Soviet transarctic flights in the late 1920s and their role in the geographical development of the Arctic regions of Siberia

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\textbf{Abstract.} The role of aviation in the development of the Arctic became evident in the late 1930s. The long-distance flights of V. Chkalov, V. Molokov, M. Gromov and other pilots not only symbolized Soviet heroism, but also contributed to the exploration and development of Arctic spaces by the Soviet Union. However, the achievements of those who made the way to the North for our aviators in 1920s are in the shadow of their successes. This article analyzes the materials of first transarctic flights - their routes, organization, technical and financial support, and the work of flight crews, both in terms of the achieved results and in the political aspect. The analysis of the goals and achievements of the USSR Osoaviakhim Northern Air Expedition in 1927 and the Transarctic Expedition in 1928 is based on the materials of St. Petersburg Central State Archive of Scientific and Technical Documentation and other materials. The authors highlight the contribution made by these expeditions into the exploration of Eastern Siberia and the Arctic Ocean and into the development of the regional transport infrastructure. The authors dwell on the work of various departments and the researchers in the field of the national aeronautics in the organization of the expedition. The conclusion is drawn on the importance of scientific and commercial interest in the development of polar aviation in the 1920s and early 1930s.

\textbf{1. Introduction}

In 1937, the exhibition «Development of the Arctic» was organized in the Central Park of Culture and Rest named after M. Gorky in Moscow, which was visited by more than half a million people. The role of aviation in this development was one of its main themes. Many researchers of the history of national aviation, and the history of the Arctic exploration note the heroism in conquering the airspace of the Soviet North [1]. As a rule, historians focus on the exploits of the «Stalin’s falcons» in the 1930s [2]. The extensive literature coverage was given to the air rescue expedition of «Chelyuskin» crew members in 1934 and the long-distance flights of V. Chkalov, V. Kokkinaki, M. Gromov and others. Far less attention is given to the early period of the Soviet program on using aviation for the exploration of the Arctic in terms of its transport accessibility and economic development.

Modern researchers emphasize the importance of air transport in the Arctic region, its role in the emergency transportation of people, materials and equipment and in the formation of passenger traffic [3]. In 1928, the first northern air line launched along the Lena River from Irkutsk to Yakutsk over 2,700 km long [4]. This achievement became possible due to the fact that the systematic
geographical exploration of the Soviet Arctic with the use of aviation began in 1924. In this regard, the Soviet Union followed the experience of other polar countries [5].

2. Findings

One of the pioneers in the use of aircraft for Arctic research was the naval pilot B.G. Chukhnoy. He insisted on sending a hydroplane J-20 for ice reconnaissance in the Novaya Zemlya in 1924, to the head of the Northern Hydrographic Expedition [6]. In August 1926, the pilot O.A. Kalwitz and hydrologist G.A. Ushakov circled Wrangel Island (St. Petersburg Central State Archive of Scientific and Technical Documentation – TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 2).

In 1927, the first Soviet long-distance Arctic flight, the Northern Air Expedition, was organized by the initiative of the outstanding polar explorer G.D. Krasinsky.

The Northern Air Expedition of the USSR Osoaviahim (Society for the Promotion of Defense, Aircraft and Chemical Construction) was organized due to the decree of the Presidium of the Osoaviahim on February 26, 1927. On February 28, 1927, an agreement was signed between the Presidium of the Osoaviahim, the Air Force Directorate of the Red Army and the Board of the Soviet Merchant Fleet on the organization of the Air Expedition to Wrangel Island (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 2). According to this document, the Red Army Air Forces provided two aircraft with the required technical equipment and highly qualified aircrew, which were to fly from Vladivostok to Wrangel Island, under the flag of Osoaviahim, along the Lena River and the Arctic Ocean. Sovtorgflot (Soviet Commercial Fleet, a shipping company in the Soviet Union) took the responsibility to deliver expeditionary equipment and technical staff by sea from the Black Sea to Vladivostok and back, to provide the expedition with a steamship for the Kolyma or Lena voyage, and to deliver fuels and lubricants on its ships to the designated points for the intermediate landing of the aircraft on the shores of the Pacific and the Arctic oceans. The expenses (28 thousand rubles) were shared by Sovtorgflot and Osoaviahim. The head of the Far East expedition G.D. Krasinsky was in charge of organizing the expedition (arranging the flights; maintaining the settlement on Wrangel Island; coordinating the expeditionary issues with local authorities, representatives of Sovtorgflot and administration of the northern trading posts).

