

# A Tsarist Attempt at Opening the Northern Sea Route: The Arctic Ocean Hydrographic Expedition, 1910-1915

By William Barr\*

**Abstract:** At present the Soviet Northern Sea Route represents an important communications artery of the Soviet Union. Although the development of the Sea Route is very largely a Soviet phenomenon, achieved largely since 1934, it owes a great deal to the efforts of the Tsarist icebreakers *Taymyr* and *Vaygach* during the period 1910—1915. In a series of voyages, known as the Arctic Ocean Hydrographic Expedition, they completed the first modern survey of the Sea Route from Bering Strait to the mouth of the Yenisey. They also discovered the archipelago of Severnaya Zemlya, and carried out the first east-west traverse of the Northern Sea Route.

**Zusammenfassung:** Der Nordsibirische Seeweg stellt heutzutage eine Hauptverkehrsader der Sowjetunion dar. Obgleich die Schaffung dieses Seeweges in erster Linie eine sowjetische Unternehmung ist, die vor allem seit 1934 betrieben wurde, verdankt er seine Verwirklichung doch in hohem Maße den Vorarbeiten der zaristischen Eisbrecher *Taymyr* und *Vaygach*. In einer Reihe von Fahrten — als Hydrographische Expedition in das Nördliche Eismeer bekannt — führten diese Schiffe 1910—1915 die erste moderne Vermessung des Nordsibirischen Seeweges von der Beringstraße bis zur Mündung des Jenissej durch. Sie entdeckten auch den Sewernaja Semlja-Archipel und vollzogen die erste Durchfahrt des Nordsibirischen Seeweges von Osten nach Westen.

The work of the Imperial Navy icebreaking steamers *Taymyr* and *Vaygach* during the period 1910-1915, represents the first modern attempt at a systematic survey of the arctic waters to the north of Siberia, through which runs the transport artery known as the Northern Sea Route. Since those initial surveys, and particularly since 1934 under the Soviet regime, the Northern Sea Route has become an important communications artery of the Soviet Union.

The current general picture of the Northern Sea Route is of convoys of ships, with icebreaker escort, sailing each summer from Arkhangel'sk or Murmansk in the west to the Ob' and Yenisey (Armstrong, 1972). Meanwhile convoys from Pacific ports pass through Bering Strait and serve the major eastern Siberian rivers, the Lena, Yana, Indigirka and Kolyma, but particularly the latter. Through voyages along the entire route can be and are made as occasion demands, but this would be a negligible fraction of the tonnage involved in the two movements already mentioned.

The main elements of the Yenisey traffic are timber from Igarka and copper/nickel ores from the mines at Noril'sk from Dudinka (Armstrong, 1973:743). In 1973 Dudinka handled a record 3,225,000 metric tons (Armstrong, 1974:174). The volume of the Igarka timber traffic is of the order of 600,000 metric tons annually. An interesting new development in the west is the growth of the port of Nadym on Obskaya Guba as a major centre in the rapidly developing Northwest Siberian gas field. In this connection, there was extensive dredging of the navigation channel between Nadym and the sea in 1972 (Armstrong, 1973:742).

Most of the freighters used on the Sea Route are ice-strengthened. They are of relatively small tonnage (less than 15,000 tons deadweight). This is probably due to the limitations posed by the shallowness of the Kara Sea, and even more so by that of the Laptev Sea and East Siberian Sea. For this reason, too, the Soviets have evinced little interest in the cruise of the giant tanker *Manhattan* through the Northwest Passage in 1969, and there is little likelihood that they will introduce such giants into the Northern Sea Route.

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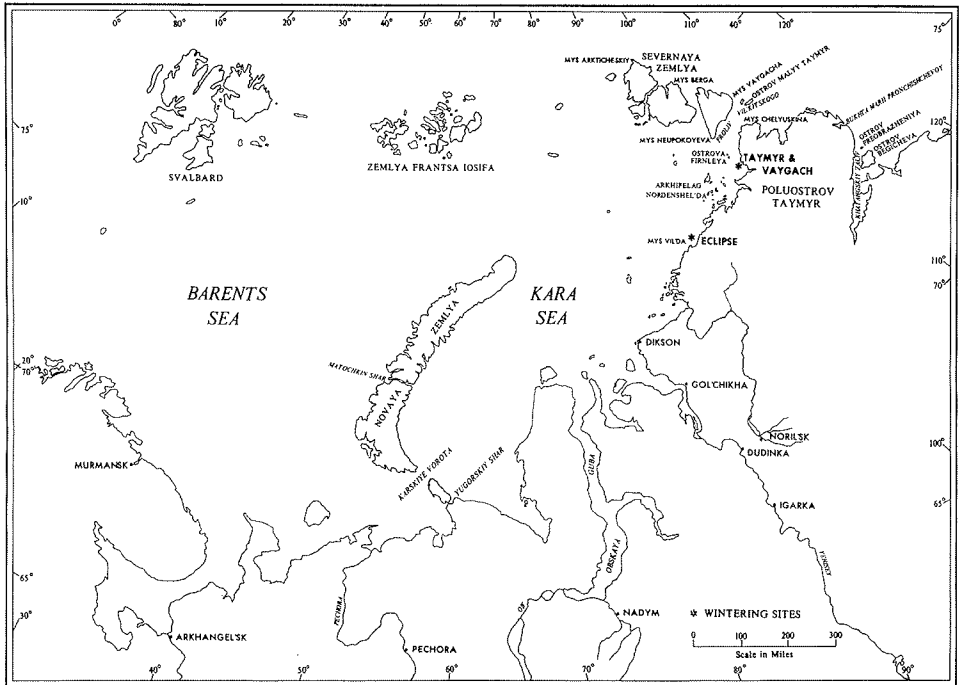


Fig. 1: The western part of the Northern Sea Route.  
 Abb. 1: Der westliche Teil des Nordsibirischen Seeweges.

