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Maritime Shipping on the Northern Sea Route: Need for Greater Emphasis on Mutual Cooperation and a Non-Negotiable Safety Culture. Part I*

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Abstract. The opening of the Northern Sea Route (NSR) due to the melting of the Arctic sea ice ushers in many opportunities. The International Maritime Organization has introduced several regulations for shipping and the training of seafarers. The Northern Sea Route has several challenges concerning the infrastructure and the harsh weather conditions. The recent incident on board the Viking Sky cruise liner was a reminder of such challenges. The Norwegian authorities responded admirably, and the Search and Rescue operation was conducted with the necessary coordinated effort in the shortest possible time. Other incidents along the NSR and increasing ship casualties in the Arctic region have been analyzed concerning the adequacy of existing regulations. The author's opinion is that these incidents bring out a need to examine the adequacy of the Polar code, infrastructure along the NSR, and the current state of Search and Rescue (SAR). From a practical point of view, the Norwegian experience would be of interest to all Arctic states and the IMO. The evolution of the Polar Code and the challenges in implementation are discussed. The article puts forth several recommendations for improving cooperation and safety to make the NSR a viable alternative route. This article can be used for educational purposes at universities. It is relevant for civil servants, shipping authorities, search and rescue authorities, and researchers involved in developing the Arctic sea routes and specifically the Northern Sea Route.

Keywords: *Arctic, Arctic routes, Arctic sea ice cover, The Northern sea route (NSR), Russia, Search and Rescue (SAR), vessel traffic patterns, cooperation.*

"All passengers and crew are safe…Throughout all of this; our first priority was for the safety and wellbeing of our passengers and our crew…We would like to thank the Norwegian emergency services for their support and skill displayed in managing the situation in very challenging weather conditions"[1].
(Statement by the company Viking Cruises)

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[1] Quoted in Calder S. Viking Sky: Why Things Went Wrong, What Happened and What's Next. URL: https://www.independent.co.uk/travel/news-and-advice/viking-sky-what-happened-storm-norway-emergency-evacuation-coast-a8837371.html (accessed 31 March 2019).

Introduction

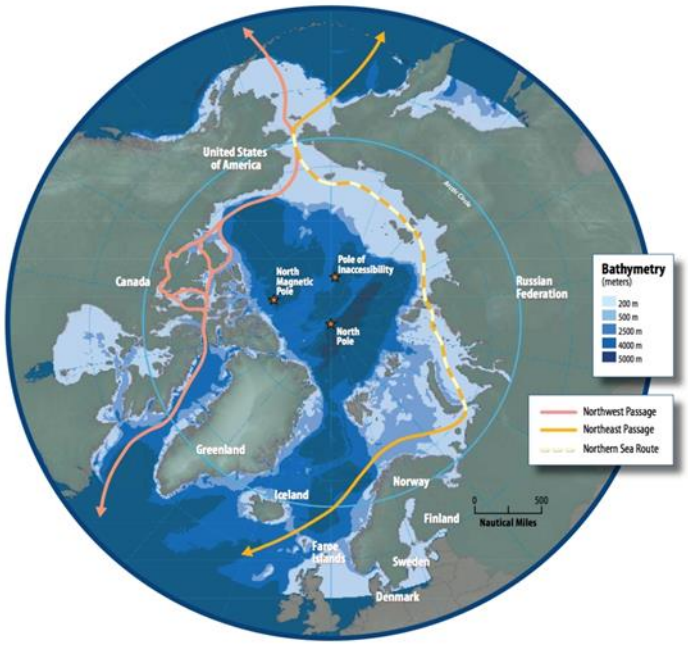


Fig.1. Nations with access to the Arctic sea will be able to shorten their sea transport routes because of the melting ice[2].

The Arctic is undoubtedly the most rapidly-changing region on the Earth and diminishing levels of sea-ice has exponentially increased opportunities for maritime activities in historically inaccessible areas such as the Northern Sea Route [NSR] and North-West Passage [1, Silber G.K., Adams J.D, p. 1], though the rate of increase in the use of these routes might not be as great as sometimes anticipated in the media.[3] By the Federal Law of the Russian Federation "About Internal Sea Waters, Territorial Sea, and Contiguous Zone of the Russian Federation" (Government of the Russian Federation, 1998), the NSR is recognized as a historical national transport route of Russia in the Arctic.

[2] The Seasonal Variations of Arctic Sea, 2018. URL: https://www.eco-business.com/news/how-well-development-in-the-arctic-affect-asia/ (accessed 31 March 2020).
[3]Rourke R. Changes in the Arctic: Background and Issues for Congress. 30.03.2020. URL: https://fas.org/sgp/crs/misc/R41153.pdf (accessed 12 April 2020).

Fig. 2. Pictorial representation of the Northern Sea Route vis-à-vis the Suez Canal route [4].

This article will focus on the Northern Sea Route [NSR] as shipping through the Arctic Ocean via the NSR could save up to 40% of the sailing distance from Asia (Yokohama) to Europe (Rotterdam) compared to the traditional route via the Suez Canal [2, Liu M., Kronbak J., p. 434]. While traffic volume through the Arctic routes is expected to increase over the next few decades, for several reasons, few observers expect that it will grow to rival established maritime trade routes [3, Verny J., Grigentin C., pp. 107-117]. However, an up to 40% reduction in distance or almost 4000 nautical miles using the NSR does not mean a corresponding 40% cost in savings as shipping companies must factor in higher building costs for ice-classed ships, the costs of Arctic proofing vessels, providing special training for crew members, non-regular and slower speeds, navigation difficulties and greater risks, compulsory icebreaker escort fees, and elevated insurance rates due to severe weather conditions and the lack of SAR assets [2, Liu M., Kronbak J., pp. 434-444].

[4] Devyatkin P. Russia's Arctic Strategy; Maritime Shipping (Part IV), 27.02.2018. URL: https://www.thearcticinstitute.org/russias-arctic-strategy-maritime-shipping-part-iv/ (accessed 01 January 2020).

