being built. This creates conditions so that indigenous peoples do not feel outside the "benefits of civilization" and receive comparable access to education, medical care and culture as residents of other regions of Russia. The process of interaction between indigenous peoples and mining companies is regulated by federal and regional laws. In addition, the districts have developed the practice of concluding agreements and agreements between communities and industrial enterprises. Of particular note is the unique experience of the Yamal-Nenets Autonomous Okrug in the creation of an Ethno-Ecological Council, whose tasks include making proposals to local governments to improve the legal framework in the field of regulation of land legal relations, environmental protection, environmental management and subsoil use. It is advisable to apply this experience in other regions. The policies of industrial companies in the North of Russia have been gradually changing for the better in recent years. Their managers and employees come to the realization that they are not pioneers of the northern and Arctic territories, that their activities must not only be carried out within the framework of the legal, primarily environmental, field, but also comply with moral standards. And since industrial development of the Arctic began before the adoption of modern environmental and socially oriented legal standards, companies should use compensatory measures and actively cooperate with local and indigenous populations in the areas of their operations. The management of many enterprises is aware of their responsibility and adopts documents and regulations that define the principles of activity and rules of behavior of employees, especially in places of traditional residence and traditional economic activities of indigenous peoples. Against the background of the material well-being of the visiting population employed in the mining industry, the social problems of the aborigines are especially visible. In addition to the fact that the level of wages in fishing, reindeer husbandry, and marine hunting is an order of magnitude lower than in industry, The high level of unemployment among indigenous peoples poses a serious threat to social stability. As a rule, industrial enterprises refuse to hire indigenous people due to low qualifications, and there are no reserves for increasing employment in traditional industries. In the reindeer herding industry of the Yamal-Nenets Autonomous Okrug there is even a problem of "oversupply" of deer and shepherds, aggravated by the depletion of food resources. In Chukotka reindeer husbandry, there are other concerns - a shortage of reindeer herders and livestock workers; the desired increase in livestock is not happening, and therefore, the scope of employment is not expanding. The authorities associate the prospects for reducing unemployment and developing the traditional sector of the economy of the North with the development of communities and processing of products from traditional sectors of the economy. Traditional forms of economic management of the Arctic peoples are increasingly involved in the regional economy, and ethnocultural heritage is recognized as an important resource for the vitality of society, which not only needs to be preserved, but also modern forms of working with it must be found. Particular attention in our study is paid to the education of indigenous peoples of the North as the most important mechanism of adaptation. In the educational process, the educational potential of the basic means of the ethnic culture of the northern peoples is widely used (oral folk art, arts and crafts, folk games and toys, traditional physical competitions, festive and gaming folklore). It is probably worth considering the possibility of creating new forms of educational structures that are more adequate to the ethnic needs of northerners, as well as paying more attention to the targeted training of pedagogical specialists in the field of ethnocultural traditions of education. In the context of increasing industrial development, today there is an obvious lack of resources for traditional environmental management. The reduction of pastures and the pollution of water bodies lead to the need to search for new ways of social adaptation in the context of the curtailment of traditional forms of management. Many Aboriginal families see a solution in young people receiving vocational education and specialties that are in demand in the labor market. At the same time, many experts express thoughts about the need for more flexible forms - perhaps nomadic, primarily primary - education for children of reindeer herders in order to mitigate the stress that is inevitable for younger schoolchildren when parting with their parents and during the first years of life and study in boarding school It is also important to understand that further development of traditional sectors of the economy is impossible without a sufficient number of Aboriginal people who have received both basic and professional special education. Today you need not only to herd deer, fish, hunt animals, but also have knowledge of management, marketing, accounting, and be economically and legally literate. So far in the North there are very few such specialists among indigenous peoples. After all, one of the reasons that communities cannot develop successfully is associated with financial reporting issues. A useful measure could be closer interaction between industrial companies and educational institutions in cities, schools and boarding schools. Familiarity and constant communication between the indigenous and visiting populations are of great importance. Their rapprochement would contribute to the establishment of a favorable psychological climate and would help graduates of boarding schools find their place in the future, including in industrial enterprises. In Russia and the world there are examples of successful participation of industrial companies in educational programs for indigenous and local populations in the Arctic and training programs for activists of indigenous social movements, which would be useful to be widely covered in the media. Measures of targeted government support for the development of indigenous peoples in combination with assistance to various forms of their self-organization are necessary. Such a policy of interested federal and regional authorities could guarantee movement towards limiting state paternalism, forming partnerships and mastering negotiation procedures by all their participants. The monograph proposes legal measures as mechanisms to overcome risks for indigenous peoples of the North associated with the industrial development of areas of their traditional residence and economic activity. Among them are the improvement of legislation, primarily the adoption of a special Federal Law "On assessing the impact on the ancestral habitat and traditional way of life of indigenous peoples of the North, Siberia and the Far East", introducing changes to land and resource legislation that correspond to the legal rights and interests of indigenous peoples, tightening environmental regulations in the Arctic. To improve the effectiveness of the proposed measures, monitoring of law enforcement practice will be required. It seems to us that in such work, an interdisciplinary approach is especially important, the joint activities of anthropologists, lawyers, ecologists, and possibly the involvement of biogeographers, economists and other specialists. An effective means of improving the quality of life of Aboriginal people could be the development by industrial companies of a policy focused on interaction and dialogue with indigenous peoples, studying and taking into account their interests. A fruitful practice in this regard appears to be the practice of campaigns, recognized in many countries, to accept obligations on social corporate responsibility, based on international standards formulated in the UN Declaration of the Rights of Indigenous Peoples (2007) and the Guiding Principles for Business Development in the Context of Human Rights (2011). Company policies based on these principles should combine direct financial injections into the regions in which they operate with targeted competitive projects aimed at developing communities and families of indigenous peoples, supporting their cultures and languages. In this case, primary importance should be given to the social sphere - education and health care, construction and support of enterprises for processing products of traditional industries. Special measures are needed both in relation to Aboriginal people living in cities and towns with a mixed population, where different economic and cultural structures coexist, and in relation to ethnically homogeneous communities of the indigenous population leading traditional environmental management. The multivariate approach proposed in the book takes into account the ability of people of any culture and social environment to innovate and gives preference to individual strategies of people, their fundamental desire to provide better personal and social living conditions. At the same time, the industrial development of the Arctic zone can contribute to the development of the indigenous peoples of the region if government authorities provide a legal framework and socio-economic guarantees, increase the efficiency and quality of education, realize the right of people to reliable information, which in total will certainly contribute to the formation of a favorable social climate. Only taking into account all these circumstances is it possible for the free, preliminary and conscious participation of indigenous peoples in decision-making that affects their interests, full control over the activities of industrial enterprises, and the application of high standards of social and environmental responsibility to their activities in the Arctic.

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