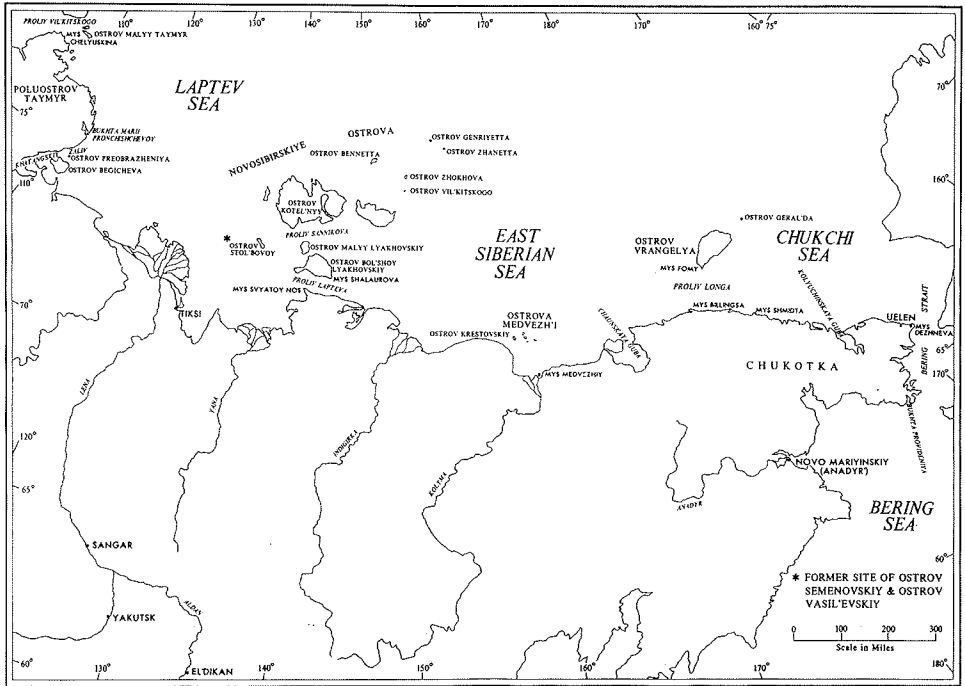


Fig. 2: The eastern part of the Northern Sea Route.  
 Abb. 2: Der östliche Teil des Nordsibirischen Seeweges.

Somewhere in the order of 14 icebreakers are normally deployed along the route during the navigation season. They include the atomic-powered icebreaker *Lenin*, the first in the world. After a major refit, including the installing of new reactors, which involved her being taken out of service for four seasons, she returned to the Northern Sea Route in 1971. Another atomic-powered icebreaker, *Arktika* has recently been launched, and underwent her trials last fall (1974).

The entire length of the Northern Sea Route has now been furnished with automatic radio beacons with a range of 150 km. Automatic lightbeacons and manned polar stations at strategic points have also greatly eased navigation along the route. The use of helicopters, flying from the icebreakers is as general on the Northern Sea Route as it is in the Canadian Arctic; they are invaluable for ice reconnaissance.

Soviet ice forecasters, like their Canadian counterparts are making increasing use of satellite photographs. Another innovation, providing clearer imagery, is the use of *Toros* radar equipment, mounted in AN-24 aircraft. This provides an almost synoptic picture of ice conditions; since the survey is flown at 6,000 m it provides a clearer picture than does the satellite photography.

The shipping season normally begins in early July and finishes by late October. A recent development, however, has been a late-season convoy to the Yenisey, greatly lengthening the season. The first of these was in 1970. Thus in 1972-73 nine freighters arrived at Dudinka around December 21, left again on January 12, and arrived back at Murmansk on January 27 (Armstrong, 1973:743). They were escorted by five icebreakers, including *Lenin*. Late in 1973, the experiment was repeated but at a slightly earlier date; the last freighter left the Yenisey on December 13, reaching Murmansk by Christmas (Armstrong, 1974:174).

Each year the Sea Route is also used for transporting river craft to the various Siberian rivers from the White Sea. An interesting feature since 1970 has been the movement of floating thermal power stations from Tyumen' on the Ob' to various destinations in Siberia and European Russia; the group-name for these 'craft' is *Severnoye Siyanie* (Northern Lights). The first, in 1970, was towed east to Zelenyy Mys at the mouth of the Kolyma, where it is supplying power to the Bilibino goldfields and to the atomic power station under construction there. In 1971 a second one moved down the Ob' and west to Pechora on the river of the same name. In 1973, a third one was towed east, bound for El'dikan on the Aldan (Armstrong, 1974:175). A fourth one is under construction, and is intended for Mys Shmidta on the Chukotka coast.

Finally, it should be mentioned that tourist ships now ply the waters of the Northern Sea Route. The passenger vessels *Tatariya* and *Vatslav Vorovskiy* cruise the Kara and Barents seas from Arkhangel'sk and Murmansk. In 1971 the latter vessel even called at Ostrov Kheysa in Zemlya Frantsa Iosifa (81°N).

This entire communications complex, with all its economic and strategic ramifications, and all its scientific support sectors, can be validly described as an outgrowth of the pioneer surveys of *Taymyr* and *Vaygach*, some 60-65 years ago. But in 1905, when the idea of mounting the Arctic Ocean Hydrographic Expedition was first mooted, knowledge of the Northern Sea Route was extremely limited, and utilization of the route even less. While three expeditions had rounded Mys Chelyuskina, those of Nordenskiöld in 1878 (Nordenskiöld, 1881), Nansen in 1893 (Nansen, 1897) and Toll in 1901 (Toll, 1909), only one vessel, Nordenskiöld's *Vega* had completed the through passage. While Nordenskiöld, Nansen and Toll had accomplished a considerable amount of survey work, the only charts available for a considerable part of the route were those produced by early nineteenth century surveyors such as Anjou and Vrangel', or, to an even greater extent, by the officers of the Great Northern Expedition of 1733-43. There

were no weather stations, no lighthouses, no radio stations. While the Kara Sea Route might be said to have come of age with the massive expedition of 1905 to the Yenisey (four steamers, four tugs, eleven lighters and two icebreakers), aimed at relieving pressure on the overstrained Transsiberian Railway during the Russo-Japanese War (Pinkhenson, 1962:421-423), this was the absolute limit of commercial traffic on the Northern Sea Route. There was no commercial shipping east of the Yenisey or west of Bering Strait.