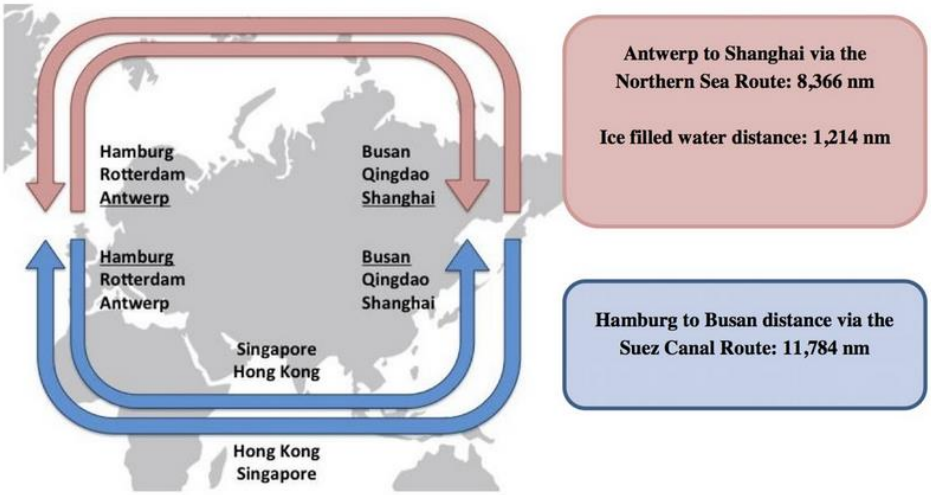


Fig. 3. Distance advantage of the Northern Sea Route vis-à-vis the Suez Canal route[5].

The Arctic Council's 'Arctic Marine Shipping Assessment 2009 report highlighted, "*There is a general lack of marine infrastructure in the Arctic, except for areas along the Norwegian coast and northwest Russia, compared with other marine regions of the world with high concentrations of ship traffic. Gaps in hydrographic data exist for significant portions of primary shipping routes important to support safe navigation. Besides, for safe operations in the Arctic, there is a need for the same suite of meteorological and oceanographic data, products, and services as in other oceans, plus comprehensive information on sea ice and icebergs. Except in limited areas of the Arctic, there is a lack of emergency response capacity for saving lives and for pollution mitigation. There are serious limitations to radio and satellite communications and few systems to monitor and control the movement of ships in ice-covered waters*" [4, Arctic Council, p. 6].

Russia needs to upgrade the Northern Sea Route [NSR]'s physical infrastructure (which atrophied after the dissolution of the Soviet Union in 1991) E.g., among Russia's seaports on the Arctic Ocean coast, only Dudinka can receive vessels all year round. All ports need dredging to be able to receive modern large-capacity vessels [5, Tianming G., Erokhin V., p. 2]. The dredging fleet operated in the Russian Arctic consists of only six vessels, incl. five self-propelled and one non-propelled dredger. Their average age is over 40 years. Because of the small number of available vessels and their obsolescence, Russia engages foreign dredgers primarily from the Netherlands and Belgium. Similarly, improving navigational, meteorological, and Search and Rescue (SAR) services will require investment on a substantive scale.

Russia does not have the financial wherewithal to do it alone, and thus far foreign investors except China, incl. from Asia, have shown limited interest [6, Arctic Centre, p. 41]. Second, the Arctic is rich in natural resources, but their scale and commercial viability remain open to question. Developing Arctic resources will be technically challenging and expensive; exploiting energy and mineral resources in other parts of the world such as the Middle East, Africa and South America, is

[5] Devyatkin P. Russia's Arctic Strategy; Maritime Shipping (Part IV), op.cit.

much cheaper, especially if the price of oil dips below $50 per barrel, existing shipping lanes that pass through Southeast to Northeast Asia have several advantages.

Third, and perhaps most importantly, from the perspective of Singapore, a major transshipment hub, the economics of container shipping on the NSR is sub-optimum. To improve economies of scale, and hence profit margins, shipping lines are investing in ever-larger vessels; the new generation of container ships has a cargo capacity of 18,000-plus TEUs. But due to draft and beam restrictions imposed by shallow waters and narrow straits in parts of the NSR, the largest container ships that can use the route have a maximum capacity of around 4,000 TEUs[6]. Thus, while it may be faster for a container ship to use the NSR than the Suez-Malacca route, the cost per container could be much higher due to the economy of scale limitations [7, Carmel S.M., pp. 38-41]. Also, harsh and unpredictable weather conditions on the NSR affect schedule reliability on which profitable container shipping depends. At the same time, the absence of major ports reduces opportunities to trade along the way.

However, the political instability in the Persian Gulf and the Middle East may also encourage countries of Northeast Asia, incl. possibly North Korea, in the future to cooperate with Russia in the development of the NSR. China has formalized its involvement in the development and exploration of the Arctic by its inclusion of northern maritime routes into a network of blue maritime passages of the Belt and Road Initiative (BRI) [8, Zhang X., pp. 370-395]. A fundamental part of the future Polar Silk Road is the Northern Sea Route (NSR), which runs along Russia's Arctic coast and provides easier access for cross-continental shipping in polar waters [5, Tianming G., Erokhin V., p. 2]. Chinese experts have stated that due to technological, economic, and political reasons, Russia is not able to increase the construction of ships and marine equipment to such an extent as to support the growing volume of cargo transportation in the Arctic [5, Tianming G., Erokhin V., p. 11]. North-East Asia has already developed as a region of significant economic importance. For China mainly, given the present dangerous geopolitical situation, with a declared trade war, the threat to the Oil producing countries of West Asia, the recent use of the "Pandemic COVID-19" as a form of trade and economic warfare, the threat of blockade since sanctions can be arguably considered as blockade; the NSR though it involves a larger financial outlay and creation of the necessary infrastructure, is a safer alternative and strategic route which must be developed along with the land route across Central Asia and Eurasia. It is, therefore, an opportunity for China to contribute its technologies and investment and to benefit from collaboration with Russia in this sphere [5, Tianming G., Erokhin V., p. 11]. Consequently, as sea-ice continues to retreat, the volume of traffic on the NSR will undoubtedly grow, especially to North-East Asia. But, for the reasons identified above, the NSR is unlikely to rival high-traffic maritime routes such as the Suez-Malacca passage in the immediate future.