There is a detailed report of G.D. Krasinsky about this expedition in the archives of the Arctic and Antarctic Research Institute (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 2). It differs significantly from the book «Northern routs» published by him [7]. The book is focused on the heroic conquering of the North, and the hardships of the Russian polar explorers, while the report from the archives of the Arctic and Antarctic Research Institute contains many technical, financial and organizational details. There are notes «not for publishing» in some fragments of the text, which mainly referred to the descriptions of breakdowns and accidents.

According to the report of G.D. Krasinsky, the expedition was entrusted with the tasks: 1) to establish communications and services for the first Soviet settlement on Wrangel Island (since 1926, not a single ship could approach Wrangel Island, where a settlement of Chukchi and Eskimos was moved from the coast of the Chukchi Peninsula, and this caused the lack of food, ammunition and medicine); 2) to assist a sea ship making its first cargo voyage from Vladivostok to the mouth of the Lena River; 3) to provide access by aircraft to the remote areas of the USSR (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 5).

The expedition was carried out on two hydroplanes - the French «Savoy» and the German «J-13» (Junkers F.13). The «Savoy» was transported by rail from Sevastopol to the starting point of the expedition, Vladivostok, and the «J-13» - from Verkhneudinsk (modern Ulan-Ude). All members of the aircrew were from the Black Sea Air Force: E.M. Luht, flight commander and pilot on the «Savoy»; E.M. Koshelev, pilot on the «J-13»; F.M. Yeger, flight engineer on the «Savoy»; G.T. Pobezhimov, flight engineer on the «J-13».

The hydroplanes were delivered to Vladivostok on June 15, 1927 and loaded in an unassembled form onto the «Kolyma» steamship on June 20 (the captain of the ship is the legendary polar sailor
P.G. Milovzorov). The next day, the ship headed for Cape North in the Chukchi Sea. On July 14 the crew approached the cape, moored an ocean ice floe to the board, on which the aircraft were assembled. The «J-13» made a test flight and remained afloat, and the «Savoy» was raised by the ship's crane and left in a dangling state.

Due to severe weather conditions (heavy fog), the flight to Wrangel Island was to be completed within five days. However, the crew of the ship and the crew of the aircraft encountered much greater difficulties. According to the report, the preparation for the flight was over on July 15, but then the ship was pressed against a floating ice floe. The «Savoy» was towed a mile aside, while the «J-13» remained on board (the crew had to shove aside the oncoming ice floes).

Due to the greater flight speed of the «Savoy» compared to the «J-13», it was decided that the German aircraft would start first, and the French one would start 10 minutes later. The «J-13» took off and three hours later landed on Wrangel Island in Rogers Bay (it should be noted that the plane barely escaped the accident by finding the ground only 10 minutes before landing). The «Savoy», with an extremely limited open water space, could not take off. The hydroplane drew in water, which greatly increased its weight. It took about four hours to scoop out water before the plane was able to take off. However, due to dense fog and deviation of the compass, the plane crew lost the route, could not find Wrangel Island and had to return to the anchorage of the ship (moreover, because of the ice, the plane had to land not in the open water, but on the lagoon in the tundra). The next day, the «Savoy» reached Wrangel Island and landed in Rogers Bay. On July 17, when ice on the mainland began to thaw, making more spaces in open water, both hydroplanes made their way back to Cape Severny and landed by the ship. In his report, G.D. Krasinsky noted that the flight was made over a «consolidated ocean ice» that covered the entire Long Strait between the mainland and Wrangel Island, which almost excluded any possibility of an emergency landing (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 39, II. 7).