Finally, and perhaps most surprising of all, one of the major arctic archipelagos still remained to be discovered: while Novaya Zemlya, Zemlya Frantsa Iosifa, Novosibirskiye Ostrova, Ostrova Medvezh'i and Ostrov Vrangelya had all been explored and charted tolerably well, the presence of Severnaya Zemlya was quite unknown. None of the three expeditions which had sailed round Mys Chelyuskina, or Semen Chelyuskin's overland expedition in 1742 had spotted the mountains of Ostrov Bol'shevik, some 60 km to the north. Further, in her drift north and west from Novosibirskiye Ostrova Nansen's *Fram* had passed well to the north of the unsuspected archipelago. Perhaps this is the true measure of how little was known of the Northern Sea Route in 1905.

#### PLANS FOR THE EXPEDITION

Stimulus for renewed interest in the Northern Sea Route at this time, to the extent of building the icebreakers *Taymyr* and *Vaygach*, and dispatching them on a five-year survey of the route, was undoubtedly provided by the Russo-Japanese War. Part of the stimulus, as inferred earlier, was the inability of the Transsiberian Railway to handle the enormous traffic it was asked to move during the war. Probably a more telling argument, however, was the belief that had Rozhdestvenskiy's squadron been able to avail itself of a relatively short Northern Sea Route, parallelling the coasts of the Motherland all the way, rather than having to tackle the 10-month voyage *via* Cape of Good Hope, coaling at sea, or wherever neutral governments could be persuaded to allow the squadron to rendez-vous with German colliers, the outcome of the Battle of Tsushima, and possibly even of the entire war, might have been vastly different. Whether this argument is valid seems doubtful (see, for example, Westwood, 1970), but the outcome was the Arctic Ocean Hydrographic Expedition (1910-1915), in which the Imperial Navy icebreakers executed the first systematic survey of the Northern Sea Route from Bering Strait to the Yenisey.

Spurred by the outcome of Tsushima, the Imperial Navy first formed a special committee (Pinkhenson, 1962:596), headed by A. I. Vil'kitskiy, an experienced arctic oceanographer and surveyor, who had carried out extensive survey work along the coasts of the Barents and Kara seas. This committee recognized that the Northern Sea Route could be made into a practicable commercial route, but only by means of a detailed survey programme, extensive sounding traverses, and meticulous mapping, especially for the section east of the Yenisey. Furthermore, it would require the building of weather and radio stations, navigation aids, lighthouses, coal depots, and the compilation of detailed pilots. Vil'kitskiy's committee called for the use of six wooden survey vessels, which would work simultaneously along different sections of the coast.

The committee's report was not immediately acted upon. Instead in 1906 a further committee under Rear-Admiral Verkhovskiy was convened (Pinkhenson, 1962:599), and reached essentially the same conclusions. One difference was that Verkhovskiy called for two steel-built survey vessels with some icebreaking capacity. Initially these vessels were seen as operating out of Arkhangel'sk, but subsequently the pressing need for a sea link with the Kolyma basin, and concern over American influence in Chukotka, resulted in Vladivostok being chosen as the expedition's base. It was envisaged that over a period of several seasons, returning to Vladivostok each winter, the two vessels

would push their surveys successively farther west, and ultimately, by rounding Mys Chelyuskina, they would complete the through passage.

#### THE SHIPS

It was this plan of action that was put into operation. Two identical icebreakers were laid down in the Navy shipyards on the Neva at St. Petersburg, and launched in the fall of 1909 (Starokadomskiy, 1959: Transehe, 1925:371; Arngol'd, 1929). They were named *Taymyr* and *Vaygach*. They were steel-hulled, with plates varying in thickness from 8 to 22 mm. The ships' hulls were extremely rounded, along the lines of Nansen's *Fram* and for the same reason, i. e. to deny the ice any purchase on the hull in the event of a severe nip. Frames were spaced at 50 cm intervals. A double bottom, and longitudinal and transverse watertight bulkheads dividing the hull into 35 compartments theoretically made the vessels practically unsinkable.

Even by contemporary icebreaker standards they were relatively small vessels: 54 m in length; beam at the waterline 11 m; draught 4.4 m; displacement about 1,200 tons. By comparison *Yermak* launched in 1898, and the only other true Russian icebreaker afloat, was 98 m long; beam 21.6 m; draught about 8 m; and displacement about 9,000 tons (Pinkhenson, 1962:270). For comparison with contemporary Canadian icebreakers, *Earl Grey*, also launched in 1909 and the queen of the Canadian icebreaker fleet until her sale to the Russians in 1914, was 81.5 m long; beam 14.7 m. *Taymyr* and *Vaygach* were equipped with triple-expansion steam engines of 1,220 rated horsepower; in comparison *Yermak's* engines could deliver 10,000 hp and *Earl Grey's* 6,500 hp (Appleton, 1970:7; 1972).

Thus it is clear that the designer of the new vessels was not aiming at a heavy icebreaker with maximum icebreaking capacity, but at a highly manoeuvrable, shallow-draught survey vessel with some icebreaking capacity. Arngol'd (1929:26) has emphasized that *Taymyr* and *Vaygach* were not expected to tackle heavy, multi-year ice. Their icebreaking capabilities were "sufficient for forcing a passage through frozen polynias and leads between them, and for breaking ice in newly frozen bays". A. I. Vil'kitskiy also stressed that the expedition ships were not intended for battering their way through solid heavy ice; their purpose was hydrographic work in open water, and the ice-strengthening with which they were provided was simply a protection against the inevitable collisions with the ice (Pinkhenson, 1962:605).

However, *Taymyr* and *Vaygach* did possess considerable endurance. Their coal bunkers could hold 500 tons; at an economical 6-knot speed, with a daily consumption of 6 tons, this was sufficient for more than 10 weeks steaming, i. e. for about 16,000 km. The provisions rooms could store enough food for the crew for 18 months.