[6] Humpert M. The Future of Arctic Shipping: A New Silk Road? 13.11.2013. URL: www.the arcticinstitute.org/future-arctic-shipping-new-silk-road/ (accessed 15 October 2019).

Realizing this and other impediments, President Vladimir Putin invited foreign investors to assist in the joint construction of Northern sea route hubs at Murmansk and Petropavlovsk-Kamchatka at the International Arctic Forum in Saint Petersburg in April 2019. He also directed the Government to draw up plans for tax relief that would promote the development of the Arctic region[7]. In February 2020, the Russian Prime Minister Mikhail Mishushtin announced a legislative package for the development of the Arctic. Any company or entrepreneur registered in the Arctic region will be given several tax benefits if they invest at least 10 million rubles in any territory of the Arctic zone[8]. The package also includes a zero-rate tax on mineral extraction for 12 years and a preferential tax regime of 5% for 15 years to stimulate oil production on the continental shelf [9]. The package is also envisaged to support the construction of ports, industrial enterprises, and other sectors essential for the development of the Arctic. The policy provides for zero income tax for ten years and for reduction to zero of VAT on services for transportation of export goods and their ice-breaking support, which should support the further development of the Northern Sea Route[10].

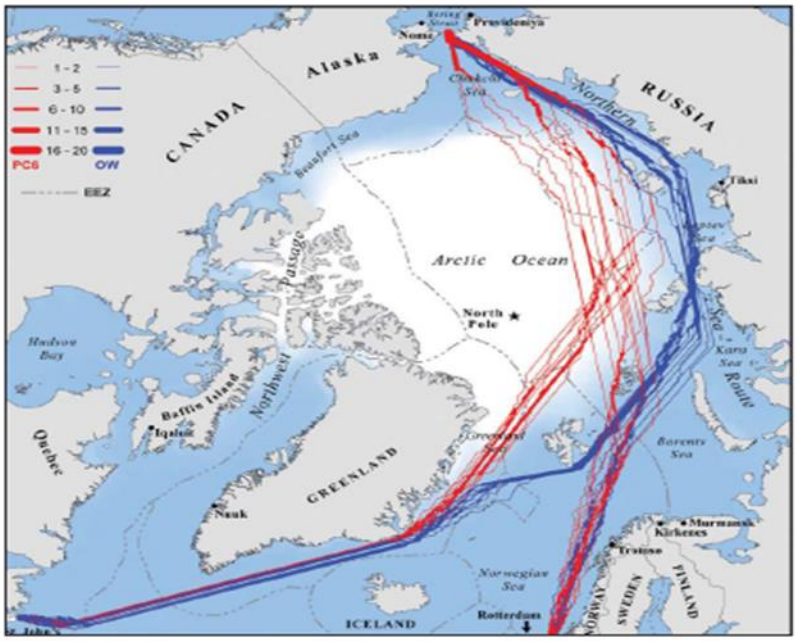


Fig.4. The fastest navigation routes for ships seeking to cross the Atlantic Ocean during September currently favors the NSR along Russia's coastline (Proceedings of the National Academy of Sciences) [9, ABS, p. 2].

It was followed by an even more significant development, which was the release of the document, "Fundamentals of Russian state policy in the Arctic until 2035", signed by President Vladimir Putin[11]. The document stated that the development of the NSR as a competitive national transport communication of Russia on the world market is one of the main national interests of

[7] Putin invites foreign investors to help build Northern Sea Route hubs. 09.04.2019. URL: https://www.arctictoday.com/putin-invites-foreign-investors-to-help-build-northern-sea-route-hubs/ (accessed 10 April 2020).
[8] Northern Sea Route Information Office, News Review of the Events on the NSR. 01.02.2020. URL: https://rticlio.com/news-review-of-the-events-on-the-nsr1-february-2020 (accessed 15 March 2020).
[9] Ibid.
[10] Ibid.
[11] Putin Endorses Foundations of Government Policy in the Arctic until 2035. The Arctic, 06.03.2020. URL: https://arctic.ru/infrastructure/20200306/931543.html (accessed 10 March 2020).

the Russian Federation in the Arctic[12]. It also stated that failure to meet the deadlines for the creation of the infrastructure of the NSR, the construction of rescue, and ice-breaking fleets is noted as one of the main threats to national security[13]. The policy also envisages the start of work on the creation of an integrated infrastructure of the NSR, a hydrometeorological, hydrographic and navigation support system for navigation along the NSR[14]. The main infrastructure is being created as part of the federal project "Northern Sea Route" with the main goal of achieving an increase in cargo traffic to 80 million tons by the end of 2024[15]. The total financing of the project until the end of 2024 is expected to be 735 million rubles[16]. The project is undoubtedly impressive in conception, but it remains to be seen if adequate funds would be made available, particularly with low oil prices and the current economic crisis due to COVID-19.

The Government is also examining the concept of the Northern Sea Route Transport Corridor to facilitate integrated work on the infrastructure of the Arctic ports, development of an icebreaker fleet, and the creation of a network of railways and highways in all regions of the Arctic[17]. It includes the construction of the most powerful icebreakers of the world (five vessels of Project 22220), auxiliary and rescue fleet, as well as the construction of the Northern Latitudinal Railway[18]. It would also allow Arctic logistics is not limited by the NSR, which begins at the Kara gate in the west and the Bering Strait in the East, as specified by international legislation[19]. The Kamchatka Development Corporation (KRKK) and Primorsky Universal Handling Company (Primorsky CPC) signed an initial agreement during the International Arctic Forum in April in Saint Petersburg on 09 April. The accord envisions the construction of a container terminal near Leningrad and another on the Kamchatka Peninsula, to be completed by 2022 and 2024, respectively. Also, one may be built on the Kola Peninsula near Murmansk[20]. OOO Pribezhny has commenced construction of a transshipment facility in Liinakhamari with a focus on Arctic logistics[21]. The borders of the Murmansk port have been modified by order of the Government of Russia dated March 31, 2020. It is to facilitate a marine transshipment complex for liquefied natural gas (LNG) [22]. The Norwegian Maritime Authority issued a permit for the transshipment of LNG produced by Novatek under the "side to