Why was it so important to make this flight to Wrangel Island? In addition to the scientific goals (ice reconnaissance, testing the aircraft capabilities in extreme conditions, etc.), the expedition pursued geopolitical and military goals. In 1916 the Russian government made the statement on the territorial allegiance of Wrangel Island, but the revolution and civil war that soon followed forced the foreign countries to revise the status quo. In 1921, the Canadian polar explorer V. Stefansson proposed his government to begin the colonization of Wrangel Island and organized an expedition which announced the accession of the island to Great Britain as soon as it landed on it (the second expedition was organized by V. Stefansson in 1923) [8]. The USA and Canada also declared their claims on this territory. The Soviet government took some diplomatic measures to defend its rights to Wrangel Island. In 1924, the Soviet naval expedition reached the island and raised the USSR flag there (at the same time, the Canadian settlers were evacuated from the island) [9].

The special importance of Wrangel Island was due to the prospects for establishing sea and air transarctic communications, in addition to the possibilities of fur trade. Thus, V. Stefansson wrote in his book «The Northward Course of Empire» (1922) that «the islands that dot the polar ocean will obviously become important relay stations on the various trans-polar routes. <…> Thus, we see that most of the islands that now dot the polar maps can with fair ease be reached by surface-going ships wanting to deposit there petroleum and other supplies needed for the maintenance of way stations for aerial traffic. <…> There will also be exceptional seasons when such islands as Wrangel cannot be reached at all by tramp steamers and many of the arctic islands are unreachable by surface ships during at least the winter and spring months. It is here that the coming air development will find an important adjunct in the sub-marine» [10].

Hence, the desire of the Soviet military and political leaders to establish air communication with Wrangel Island is reasonable. There was also the commercial interest of Sovtorgflot in establishing air communication with the island to deliver the goods for Soviet settlers and export furs. In addition to it, the geographical exploration of the area using aerial reconnaissance was of high importance for the country.

With both hydroplanes on board, the steamship «Kolyma» headed for Tiksi Bay at the mouth of the river Lena. The further flight route was as follows:
On August 8, the aircraft took off along the Lena route and reached Boulun. On the way, the «Savoy» landed at the convoy of vessels on the river Lena, heading for Tiksi. On August 10, gasoline and oil were delivered to Boulun by a special steamership;

On August 11, the flight continued along the intended route, landing on the Dzhardzhan River;

In the morning of August 12 the planes arrived in Zhigansk, and in the evening they were at the mouth of the river Vilyui;

On August 13, the expedition reached Yakutsk;

On August 18, the planes flew from Yakutsk to Isitskaya, then to Olyekminsk;

On August 19, the planes flew from Olyekminsk to Macha, where the expedition was delayed due to heavy rains;

On August 21, the planes were to fly to Vicktim, but due to bad weather conditions they were forced to make an intermediate landing in Mukhtuy; they got to Vicktim on August 22;

On August 23, the expedition went from Vicktim to Kirensk;

On August 24, the hydroplanes flew from Kirensk to Ust Kut, where they were delayed due to an accident;

On August 27, the expedition continued its way to Zhigalovo, and then to Kachug;

On August 28, the hydroplanes landed in Irkutsk;

On September 6, both hydroplanes were transported by rail from Irkutsk to the hailing port (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 7-9).

According to the reports, the airborne time for the «Savoy» was about 48 hours, in total, and for the «J-13» it was about 54 hours (including trial and campaign flights).