The living quarters were well insulated; the steel hull plates and frames were covered with alternate layers of pulverized cork, kapok and rubberoid, together with an airspace, making a total insulation layer of 25 cm. In case of wintering, when the fires would be drawn, and the steamheating non-operative, 10 coal burning stoves were installed in various parts of each ship. Lamps and the necessary naphtha for fuel were carried for periods when the electricity would be shut off. In each galley, the oven was capable of baking 200 kilos of bread in one batch. Each ship carried a radio transmitter, but the effective range was only 240 km.

Normal complement aboard each icebreaker was 50 officers and men of the Imperial Navy. Since the expedition lasted five years, there was considerable turnover in personnel. Indeed the medical officers, Dr. Starokadomskiy aboard *Taymyr*, and Dr. Arngol'd aboard *Vaygach*, were two of the few who stayed with the ships throughout the expedition. This was very useful, since it is to these two men that we owe the two

best available accounts of the expedition. For a variety of reasons, Starokadomskiy's account is vastly more comprehensive and reliable and it is on this account in particular that this paper is based.

The first commanders were Captain Matisen aboard *Taymyr* and Captain Kolchak aboard *Vaygach*. The latter, of course, is better known in history in his capacity of Supreme Ruler of all the Russians, in command of the Whites in Siberia during the Civil War. Interestingly enough, while Kolchak appears in full in the 1947 edition of Starokadomskiy's book, he is totally eliminated from the later (1953 and 1959) editions. The two icebreakers sailed on their maiden voyage on November 10, 1909, bound for Vladivostok. There were numerous quite lengthy delays and courtesy visits to foreign ports. For example, damage in *Taymyr's* engine room in the North Sea led to a 10 week sojourn in Le Havre, while the damage was being repaired. Further ports of call were Algiers, Port Said, where Captain Matisen was replaced by Captain Makalinskiy, Perim, Djibouti, Colombo, Sabang, Singapore, Saigon, Cam Ranh, and Shanghai. They finally reached Vladivostok on July 16, 1910.

Here Makalinskiy, who had been only a stop-gap, was replaced as commander of *Taymyr* by Captain Davydov, perhaps better known as the captain of the gunboat *Krasnyy Oktyabr'*, which in 1924 hoisted the Hammer and Sickle on Ostrov Vrangelya for the first time, and removed a party of Alaskans who were occupying it (Davydov, 1925; Stefansson, 1925:306). Kolchak remained in command of *Vaygach*, and overall command of the expedition was assumed by I. S. Sergeyev, a proverbially cautious commander.

#### 1910 SEASON

There was still time in the 1910 season for a brief reconnaissance foray into the Chukchi Sea. Of course the time available for actual survey work would be severely limited, both in this and subsequent seasons, by the choice of Vladivostok as expedition base. The icebreakers had to steam 4,320 km just to reach Bering Strait; furthermore this arrangement necessitated the use of a coaling vessel in ports such as Bukhta Provideniya. However, there really was no other choice, since there was no other port with the necessary supply and repair facilities in the Pacific at that time.

*Taymyr* and *Vaygach* put to sea on August 30, accompanied by the collier *Argun'*, which was to accompany them to Bukhta Provideniya. Having coaled from her as arranged at that port, the two icebreakers passed through Bering Strait, and hove to off the little Eskimo settlement of Uelen on September 16, in the hope of getting a clear sky for an astronomical fix on Mys Dezhneva. On the 23, thwarted in this intent, they weighed anchor and headed north and west, sounding and surveying as they went. But they were not destined to get very far; only 30 km from Uelen, near Mys Intsova, solid ice barred further progress. On October 3 the two vessels turned back, and by November 2 were back at Vladivostok. They had blooded their bows on arctic ice for the first time.

#### 1911 SEASON

The 1911 season saw the two vessels putting to sea from Vladivostok on August 4. Captain Kolchak had been replaced by Captain Loman aboard *Vaygach*, but otherwise there were few changes among the officers. Having coaled and watered at Bukhta Provideniya, by the evening of August 23 they were anchored in fog off Mys Dezhneva. After waiting in vain for two days for a clear sky, Sergeyev ordered the icebreakers to proceed north and west. The procedure followed throughout the expedition when both vessels were sailing in company, was that one stayed inshore taking bearings on all conspicuous coastal features, and also sounding regularly, while the other steamed a parallel course a few kilometres offshore in order to ascertain the detail of the offshore

bathymetry. Following this procedure, and anchoring for the duration of each short arctic summer night, and carrying out marine biological and physical oceanographic research at selected stations, the expedition vessels made steady progress through icefree waters. Off Mys Severnyy (now Mys Shmidta) the first scattered floes appeared and in fog and snowsqualls the ships had to lie at anchor until August 31. With clear weather and icefree seas, progress was resumed westwards through Proliv Longa. Near the entrance to Chaunskaya Guba they met the steamer *Kolyma*, Captain Troyan, who was just returning from the *Kolyma*, the first steamer ever to visit that river. On the afternoon of September 3 *Taymyr* ran heavily aground, a frequent occurrence during the survey of the extremely shoal water of the East Siberian and Laptev seas. *Vaygach* also ran aground in trying to tow her off, and it was at the cost of 10 hours of work and 70 tons of fresh water that they finally got free.

On the morning of September 5, the icebreakers anchored off Mys Medvezhiy at the mouth of the *Kolyma*. The coast from Bering Strait to the *Kolyma* had been accurately surveyed for the first time. On September 8 they started back in fog and snow, with every indication that winter was not far away. Off Mys Billingsa the vessels parted company, with *Vaygach* heading north to survey Ostrov Vrangelya, while *Taymyr* continued steadily east, filling in gaps in the surveying and sounding of the Chukchi coast.

In 1911 the extent and shape of Ostrov Vrangelya was known approximately particularly from the visits by the American vessels *Corwin* and *Rogers* in search of De Long's *Jeannette* in 1881 (Hooper, 1885; Gilder, 1883; Muir, 1917), but there was no accurate chart of the island's coasts, and perhaps more significantly, no Russians had yet visited the island.