[12] Northern Sea Route Information Office, News Review of the Events on the NSR. 01.03.2020. URL: https://rticlio.com/news-review-of-the-events-on-the-nsr1-march-2020 (accessed 10 March 2020).
[13] Ibid.
[14] Ibid.
[15] Ibid.
[16] Ibid.
[17] Northern Sea Route Information Office, News Review of the Events on the NSR. 01.02.2020. URL: https://rticlio.com/news-review-of-the-events-on-the-nsr1-february-2020 (accessed 15 March 2020).
[18] Northern Sea Route Information Office, News Review of the Events on the NSR. March 2020, op.cit.
[19] Chernov V. New Port Planned for Russia's Growing Northern Logistics Chain. 14.03.2020. URL: https://www.maritime-executive.com/blog/new-port-planned-for-russia--s-growing-northern-logistics-chain (accessed 15 March 2020).
[20] Humpert M. Container Shipping is coming to the Arctic along Russia's Northern Sea Route. 05.07.2019. URL: https://www.highnorthnews.com/en/container-shipping-coming-arctic-along-russias-northern-sea-route/ (acessed 06 June 2019).
[21] Chernov V. New Port Planned for Russia's Growing Northern Logistics Chain, op.cit.
[22]Northern Sea Route Information Office, News Review of the Events on the NSR. 01.04.2020. URL: https://rticlio.com/news-review-of-the-events-on-the-nsr1-april-2020 (accessed 12 April 2020).

side" (ship to ship) scheme for six years [23]. This was supposed to be carried out in the Murmansk region, around Kildin island[24]. Novatek had reported completion of the construction of anchoring berths for carrying out side-by-side transshipment operations near the Kildin island [25]. It is also intended to create a transport and logistics hub in Sakhalin, which will include modernization of the Korsakov port and possibility in the future of a modern transshipment port in the Makarovskiy district [26].

Fig. 5. Map showing the approximate proposed route and location of the transshipment hubs [27].

The first landmark transit voyage along the NSR was during the summer of 2010 of the MV Nordic Barents, an ice-class IA bulk carrier flying the flag of Hong Kong and owned by the Norway-based Tschudi Shipping Company [10, Franckx E., Boone L., p. 190]. The ship left the port of Kirkenes, Norway, with a cargo of 41,000 tons of iron ore concentrate to be unloaded just twelve days later in China. This ship did not stop at a Russian port to load or unload [10, Franckx E., Boone L., p. 190]. It, therefore, represented the first instance that an exact transit passage for international commercial purposes took place by a foreign-flagged vessel using the Northern Sea Route. However, *MV Beluga Fraternity* and *MV Beluga Foresight* had technically used the NSR from East to West with the help of the icebreaker *50 Let Pobedy* at the end of August – September 2009[28]. The *MV Nordic Barents* was escorted by Russian nuclear icebreakers and completed the entire passage of the Northern Sea Route in nine days [11, Ostreng W. et al., pp. 184-185]. Therefore, it is evident that an increase in trans-Arctic shipping along the NSR will benefit ports in Northeast Asia

[23] Ibid.
[24] Ibid.
[25] Ibid.
[26] Northern Sea Route Information Office, News Review of the Events on the NSR. February 2020, op.cit.
[27] Ibid.
[28] Chernova S., Volkov A. Economic feasibility of the Northern Sea Route container shipping development. Master's thesis. Bodo University, 2010. URL: https://nordopen.nord.no/nord-xmlui/handle/11250/140636 (accessed 06 June 2020).

and may divert traffic from traditional transshipment hubs such as Singapore. According to preliminary estimates, shipping in the region promises to increase China's trade with European countries from 10.95% to 20% and to contribute to ensuring energy security due to diversifying fuel supply routes [12, Kobzeva M., p. 6]. Japan [29] (world's largest LNG buyer) and Germany, though close security partners of the United States, have continued their energy links with Russia despite the threat of US sanctions. In response to President Trump's remark in July 2018, "Germany, as far as I am concerned, is captive to Russia because it's getting so much of its energy from Russia", Chancellor Angela Merkel retorted diplomatically, "we can make our policies and our own decisions" [30]. Having discussed the broad issues concerning the NSR, it would be relevant to examine with the help of two case studies whether the concerns mentioned above, especially related to the safety of navigation, can be justified with the help of two case studies.

Incident 1. «Viking Sky»

A study of "Arctic Tourism: Realities and Possibilities" published in the Arctic Yearbook 2014 recognized various aspects of incl. possible challenges and solutions. The study defined the Arctic as incl. all of Norway, incl. Tromso [13, Maher P., p. 6]. There has been an increasing trend of large passenger ships operating in Arctic waters. The basic search and rescue infrastructure and minimal hydrographic data in these areas continue to be a cause for concern for the cruise shipping industry intent on expanding in these waters [14, Brigham L., p. 179]. In 2019 while on a pleasure cruise hundreds of passengers, many of them senior citizens had to be evacuated from the cruise liner "*Viking Sky*" when off the Norwegian coast. Though the incident happened just outside Arctic waters as defined by the Polar Code, it is considered relevant to discuss the case study with the steady growth of Arctic tourism. The Arctic Shipping Status Report stated that in line with the increase in Arctic marine tourism, 73 cruise ships sailed in the Arctic Polar Code area in 2019 as compared to 65 in 2018 [31]. The ship had stormy weather experience and the engines stopped working. The ship was only two years old, with 915 passengers and 458 crew members. The *Viking Sky* was taking passengers on the "In Search of the Northern Lights" voyage starting and ending in Tilbury in Essex. She had sailed from Tromsø on 21 March 2019 and was due to arrive in Tilbury on 26 March despite a shipping forecast for the planned voyage of both heavy winds and rough seas. Finally, "Mayday" was declared at 1400 hours on 23 March after it lost power/propulsion and started drifting towards the land (Hustadvika's offshore rocks). As per the company statement, *Viking Sky* experienced a loss of engine power off the coast of Norway near Molde." An emergency had to be declared, and passengers went to their rescue stations. According to company sources, a

[29] Hanafusa R. Japan and Russia set to launch $9bn LNG project in Far East. Nikkei Asian Review, 20.12.2019. URL: https://www.asia.nikkei.com/Business/Energy/Japan-and-Russia-set-to-launch-9bn-LNG-project-html (accessed 06 January 2020).