It is obvious that the tactics of the expedition was to make short «jumps» (164-452 km) from one settlement to another along the Lena river bed. Flights were made only during the day and in fine weather. Nevertheless, even in these relatively populated areas, the crew faced serious difficulties. The climatic conditions in which the flight took place were harsh: diverse landscape (mountains, forests, swamps) led to uneven heating of the ground, which was followed by a frequent change in air currents. The situation was complicated by low cloud cover and frequent rains. As G.D. Krasinsky wrote in his report, as the expedition drew on the upper reaches of the river Lena, its riverbed narrowed. The winding Lena riverbed is framed by the mountains, which led to serious difficulties during take-off. Thus, in Kirensk, the «Savoy» ran into an underwater rocky bank during the run and got a hole in the bottom, which was found only in Ust-Kut. In Kachug, an accident with «J-13» occurred during its take-off, with the racks partially bent and broken and the wing damaged (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 8)

In addition to military, political, economic and scientific goals, the Northern Air Expedition was of ideological importance. In all settlements where they landed, the participants of the flight made presentations, conducted excursions, made campaign flights (in Boulun, Yakutsk and Irkutsk) (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 9).

The results of the Northern Air Expedition and the heroism of the pilots were highly appreciated. All participants - pilots E.M. Luht, E.M. Koshelev, mechanical engineers Yeger, G.T. Pobezhimov, captain of the ship «Kolyma» P.G. Milovzorov, and G.D. Krasinsky were awarded the Order of the Red Banner (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 4, 10). In addition, the pilots and mechanical engineers were given 1,500 rubles to each of them (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 4).

The Northern Air Expedition of 1927 was induced by military-political and economic goals, while the next transarctic flight, which was planned to be made in 1928, was associated with the exploration of the Taimyr Peninsula and Severnaya Zemlya. The main organizer of the new Transarctic expedition was Osoaviahim, and the partial funding was provided by Sovtorgflot (the company planned to arrange the Arctic sailing by steamboats and make the ice reconnaissance, while the organizers of the expedition intended to stop over on Wrangel Island, visit the Soviet settlement and Sovtorgflot trading post and then carry out aerial ice reconnaissance) (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 46-47).
On January 11, 1928, the Presidium of the USSR Academy of Sciences approved the report of the Academy of Sciences member A. Fersman on the Arctic flight along the route Petropavlovsk - Leningrad through the Arctic Ocean. The flight was to be supported by the special Taimyr expedition of the USSR Academy of Sciences and the Committee for the Study of the Yakut Autonomous Soviet Socialist Republic (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, II, 12-13).

According to the plan proposed by the head of the Taimyr expedition A.I. Tolmachev, the expedition, with the participation of a biologist, geologist and topographer, was to leave Leningrad in early February 1928. The first party was to go to Krasnoyarsk, then to the north along the river Yenisei to Dudinka, then to Khatanga, where it was planned to organize the convoy to Taimyr. The second party was to head off to Yakutsk, and then down the river Lena to Boulun. From Boulun the latter had to deliver gasoline to Khatanga. It was planned that the parties would meet on the river Khatanga by May 1 and move together to Lake Taimyr (before the onset of spring thaw). After thawing of ice on the lake, the expedition was to be rafted along the Taimyr River on the barrels of gasoline towed and fastened together like rafts. The plane was expected to fly to the mouth of the Taimyr (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, II, 14).

Thus, the Taimyr expedition was planned as an intermediate base for refueling the aircraft. This was one of the challenges for organizing transarctic flights at the turn of the 1920s - 1930s: the flight range was insufficient to cover long distances without refueling, and the desertedness of the area, as well as its transport inaccessibility did not allow for building a stationary fuel base network.

At the same time, air connection with the territory of North-East Siberia created new opportunities for its exploration. It was decided that the geologist and biologist from the Taimyr expedition would fly to Severnaya Zemlya, and the pilots would conduct ice reconnaissance and find out whether it would be possible for the researchers to go on boat along the northern coast of West Taimyr, where ice blocking frequently occurred, to study flora and fauna of Far North Asia. As A.I. Tolmachev wrote, «lack of information about the Taimyr fauna is one of the largest gaps in the knowledge of the animal world» (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, II, 14).