*Vaygach* sighted the mountains of Ostrov Vrangelya on September 15, and a landing was made near Mys Fomy at the southwest end of the island. An astronomical fix was determined and an iron beacon with a brass plate recording the details of the visit, in Russian and English, was erected. *Vaygach* then proceeded north and east around the island in open water, then south between Ostrov Vrangelya and Ostrov Geral'da, before returning to join *Taymyr* at Mys Dezhneva. It was this landing in 1911 that formed the major basis of the Soviet Union's strong reaction to Mackenzie King's rash statement that Ostrov Vrangelya belonged to Canada, in 1922 (see Barr, 1972:231; Diubaldo, 1967:213).

By September 24 both vessels were back at Bukhta Provideniya and by October 28, at Vladivostok. The sum total of the season's work was 2,500 miles of coast surveyed; 11 astronomical fixes established; and 2,900 soundings made.

#### 1912 SEASON

Next year, 1912, the aim was to carry the survey west to the mouth of the Lena. The expedition began much earlier than in previous years, leaving Vladivostok on June 13. Surveying the Kamchatka coast *en route*, they reached Bukhta Provideniya on July 15; here they coaled and watered as usual from *Argun'*. They passed Bering Strait on July 22, and despite a little ice in Proliv Longa, by the 29th they were back at Mys Medvezhiy, the terminal point of their previous year's survey.

The first objective was an accurate survey of all six of the Ostrova Medvezh'i; this was accomplished between August 1 and 3. Names were bestowed on four of the islands so far nameless. From here west the two vessels for the first time experienced something that was to plague them throughout their work in the western part of the East Siberian Sea and the Laptev Sea. Despite their shallow draught, the extreme shoal conditions prevented them from getting any closer than 22 km from the coast. At this distance,

of course, accurate survey was impossible. Fog and quite heavy ice complicated the situation. The ships' captains had to content themselves only with sounding, and proceeded west some 30 km offshore; even here depths were only 10-15 m.

On August 11 Mys Shalaurova on Ostrov Bol'shoy Lyakhovskiy was sighted. Here the vessels separated: *Taymyr* proceeded straight west through Proliv Lapteva, surveying the south coast of Ostrov Bol'shoy Lyakhovskiy. *Vaygach* meanwhile proceeded north up the west coast of Ostrov Bol'shoy and Malyy Lyakhovskiy. Heavy ice in the west end of Proliv Sannikova prevented *Vaygach* from reaching Ostrov Kotelnyy. Instead she swung west to Ostrov Stol'bovoy, where a landing was made, an astronomical fix was determined, and the coasts surveyed. From here she proceeded to the small islands of Ostrov Semenovskiy and Ostrov Vasilevskiy. On August 20 a party went ashore on Ostrov Vasil'evskiy, and some ptarmigan and waterfowl were shot. This visit to these two little islands is quite significant, since this was the last known landing before they disappeared. They consisted entirely of ice-rich sediments with massive bodies of ground ice in the permafrost, and as a result of the mechanical and thermal effects of wave action, they have since been totally eliminated.

Two days later *Vaygach* reached Bukhta Tiksi near the Lena delta, and *Taymyr* arrived four days later. The latter had spent the last 10 days in rather mundane and tedious survey work along the mainland coast, including the prominent headland of Mys Svyatoy Nos. Having watered at Bukhta Tiksi, now a bustling arctic port, but then practically uninhabited, the two icebreakers got under way again on August 27. About 130 km northwest of the Lena delta a zone of heavy ice forced them to swing south of their planned direct course northwest to Poluostrov Taymyr. Despite difficult ice conditions, fog and snow, *Vaygach*, whose captain, Loman, proved more aggressive, managed to reach 76° 09'N on the east coast of Poluostrov Taymyr on September 8, but here she was forced to turn back. In the process her hull was quite badly dented, and she began to leak. Having extricated themselves from the ice, the two ships headed directly back east almost in icefree waters. On September 23 they passed Bering Strait southward bound, and by October 23 they were back in Vladivostok.

#### 1913 SEASON

The following year the campaign was renewed, but under new commanders: Captain B. A. Vil'kitskiy, son of A. I. Vil'kitskiy, took over command of *Taymyr* and Captain P. A. Novopashenny assumed command of *Vaygach*. Sergeyev retained his position as expedition leader. The ships sailed from Vladivostok on July 9, 1913 and by the 20th had reached Bukhta Provideniya where they coaled from *Argun'* as usual. During this operation, however, Sergeyev suffered a stroke which left his left side paralyzed. The outcome was that he was evacuated south by sea, and Vil'kitskiy took command of the expedition.

Thus it was the beginning of August before the icebreakers ultimately passed Bering Strait. *Vaygach* was detailed to carry out an ice reconnaissance towards Ostrov Vrangelya, while *Taymyr* continued the mundane task of adding still more soundings to the route along the mainland coast. On August 16 the two icebreakers rendez-vous'd at Ostrov Krestovskiy in the Medvezh'i group. *Vaygach* had been unable to reach Ostrov Vrangelya due to heavy ice.

From here the vessels separated again, with Ostrov Preobrazheniya off the coast of Poluostrov Taymyr as the rendez-vous. *Vaygach* would follow the mainland coast, while *Taymyr* set a more northerly course around the north of Novosibirskiye Ostrova. Although entangled for some time amongst shoals in extremely shallow water (5 m or less) *Taymyr* managed to extricate herself and to proceed northwards. Early on the



morning of August 20 a small, high, rocky island was sighted; a landing was made and the flag hoisted. This was named Ostrov Vil'kitskogo. Next morning Ostrov Bennetta was sighted, but a landing was ruled out by heavy seas. On the afternoon of August 23 the rendez-vous was completed as planned off Ostrov Preobrazheniya. As always, *Vaygach* had had serious problems with the shallow-water conditions along the mainland coast in the Laptev and East Siberian seas, but had succeeded in surveying the south and east coasts of Ostrov Begicheva.