[30] Karasz P. Germany Imports gas From Russia. But Is It a 'Captive', 11.07.2018? URL: https://www.nytimes.com/2018/07/11/world/europe/trump-germany-russia-gas-html (accessed 12 January 2018).

[31] Protection of Arctic Marine Environment. Arctic Shipping Status Report 2013-2019. URL: https://pame.is/index.php/projects/arctic-marine-shipping/astd (accessed 16 April 2020).

huge wave came at this time, swept passengers off their feet, and also broke a large window causing injuries[32].

Search and Rescue

Passengers were evacuated by helicopter being winched off the ship individually and taken in groups of 15-20 to the town of Molde. 479 passengers were evacuated from the vessel by 1030 hours on 24 March. Approximately 20 people who suffered injuries underwent treatment at medical centers in Norway. It is relevant to mention that at the time of the emergency, the *Viking Sky* was 200 nautical miles south of the Arctic Circle. This fortuitous position aided search and rescue operations. On completion of the Search and Rescue [SAR] operation in addition to thanking the Norwegian administration, which did a commendable job, the company stated that "We would also like to thank the residents who throughout the whole process have been incredibly supportive and hospitable. "In another incident affecting a ship of the same company, passengers of the Viking Idun were jolted out of their beds in the early hours of the morning on April 01, 2019, after their vessel collided with an oil tanker. The river cruise from Antwerp to Gent had been carrying 171 passengers on a 10-day itinerary through Belgium. Fortunately, no one was seriously injured, and there was no leak as the damage was above the waterline"[33].

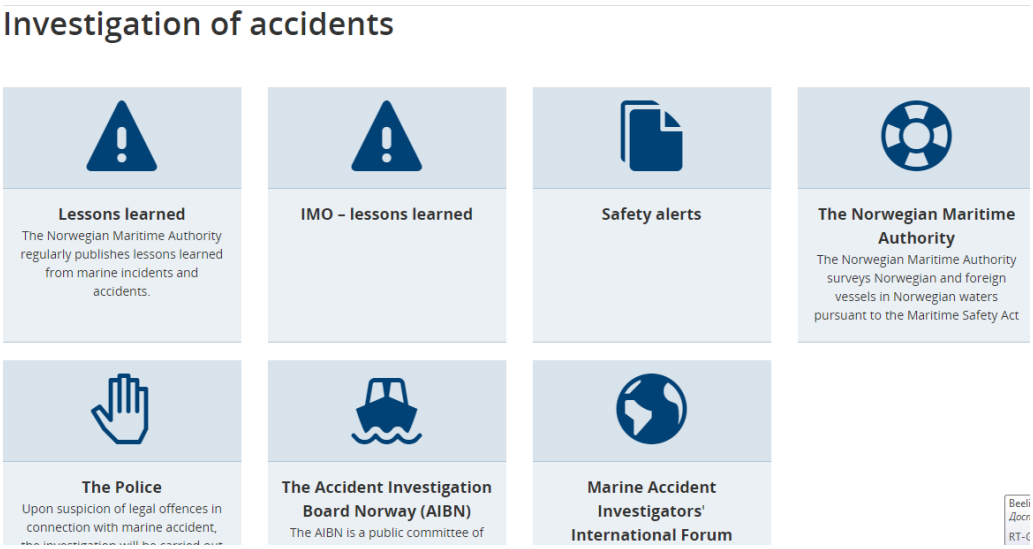
Analysis: Viking Sky Incident

While undoubtedly, the authorities would carry out a detailed investigation into the incident, an engine failure in a two-year-old ship is a serious cause for concern. It could point to either faulty operation of the engine or lack of knowledge by the crew in handling an emergency. On March 25, 2019, Sjofartsdirektoratet (Norwegian Maritime Authority) started an investigation of why the vessel was navigating in such weather. A technical study about engines' malfunction and a review of the rescue operation was also conducted. Officially, engines' failure was caused by low oil pressure. The lubricating oil's level in the tanks was within set limits, but relatively low during the Hustadvika crossing. The oil tanks are fitted with level alarms, but those did not trigger at the time. The heavy seas in Hustadvika caused significant movements in the tanks, and the supply to the pumps stopped. It triggered an alarm indicating low lubrication oil level, which in turn caused the automatic shutdown of all four engines [34]. On March 26, Sjofartsdirektoratet granted Viking Ocean Cruises a permit for Viking Sky to sail to Kristiansund for urgent repairs.

All such engines and their control equipment fitted on various ships of the type would need to be checked for seaworthiness. Besides, the decision to sail despite a weather warning of gale-force winds and stormy seas is another area that needs investigation. Though the incident hap-

[32] Quoted in S. Calder. Viking Sky: Why Things Went Wrong, What Happened and What's Next, op.cit.
[33] Terror as Viking Cruise Ship wake in Collision with Oil Tanker. 05.04.2019. URL: https://www.nzherald.co.nz/travel/news/article.cfm?c_id=7&objectid=12219543 (accessed 10 April 2019).
[34] Viking Sky accidents and incidents. 10.04.2019. URL: https://www.cruisemapper.com/accidents/Viking-Sky-972 (accessed 15 April 2019).

pened outside the Arctic Circle, its proximity to Arctic waters, the presence of 915 passengers and 458 crew members, and an almost brand new cruise liner brings out a need to examine the adequacy of the Polar code and the current state of Search and Rescue [SAR]. Whilst the Norwegian Maritime Authority has a comprehensive website for seafarers following the Maritime Safety Act, it has not yet put out an investigation report on this incident [35].