Apart from geologists, geographers and biologists, the military were also interested in air connection with Taimyr and Severnaya Zemlya, in particular, the planned air expedition of A. Nobile to Severnaya Zemlya (Northern Land) [11]. The United States also showed some interest in this field. Thus, in December 1927, there was an article in the «Science» about the planned expedition of the American Natural History Museum to the unexplored areas of the Arctic coast of Siberia on the Morrissey ship. Among other goals, the purpose of the expedition was to study the Northern Land and «the economic possibilities of Kamchatka, which is rich in timber, coal, gold, lead, zinc and other minerals and in grazing lands» [12].

Meanwhile, the organizers of the Soviet flight faced difficulties of both organizational and financial nature. The materials of the transarctic flight of 1928 show that such expeditions were very expensive. So, in 1928, it required about 35 thousand rubles to organize the flight of one aircraft named «Soviet North», without taking into account the costs of the Air Force of the Red Army to equip the aircraft («Dornier Val» with BMV-6 engines) and the costs of Taimyr and The Yakut expeditions of the USSR Academy of Sciences on the organization of stop-over air flight bases which amounted to about the same figure) (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, II, 13, 16). The transport services for the delivery of the aircraft and the crew were undertaken by Sovtorgflot (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, II, 31). The daily expenses of the participants of the transarctic air expedition (five people, including the Head of the expedition G.D. Krasinsky and the ship commander A. Volinsky) amounted to 225 rubles per month, not including actual travel expenses, equipment and insurance (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, II, 24-25).

It is obvious that it was impossible to conduct such an expensive and difficult undertaking without any support, given the adverse geographical and climatic circumstances. Therefore, the organization of first transarctic flights involved various structures, such as scientific, military, transport, governmental, and others. Moreover, each participant of such agreements pursued their own goals, sometimes difficult to coordinate. The expeditions did not have a single budget, which gave rise to more
discrepancies. Sometimes, the coordination of the work was hindered by personal ambitions and conflicts, which can be seen in the correspondence between the organizers of the expedition.

When concluding an agreement between the Committee for the Study of the Yakut Autonomous Soviet Socialist Republic, the Taimyr expedition of the Academy of Sciences of the USSR, and Osoaviahim, the parties could not reach a consensus. Thus, Osoaviahim demanded that the Yakutsk Committee and the Government of the Yakut Autonomous Soviet Socialist Republic (YAASSR) build fuel bases on the way of the transarctic air expedition, while the other side only agreed to provide a deer caravan to move goods to Lake Taimyr. The local executive committee in Yakutsk squandered part of the gas of Osoaviahim in February 1928. The Taimyr expedition was required to arrange an air base on Lake Taimyr and waited for the plane to arrive from August 5 to September 1, but this plan failed. Osoaviahim made a commitment to bring two researchers of the Taimyr expedition to Severnaya Zemlya, but did not fulfill it, and it also had to deliver goods to the Wrangel Island for the trading post of Sovtorgflot, but failed to do it (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 18, 22, 48, 51).

Thus, the planned route of the expedition (Petropavlovsk-Kamchatsky - Ust-Kamchatsk - Olyutarka - Anadyr - Uelen - Severn - Wrangel Island - Cape Medvezhy - Nizhnekolymsk - Cape Medvezhy - Kigilyakh - Bouln - Nordvik - Foma - Dikson - Yushar - Arkhangelsk - Leningrad) was becoming impossible, and the flight lost its sense. Furthermore, the chairman of the government committee for the Soviet flights (established in 1925) S.S. Kamenev stated that the flight to Severnaya Zemlya should be either canceled or postponed as it failed to pursue its goal of exploring the land (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 51).

However, an attempt was made, but turned out to be a failure. The flight from Vladivostok to Cape Dezhnev took 30 days. Only on August 18, 1928 did the flight begin along the Siberian coast, but there the plane «Soviet North» crashed. There was no radio on board (sic!), because the plane was overloaded, so the crew could not report the disaster on time. Thus, the expedition made only 6 of the 14 thousand km of the planned route (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 34, II. 3).