A few hours were spent ashore on Ostrov Preobrazheniya, then the ships proceeded north. *Vaygach* ran aground near the mouth of Bukhta Marii Pronchishchevoy, and had to call for help; thereafter both vessels surveyed the fiord-like inlet together. During the next four days, as the two ships worked their way slowly north along the east coast of Poluostrov Taymyr, surveying and sounding the tangled maze of headlands and islands, bedevilled by fog, snowsqualls and rain, hopes of rounding Mys Chelyuskina were high. They had met no heavy ice thus far, and the expectations were that Mys Chelyuskina would also be icefree, since, as far as was known, off it lay only deep, open water, with no barriers against which the ice could pile up.

On September 1, however, they encountered a field of solid ice right at the cape, with its edge stretching away to the northeast. The icebreakers turned north along the edge of this barrier, with the intention of rounding it on the north. On the afternoon of September 2 a low island was discovered; it was named Ostrov Tsesarevicha Alekseya, subsequently renamed Ostrov Malyy Taymyr in 1926. After a brief landing, the two ships continued to follow the ice edge north and west, with *Taymyr* in the lead.

#### SEVERNAYA ZEMLYA

That night, for the first time in their four seasons in the Arctic Ocean, they encountered icebergs, some 10-12 m in height. This posed another mystery, almost as puzzling as the unbroken ice off Mys Chelyuskina. What was the source of the icebergs? The glaciers of Svalbard, Zemlya Frantsa Iosifa were too far west, while the glaciers of Ostrov Bennetta were equally remote and too small.

The mystery was soon solved; at dawn next morning a steep, mountainous coast emerged from the haze. *Vaygach* was ordered to explore south along the coast, while *Taymyr* proceeded northwest. Generally *Taymyr* was able to follow the shore lead between the landfast ice and the pack. To port lay a high precipitous coast, from time to time interrupted by inlets or straits, but heavy ice prevented closer investigation. Thus Vil'kitskiy was unable to determine whether this was one island or an archipelago. Having surveyed 80 km of coast, *Taymyr* moored with ice anchors to the landfast ice and waited for *Vaygach* to catch up. The latter appeared on the morning of the 4th, and also moored to the landfast ice, close inshore. *Vaygach* had made little progress south along the coast before she was baulked by solid ice. Novopashenny landed a party on the southeastern cape, which was named Mys Yevgenova (now Mys Vaygacha).

At noon on September 4 a party from both ships went ashore to take astronomical and magnetic observations. Their position was established to be 80° 04'N; 97° 12'E and the site was named Mys Berga. A post was set up with date and name of the expedition. At 1800 hours the entire personnel of both ships, apart from a skeleton crew on watch, was paraded on shore, and Vil'kitskiy read a proclamation claiming the new landmass for the Tsar. The Imperial flag was hoisted to the accompaniment of a gun salute, and the landmass was named Zemlya Imperatora Nikolaya II.

Both vessels now proceeded farther northwestwards in company along a fairly continuous shore polynia. But gradually the ice became heavier and eventually the land to port came to an end. Beyond, heavily-ridged multi-year ice stretched to the horizon.

They had reached the northern tip of the new land (now Mys Arkticheskiy), and further progress was impossible. The icebreakers had traced the coastline over a distance of 290 km, and by dead reckoning they were at 81° 17'N. Despite an extensive water sky to the northwest, Vil'kitskiy wisely decided to retreat, although his decision was far from being unanimously popular.

Having successfully returned to Mys Vaygacha, the icebreakers were still unable to make any progress westwards along the south coast. After a visit to Ostrov Malyy Taymyr, and the discovery of nearby Ostrov Starokadomskogo, on September 10 the icebreakers were blocked by solid ice only 16 km from Mys Chelyuskina. A party of six men, led by Dr. Starokadomskiy reached the cape overland and built a small cairn. On the 12th both ships made one last concerted effort to force the ice barrier but had to retreat; in 24 hours they made only 5 km.

Heading almost due east, they were in completely open water by the afternoon of the 15th. At sunrise on the 18th they reached Ostrov Bennetta and a landing party went ashore to locate and recover geological samples left by Baron Toll in 1902. The mission was successful and a cross and plaque to Toll's memory were erected. Having surveyed the coasts of the island, the icebreakers proceeded east. On October 5 they passed Mys Dezhneva southward bound. A violent storm in the Bering Sea exhausted their coal reserves and this resulted in an emergency 10-day visit to St. Michael's, Alaska. Having bought enough coal to reach Petropavlovsk, they reached that port on October 27. By November 25 they were back at Vladivostok.

#### 1914 SEASON: THE THROUGH-PASSAGE

The following season, 1914, the two icebreakers were ordered to complete the through-passage to Arkhangel'sk; hydrographic work would be undertaken only if it would not hinder the achievement of that goal. The officers remained unchanged from the previous season.

The ships sailed from Vladivostok on June 7, but there were several delays before they got down to their real task. The first week was spent in bathymetric work in the Tuscarora Deep off the coast of Japan. Not until July 28 did they reach Bukhta Provideniya. The next task they were assigned was to try to rescue the crew of Stefansson's *Karluk*, marooned on Ostrov Vrangelya since the ship had been crushed the previous January (Bartlett, 1928; Bartlett and Hale, 1916; Stefansson, 1925). While *Vaygach* proceeded with hydrographic work along the Chukotka coast, *Taymyr* steamed to Nome to get the latest information on the rescue attempts. Her visit caused quite a stir, and made the pages of the "Nome Nugget" for August 3, 1914 (Barr, 1972:229).

The following day the news of the outbreak of war reached even such a remote spot as Nome. As units of the Imperial fleet, *Taymyr* and *Vaygach* might conceivably be required for active duty. Vil'kitskiy immediately put to sea to rendez-vous with *Vaygach* and consult with Novopashenny as to their course of action. The outcome of this consultation was that *Vaygach* should still attempt to reach Ostrov Vrangelya, while *Taymyr* would backtrack on Novo-Mariyinskiy on the Anadyr to ask for orders from the Naval Command in St. Petersburg. Finally the reply came: the icebreakers were ordered to proceed with their mission.