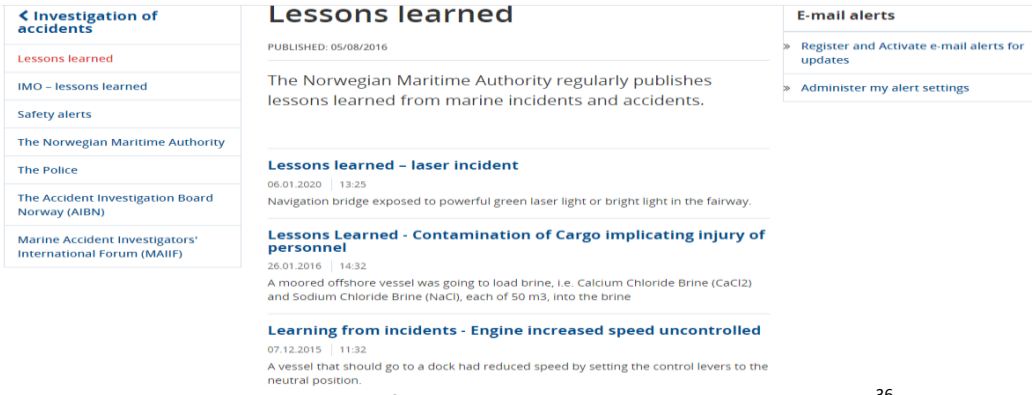


Fig. 6. Representation of the Norwegian Maritime Authority website [36].

Incident 2. Boris Vilkitsky Incident

These facts are gross violations of the Rules of navigation in the waters of the Northern sea route: on April 09, 2018 Merchant vessel “Boris Vilkitsky” entered the waters of the NSR via point Cape Zhelaniya with the help of the icebreaker “Taimyr” in violation of the ‘rules of navigation’ in the waters of the Northern Sea Route. The Kara Gate located between Vaigach Island and Novaya Zemlya Island is the hardest for navigation because of the ice exchange with the Kara Sea. There is predominantly first-year pack ice with a thickness that reaches 0.12-0.14 m by the end of the win-

[35] Norwegian Maritime Authority, Norwegian Maritime Authority. 09.04.2020. URL: http://www.nsra.ru/ru/archive_non_compiant_vessels_2018.html (accessed 01 January 2019).
[36] Northern Sea Route Authority, Srochno Informatsii – Suda Narushiteli, 12 April 2018. URL: http://www.nsra.ru/ru/archive_non_compiant_vessels_2018.html (accessed 01 January 2019)

ter. Ice fields in the Kara Gate are frequently compressed and hammocking, which tremendously aggravates ice-breaking. In that region, ice flows periodically drift with high speed, which may disable even nuclear icebreakers [15, Mayorova et al., pp. 117-128].

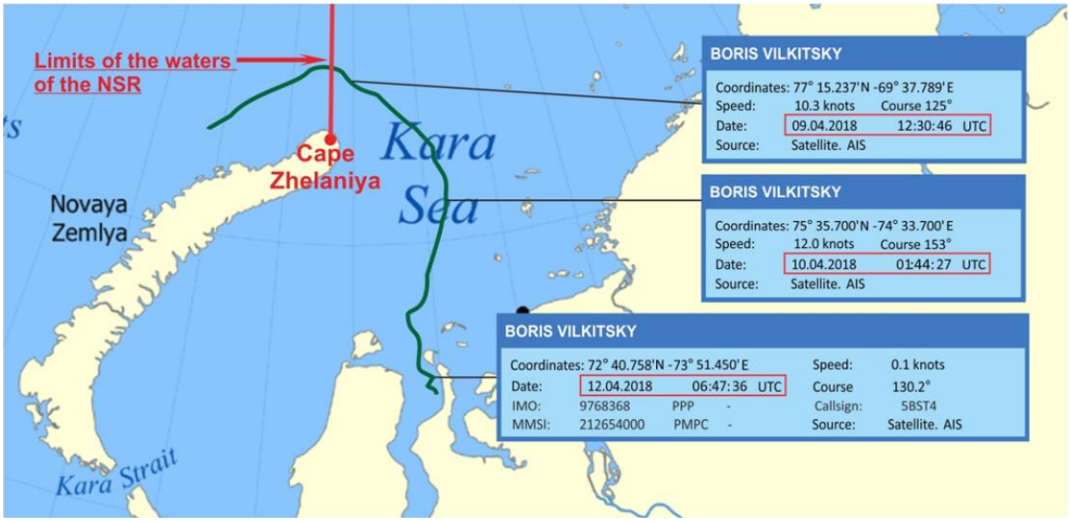


Fig. 7. Representation of the Boris Vilkitsky incident by the Northern Sea Route Authority[37].

According to a Western source, there was an ongoing feud over control of the Northern Sea Route between the Rosatom and the Russian Ministry of Transport[38]. However, according to Russian sources, it is rather a feud between NSR Administration (controlled by Ministry of Transport) and Novatek, which experiences a shortage of high ice-classed vessels for the development of its projects on the Yamal peninsula[39]. However, it is understood that this reportedly escalated in April 2018 when the LNG carrier *Boris Vilkitsky*, operated by Dynagas LNG Partners (Cyprus), a vessel not registered in an Arctic state entered the NSR despite damage to one of its three engines.

The malfunction reduced the vessel's ice capabilities from Arc7 to Arc4 and made it illegal for the vessel to enter the route. A vessel must be at least of Arc5 class[40] to operate in the Kara Sea during summer and autumn. Arc4 class vessels are allowed independent navigation under easy and moderate ice conditions. During winter and spring – Arc8. Independent operation of Arc5 and Arc6 class vessels are permitted under easy ice conditions only, and Arc7 is permitted under easy and moderate ice conditions [5, Tianming G., Erokhin V., p. 9].

[37] Northern Sea Route Authority, Srochno Informatsii – Suda Narushiteli, 12 April 2018. URL: http://www.nsra.ru/ru/archive_non_compiant_vessels_2018.html (accessed 01 January 2019).
[38] Malte H. Shipping Safety Violation Escalating Internal Conflict Russia's Northern Sea Route, 04 May 2018. URL: https://www.arctictoday.com/shipping-safety-violation-escalating-internal-conflict-russias-northern-sea-route/ (accessed 15 April 2019).
[39] Gunnarsson B. Ship Traffic Analysis on the Northern Sea Route and Development of Arctic Transportation and Logistics. Lecture to the International Ph.D. School, Northern Arctic Federal University, Arkhangelsk, 05 April 2019.
[40] Sevmorput Doshel do Kremlya. Kommersant. 03 May 2018. URL: https://www.kommersant.ru/doc/3619227 (accessed 15 April 2019).