According to the act drawn up by the Head of the expedition G.D. Krasinsky on August 25, 1928, the aircraft crew had a narrow escape: «On the morning of August 19, 1928, the expedition hydroplane flew from the Kolyuchinskaya Bay (Bay of the Chukchi Sea - authors) to Wrangel Island. 10 minutes later, we fell into the fog, turned back, anchored («Dornier Val» is a hydroplane - authors) at the Kolyuchinskaya Spit. In the evening, the wind grew stronger, and the storm began. At 5 o’clock p.m. on the August 20, when the rain and snow began to drift the anchored aircraft inland Kolyuchinskaya Bay <...>; the motors failed to start. <...>

In the morning of August 22, with an increasing storm and chaotic waves, the aircraft started swinging. The wings began to deform under the blows: they knocked down the ends of the wings, broke the ailerons and tore both struts of the right wing. A large volume of water penetrated the rear compartment, which caused a trim on the tail and broke the rudder. The plane began to roll heavily on the port side. At 6 a.m. on August 22, the aircraft was thrown to the shore by the port side in the following days the aircraft continued to collapse. <...> <...> <...>.

Due to the fact that the plane was completely destroyed, the Head of the expedition decided to leave it at the scene of the accident, and the expedition members had to go on foot to the coast of the Arctic Ocean» (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 52).

Fortunately, the crew of the «Soviet North» managed to get to the village of Uelen in Chukotka. Several attempts were made (by sea and by sleigh) to get to the plane and save its equipment, but they failed due to bad weather and (again!) the high cost (the Chukchi authorities requested 100 thousand rubles) (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, ll. 54-57). The remains of the aircraft were taken away by the nomadic Chukchi.

In 1929, the flight of the crew members O.A. Kalwitz, F.F. Leonhard and G.D. Krasinsky on the route St. Lawrence Bay - Wrangel Island - Nizhnekolymsk - Middle Lyakhovsky Island - Bouln continued the air exploration of the Arctic Ocean coast (it was planned that the plane would fly to...
Dikson, but the accident forced the crew to stop the expedition) (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 34, II. 4)

Serious conclusions were made from the failure of the transarctic flight of the «Soviet North» in 1928 and the expedition in 1929. In November 1928, a special Committee came to the following conclusion: the experience of the 1927 flight showed that air communication along the Lena River and with Wrangel Island was possible. However, it was decided to postpone the flights on various northern routes, and concentrate on studying all flight conditions along the route. The Committee proposed the idea of building a network of air bases (in Petropavlovsk-Kamchatsky, at the mouth of the Lena River, on Dikson) and conduct short research flights (TsGANTD SPb, f. 369, op. 2-1, ed. khr. 9, II. 64, 67-68). It was also deemed necessary to provide this network with its own hydroplanes so as not to transport them from the European part of the country.

The work on the organization of Arctic flights was entrusted to G.D. Krasinsky, who started working in the People's Commissariat of Commerce in 1929. The commercial interest associated with the export of furs became one of the determining factors in the continuing attempts to use aviation in the development of the Soviet Arctic.

3. Conclusion
The air expedition of the American L. Ellsworth and the Norwegian R. Amundsen in 1925 (the flight from Svalbard to Cape Nordkapp on the island of Magereu) proved that airplanes can make long-distance Arctic flights. The importance of aviation for the exploration and economic and transport development of the Arctic became obvious for the Soviet Union in the mid-1920s. In addition to the evident technical benefits, the aircraft could be used for the development of the Soviet heroic image. However, the first Soviet transarctic flights of 1927-1929 showed the disadvantages of this type of transport (low carrying capacity, high cost of air transportation, dependence on the weather).

The transarctic flights of the second half of the 1920s could not be supported by the existing infrastructure: there were no polar stations, settlements, seaports along the airways. They could contribute a lot to the exploration of Siberia and the coast of the Arctic Ocean, yet they needed a serious support in terms of the land infrastructure development.