Steaming back north through Bering Strait, Vil'kitskiy hurried to catch up with *Vaygach*. On August 19 *Taymyr* reached her sister-ship beset in the ice within sight of Ostrov Vrangelya, indeed only some 25 km from the shore. She had been trying for several days to reach the island, but to no avail. As the two vessels tried to extricate themselves, *Vaygach* was completely immobilized for a spell: an underwater projection of ice

became jammed in her propeller. A diver had to be sent down to saw off this ice tongue.

By August 19 both vessels were back at Kolyuchinskaya Guga; *Vaygach's* hull had been dented and she had lost a propeller blade. Having coaled and watered from a collier they had arranged to meet them there, they sailed again on August 21. During the next two days they made repeated attempts to reach Ostrov Vrangelya, but in vain. The marooned crew of *Karluk* were finally rescued by the Alaskan schooner *King and Winge* on September 7.

The first task of the two icebreakers was to survey some of the small islands north of Novosibirskiye Ostrova. On August 27 *Taymyr* visited and surveyed Ostrov Vil'kitskogo. *Vaygach* was supposed to survey Ostrov Zhannetta and Ostrov Genriyetta, but could not reach them due to ice. Instead she discovered and surveyed another island, Ostrov Zhokhova.

By September 2, both vessels were back at Mys Chelyuskina; this year ice conditions in Proliv Vil'kitskogo were immeasurably better, and they passed the straits without difficulty. But off Mys Neupokoyeva, the southwest corner of Severnaya Zemlya, they ran into heavy ice. After a brief landing, the icebreakers weighed about midnight and headed slowly south through the ice. Fog caused long delays while they lay at ice anchors, but they made steady, though tortuous progress, dictated by the leads and polynias. They passed the Ostrova Geyberga but on September 9, off the Ostrova Firnleya *Taymyr* was caught between two large floes pivoting around each other and was severely nipped. She received heavy damage on the port side beneath the waterline; the bulkheads of the transverse and forward coal bunkers were stove in; rivets in the hull plating were extensively sprung; and the water started to pour in. The pressure fortunately ceased, the leaks were stopped, and the water pumped out, but the ship had been seriously weakened. Another similar nip might prove fatal. *Vaygach* also suffered damage from ice pressure; she broke another propeller blade, and was taking water quite steadily.

With the chance of pressure being renewed at any minute, *Taymyr's* crew spent the night in moving reserves of food, warm clothing and fuel from the hold to the upper deck, in preparation for abandoning ship. In the midst of all this anxiety, tension and bustle, while trying to reach *Vaygach*, the radio operator happened to pick up a totally unexpected transmission from some unknown ship (Barr, 1974a:6). He asked the other ship to identify herself, and was informed that she was *Eclipse*, some 275 km to the southwest.

*Eclipse*, a Scottish whaler, had been dispatched by the Russian government under the command of the veteran Norwegian arctic explorer, Otto Sverdrup, to search for any traces of the missing Rusanov and Brusilov expeditions (Sverdrup, 1928). In 1912, at the end of a summer's geological fieldwork on Svalbard, Rusanov with ten companions had sailed east in the diminutive *Gerkules*, in an attempt at traversing the Northern Sea Route. Apart from a message left at Matochkin Shar, nothing more had been heard from the expedition (Barr, 1974b). Brusilov, in *Svyataya Anna*, a somewhat more appropriate vessel, had also set out to tackle the Northern Sea Route. *Svyataya Anna* had last been seen as she fought her way through the ice of Yugorskiy Shar into the Kara Sea on September 4, 1912 (Barr, 1975b). Sverdrup had instructions to search the coasts of the Kara Sea for any sign of these expeditions, from the north island of Novaya Zemlya all the way to Mys Chelyuskina. *Eclipse* had penetrated east from Dikson, and at the time contact was made with *Taymyr* and *Vaygach*, was temporarily icebound near Mys Vil'da.

The unexpected contact with another expedition must have been a source of great relief to the officers and men aboard *Taymyr* and *Vaygach*. An animated exchange began, with

Sverdrup reporting all he knew of the progress of the war. Sverdrup thought that he might be able to reach the icebreakers, but fortunately the ice prevented him. From his wintering at Mys Vil'da he was able to act as an essential radio relay-station between *Taymyr* and *Vaygach* and St. Petersburg. Had he moved any farther north, he would have lost contact with the mainland. At the same time, even at Mys Vil'da, he was at the limit of *Taymyr's* range; had they been any farther apart they would not have been able to read each other.

After some more alarming ice pressures, and minor southwards progress, by September 24 *Taymyr* and *Vaygach* reached their enforced wintering sites: *Taymyr* lay near Bukhta Dika; *Vaygach* 25 km NNW of her; and *Eclipse* at Mys Vil'da, 275 km to the southwest. All three vessels made normal wintering preparations, and fairly rigid timetables of activities were inaugurated to counteract boredom and ward off scurvy.

Vil'kitskiy, Novopashenny and Sverdrup now began to wrestle with the problem of what would happen if the ice were not to break up the following season to free *Taymyr* and *Vaygach*, or if their somewhat depleted coal reserves were used up in manoeuvring to get out of the ice. There was insufficient food for the crews of the two icebreakers to survive a second wintering. The ultimate outcome, worked out in collaboration with the Chief Hydrographic Directorate in St. Petersburg, was a rather complex precautionary evacuation of half the crews. In the spring supply depots were laid between *Eclipse* and *Taymyr*, and on April 29 Sverdrup started north on skis with three men and three dogteams. Meanwhile *Vaygach's* complement of the evacuation party hiked across the ice to *Taymyr*. On May 19 the evacuation party, 39 in all, set off to walk the 275 km to *Eclipse*, escorted by Sverdrup and his men. In the meantime Nikofor Begichev, a very experienced northerner, had trekked north to *Eclipse* from the Turukhansk area with 650 reindeer. The caravan of reindeer and sailors started back south on July 15, and by August 19, had reached Gol'chikha on the Yenisey, some 700 km away.