The NSR Administration officials only became aware of the damage when the vessel experienced difficulties navigating in heavy ice end route to Sabetta port while being escorted by the Rosatomflot (Rosatom's subsidiary) icebreaker Taimyr. Following the arrival of the vessel in Sabetta, officials uncovered additional violations, incl. the absence of accurate ice charts and the lack of required ice navigation experience by the captain and crew[41]. The *Boris Vilkitsky* remained in port for more than a week before it was permitted to leave upon intervention by the Presidential Administration[42]. The Rosatom presented this case as evidence of the Ministry of Transport's bureaucratic approach to the NSR management while portraying itself as a responsible actor who cared for Russia's commercial interests [16, Sergunin A., Konyshev V., p. 6]. In this situation, President Putin supported the Rosatom and criticized the Ministry of Transport during a meeting with members of the Duma (Russian Parliament). He stated, "Gas carriers are not allowed into the port under far-fetched pretexts, then they do not let them depart. It will be dealt with separately"[43].

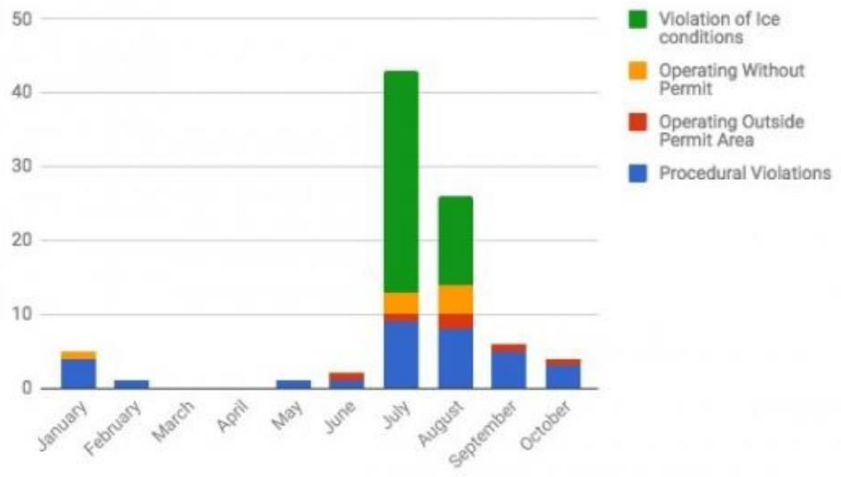


Fig. 8. Violation of Safety Rules along the NSR: January — October 2017[44].

There have been other safety violations reported and archived on the Northern Sea Route Authority website for the years 2016–2017, which was a welcome development[45]. According to the analyst Malte Humpert these violations showed a sharp increase in 2017, as shown in Fig. 8[46]. But this may also be because of the sharp increase in traffic along the NSR concerning previous years. Cargo traffic in the Arctic seas has been steadily increasing, amounting to 54.3 million tons in 9 months of 2017, to 66.9 million tons in 2018, and 78.6 million tons in 2019 [17, Teslya A., Gutman S., p. 3]. However, the

[41] Malte H. Shipping Safety Violation Escalating Internal Conflict Russia's Northern Sea Route, op.cit.
[42] Ibid.
[43] Sevmorput Doshel do Kremlya. Kommersant. 03 May 2018. URL: https://www.kommersant.ru/doc/3619227 (accessed 15 April 2019).
[44] Malte H. Shipping Safety Violation Escalating Internal Conflict Russia's Northern Sea Route, op.cit.
[45] Northern Sea Route Authority, Srochno Informatsii – Suda Narushiteli, 12 April 2018. URL: http://www.nsra.ru/ru/archive_non_compliant_vessels.html. (accessed 01 January 2019).
[46] Malte H. Shipping Safety Violation Escalating Internal Conflict Russia's Northern Sea Route, op.cit.

website does not show any entries for 2018 other than the *Boris Vilkitsky* incident and nil for 2019 [47]. It is presumed that there were no safety violations observed or reported. However, Western observers have already remarked that the bad publicity post the *Boris Vilkitsky* incident and increased number of safety violations reported in 2017 may have led to a clampdown on putting information on the website[48]. The website also does not indicate any action taken against violations and steps taken to prevent the recurrence of incidents posted earlier on the website[49].

Fig.9. Map of the NSR [9, ABS, p. 5].

The length of the Northern sea route varies from Kara gate to Dezhnev strait is approximately 2,700 nautical miles (high latitude paths) to about 3,500 nautical miles (littoral paths) depending on the particular route, ice situation, weather conditions, and other factors [5, Tianming G., Erokhin V., p. 6-7]. It is noteworthy that after that incident, the Ministry of Transport developed a bill (still under consideration) suggesting splitting the NSR into 28 sections (instead of 7) of more precise regional ice conditions that would allow for extending navigation through the NSR to vessels with weaker ice-classification. The bill would enable ARC-4 and Arc-5 vessels to enter some of the areas of the NSR (in particular, Kara Sea and Sabetta region — important for Novatek) where they were and are prohibited from entering under current regulations[50]. Current rules of regulation for the NSR which came into force on 17 January 2013 stipulate that there are seven large areas of the NSR with different climate and ice conditions and the rules for ship permission

[47] Northern Sea Route Authority, Srochno Informatsii – Suda Narushiteli, 12 April 2018. URL: http://www.nsra.ru/ru/archive_non_compliant_vessels.html. (accessed 01 January 2019).
[48] Malte H. Economic interests may trump shipping safety as Russia seeks to reduce ice class requirements. 12.11.2018. URL: https://www.highnorthnews.com/en/economic-interests-may-trump-shipping-safety-russia-seeks-reduce-ice-class-requirements (accessed 15 April 2019).
[49] Ibid.
[50] Malte H. Shipping Safety Violation Escalating Internal Conflict Russia's Northern Sea Route. 04.05.2018. URL: https://www.arctictoday.com/shipping-safety-violation-escalating-internal-conflict-russias-northern-sea-route/ (accessed 15 April 2019).