On the whole, the experience of early transarctic flights became the basis for the large program of the Arctic airspace development, which became one of the most notable achievements of the Soviet Union in the pre-war period.

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References
[1] Schmidt O Y 1934 The Arctic Research in the Soviet Union Reports of the Soviet delegation at the International Geological Congress in Warsaw: publication of the Scientific Research Institute of the Great Soviet Atlas of the World at the Central Executive Committee of the USSR (Moscow: Publishing House named after Klim Voroshilov) (in Russian)

Dyakonov M A History of expeditions to the polar countries (Arkhangelsk: Arkhangelsk Regional Publishing House) (in Russian)

Belov M I 1969 Scientific and economic development of the north of the Soviet North. 1933-1945 (Leningrad: Hydrometeoizdat) (in Russian)

Negenblya I E 2007 Over the boundless Arctic (Yakutsk: Yakutsk Territory) (in Russian)

Timoshenko A I 2013 Soviet experience in the development of the Arctic and the Northern Sea Route: Formation of a mobilization economy Historical and economic research 14 (1-2) 73-95 (in Russian)

Zaykov K S Saburov A A 2017 Soviet Studies of the Arctic Islands and Archipelagos in 1920-1940: Peculiarities of Personnel Screening, Training and Motivation Modern History of
Schlegel K 2011 *Terror and the dream. Moscow 1937* (Moscow: ROSSPEN) pp 370–391 (in Russian)

Libman A Yu 1937 Aircraft in the service of the Northern Sea Route *Soviet Arctic* 2 39–48 (in Russian)

Gunther H 1991 «Stalin's Falcons» (Analysis of the myth of the 30s) *Questions of literature* 12 122-141

Nalimov P A 2016 Prospects for the unified Arctic transport system *Arctic space of Russia in the XXI century: development factors, management organization* ed VV Ivanter (St. Petersburg: Polytechnic University Press) p 972 (in Russian)

1933 *The air-roads of the North : collection of articles* eds JY Anvelt et al (Moscow: Soviet Asia) p 5 (in Russian)

Lebedenko A 1930 *Flight over the ocean* (Moscow; Lenindrad.: State Publishing House) p 40 (in Russian)

Gorkina T I 2013 Geopolitical problems of the Arctic *Bulletin of the Russian Academy of Sciences. Series: Geographical* 6 7–18 (in Russian)

Lindholt L 2005 Arctic National Resources in Global Perspective *The Economy of the North*. 2005 pp 27–32

Agranat G A 1970 *Foreign North: Development Experience* (Moscow: Science)

Turkov A A 2016 US public opinion on the successes of the USSR in the development of the Arctic in the 1930s *Bulletin of the Northern (arctic) federal University. Series: Humanities and Social sciences* 1 49-53 (in Russian)

1933 *The air-roads of the North : collection of articles* eds JY Anvelt et al (Moscow: Soviet Asia) p 20 (in Russian)

Krasinsky G D 1929 *Northern routes* (Moscow: Osoaviakhim Publishing House) p 160 (in Russian)

Webb M 1992 Arctic Saga: Vilhjalmur Stefansson's Attempt to Colonize Wrangel Island *Pacific Historical Review* 61(2) 215–239

Bocharov A A Mikhailov A A and Smirnova D D 2016 The contest of Russia (USSR) for its influence in the Arctic: Political events around Wrangel Island in 1921-1926 *Arctic: history and modernity* (Moscow: Science) pp 154-7 (in Russian)

Stefansson V 1922 *The Northward Course of Empire* (New York: Harcourt, Brace and Co) pp 185-9 (in Russian)

Cameron G 2017 *Umberto Nobile and the Arctic search for the airship Ialia* (London, Fonthill media)

Běhounek F 1928 7 *Weeks in Polar Ice* (Leningrad: Krasnaya Gazeta publishing house) (in Russian)

1927 The Stoll – McCracken Siberian-Arctic expedition *Science. 66 (1722)* 646