In the event, *Taymyr* and *Vaygach* got under way without too much difficulty when breakup came in early August. They were badly delayed by ice and fog among the islands of Arkhipelag Nordenshel'da, but had reached Dikson by the end of the month. Once they had bunkered, and once *Vaygach* had picked up the overland party at Gol'chikha, they were ready to proceed west. The rest of the voyage was plain sailing and on September 16, 1915 *Taymyr* and *Vaygach* reached Arkhangel'sk. The Arctic Ocean Hydrographic Expedition was over.

#### ASSESSMENT

An assessment of the achievements of the expedition is not a simple task. Nobody can dispute that the discovery of Severnaya Zemlya and the other small islands was a significant contribution; as the last major territorial discovery to be made on the surface of the globe, the finding of Severnaya Zemlya was a particular triumph. As the second through passage of the Northern Sea Route, and as the first from east to west, the 1914-1915 voyage certainly deserves its place in history. But in terms of the furthering of the cause of the Northern Sea Route as a practical shipping route, both of these major achievements tended to backfire to some degree.

For many years after the completion of the expedition, it was argued by many eminent arctic navigators and scientists, among them men such as Novopashenny, Transehe, and Starokadomskiy (Pinkhenson, 1962:674-676; Transehe, 1925:392; Arngol'd, 1929), who had taken part in the expedition, that the presence and position of Severnaya Zemlya, for the time being, ruled out any possibility of the Northern Sea Route becoming a practicable route. It was felt that there was little likelihood of Proliv Vil'kitskogo regularly clearing of ice every season. With regard to the through-passage accomplished

in 1914-1915, the feature which detracted from it was the fact that *Taymyr* and *Vaygach* had been forced to winter. Not a single vessel yet had managed to make the passage from Atlantic to Pacific without wintering, and the sceptics doubted if it were possible. Clearly this was unacceptable for a commercial route.

A useful measure of how much weight these arguments carried is to be found in the movement of Russian naval vessels in 1916-1917. German submarine activities in the White and Barents seas necessitated the movement of warships from the Pacific, since the Baltic and Black Sea fleets were bottled up by the enemy. In this situation, precisely the one which it was hoped the Arctic Ocean Hydrographic Expedition would help to solve by demonstrating the reliable navigability of the Northern Sea Route, Naval Command routed the vessels involved by way of Suez and Gibraltar (Pinkhenson, 1962:643). En route the battleship *Peresvet* was sunk by German mines as she emerged into the Mediterranean at Port Said in January, 1917, and 250 men of her crew were lost. Of course the Revolution, the Civil War and the Interventions militated against any massive attempts at arctic exploration for some time, but it is significant that no attempt was made to follow up Vil'kitskiy's discovery of Severnaya Zemlya until 1930. That season a four-man expedition, led by G. A. Ushakov and relying on dogteams for transport was dispatched to the archipelago. In the course of two seasons work, Ushakov and his men established the extent of the archipelago, surveyed the coasts of all the major islands, and produced the first comprehensive map (Ushakov, 1959; Urvantsev, 1969; Barr, 1975a).

Traffic on the Kara Sea Route to the Ob' and the Yenisey in the west, and to the Kolyma in the east slowly built up during the twenties. Use of the entire route, however, was much slower in developing. The voyage of Amundsen's *Maud* was forced to winter three times: once at Mys Chelyuskina, once at Chaunskaya Guba, and once at Mys Serdtse-Kamen' (Belov, 1959:153-56).

Not until 1932 was a serious attempt made by the Soviet Government to conquer the Sea Route. Even then, however, *Sibiriyakov*, the vessel chosen, was scarcely the best available; she was originally the Newfoundland sealer *Bellaventure* of only 1380 tons displacement with engines of only 2,000 hp. She reached Bering Strait in one season, admittedly, but the last part of the voyage was made under improvised sails, since she had lost her propeller (Vize, 1946). The following year, *Chelyuskin* an ice-strengthened freighter, met with considerably less success. Beset in the ice near Kolyuchinskaya Guba, she drifted southeast to the narrows of Bering Strait, but at the critical moment the drift changed, and the *Chelyuskin* swung back north into the Chukchi Sea. She was eventually crushed and sank, but her crew were evacuated by air (Shmidt et al., 1935). The through-passage by the icebreaker *Litke* in 1934 can perhaps be taken to represent the true beginning of the Soviet exploitation of the Northern Sea Route. *Litke* steamed from Vladivostok to Leningrad in one season without serious incident (Vize, 1946; Nikolayeva and Sarankin, 1963). The next year cargo vessels began to move along the Sea Route with icebreaker escort in both directions, and it is from these beginnings that the Northern Sea Route as it is today has grown.

The true link between the voyages of *Taymyr* and *Vaygach* lies in the survey and scientific work carried out during the expedition. Unfortunately much of the scientific data were lost by fire in Yaroslavl in 1918 during the Civil War, the archives of the Hydrographic Directorate having been evacuated here from Petrograd (Belov, 1957:11). Thus, in essence the real contribution lay in the charts and pilots that were produced (Pinkhenson, 1962:631). On the basis of the 1911 surveys, a new chart of the coast of Chukotka as far west as the Kolyma had already been produced by 1912. In that year too, Captain Davydov compiled the first pilot for this same stretch of coast. By 1914

charts based on the expedition's work had been published for the entire coast from Bering Strait to Mys Chelyuskina. In 1922 the Central Hydrographic Directorate published the first Pilot of the Siberian Seas, divided into three parts: Mys Dezhneva to Chaunskaya Guba; Chaunskaya Guba to Khatangskiy Zaliv; and Khatangskiy Zaliv to Mys Chelyuskina. Data from the Arctic Ocean Hydrographic Expedition were also heavily used in a work published by the Central Hydrographic Directorate in 1918 on the meteorology and oceanography of the Kara Sea and Siberian Sea. Finally the first pilot for the Kara Sea, compiled by N. I. Yevgenov in 1930 also leaned heavily on the data gathered by *Taymyr* and *Vaygach* in 1914-1915. Thus, development of the Northern Sea Route, when it did finally come under the Soviet regime, owed not a little to the efforts of the officers and men of the Imperial Navy who served aboard *Taymyr* and *Vaygach*.

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