to enter each of these areas differ depending on the ice class of the vessel, ice and weather conditions and season[51]. The apparent alleviation of the ice situation in the Arctic should not be categorically associated with the improvement of navigation conditions [5, Tianming G., Erokhin V., p. 8]. Dynamic forces that affect the ice, as well as icebergs detached from an ice shelf, pose severe risks for navigation [5, Tianming G., Erokhin V., p. 8]. Thus, in some of the parts of the Arctic Ocean, deformed first-year ice may reach 5-7m in thickness, which aggravates or almost blocks the passage of sea vessels, specifically in narrow straits where the currents press the ice and in such a way increase its thickness [5, Tianming G., Erokhin V., p. 8]. Drifting ice is another danger to navigation. Because of the decreasing thickness of ice cover and the area of the ice shelf, ice becomes more mobile, drift velocity increases, and the behavior of ice becomes more dynamic and less predictable [5, Tianming G., Erokhin V., p. 8]. Thus, many experts believe that there are dynamically changing icing conditions throughout the year [18, Zagorski A., p. 225]. Currently, specialists from the Admiral Makarov State University of Maritime and Inland Shipping in Saint Petersburg are trying to develop a new method for forecasting the ice situation in the Kara Sea that is part of the NSR[52].

The NSRA gives permission based upon certification provided by the ship. There is no physical inspection [18, Zagorski A., p. 225]. In another incident, on April 3, 2020, the nuclear icebreaker "Vaygach" completed emergency towing of the tanker "Varzuga" (Bunker company, JSC Arkhangelsk) in the north-eastern part of the Barents Sea. This towing started on March 29 in the Ob Bay along with another nuclear icebreaker "50 let Pobedy" as the tanker, which was in ballast had a failure in Azipod steerable thruster. The ship could have drifted ashore due to the ice conditions. Therefore, according to Dmitry Lobusov, captain of the icebreaker "50 let Pobedy", "it was necessary to get to work quickly"[53]. Therefore, after carrying out an open-source analysis of the incidents along the NSR and taking into account the views of experts and the paramount need to preserve the fragile Arctic environment, in the considered opinion of the author, it is too premature to consider an amendment based on economic interests. The Russian authorities need to consider an amendment after only ten years of safe operation in the waters of the NSR, i.e., not before 2023. The views of seafarers incl. masters of Arctic nation flagged vessels, would need to be considered.

[51] Northern Sea Route Authority, Rules of Navigation in the water area of the Northern Sea Route. 12.04.2018. URL: http://www.nsra.ru/files/fileslist/120-en5280-120-en-rules_perevod_cniimf-13_05_2015.pdf (accessed 01 April 2020).
[52] Northern Sea Route Information Office, News Review of the Events on the NSR. March 2020, op.cit.
[53] Northern Sea Route Information Office, News Review of the Events on the NSR. April 2020, op.cit.

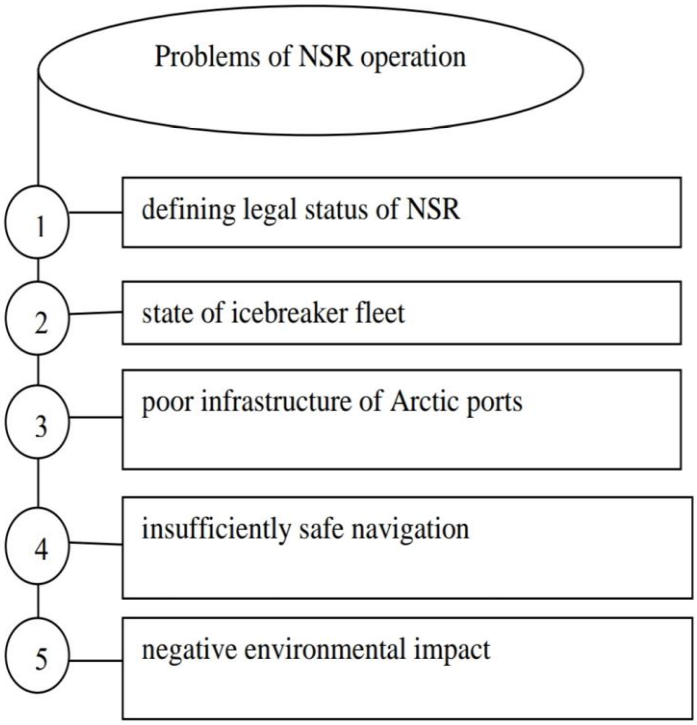


Fig. 10. Problems of NSR operation [11, Teslya A., Gutman S., p. 3].

At the International Scientific Round table conference: "Logistics in the Arctic: problems of international cooperation" held in Saint Petersburg in November 2019, researchers brought out the problems of NSR operation, as indicated in Fig. 10. They also stated that the seaports are the weakest link in the NSR, as their owners do not have sufficient funds for modernization [17, Teslya A., Gutman S., p. 3]. Some of the drawbacks highlighted were:

- Berthing facilities require overhaul and reconstruction.
- Sea bottom must be dredged to receive modern large-capacity ships.
- There are limited services for bunkering of ships or collection of sewage or solid waste.
- There are no facilities for oil spill response and collection and disposal of ship's waste, or these facilities are in a critical condition.
- Protective structures, signaling, and warning systems have fallen into disrepair due to a lack of proper control. Security for inspection and admission to special facilities are poorly developed [17, Teslya A., Gutman S., p. 3].

Most likely, after careful study of inputs from all stakeholders, on 27 December 2018, President Putin signed a law that established a shared responsibility for the NSR management between the Rosatom and Ministry of Transport[54]. Rosatom's new powers in the Arctic included development and operational duties for shipping, as well as infrastructure and seaports along the northern Russian coast. The Ministry of Transport retained its powers to issue regulations on shipping (incl. safety and environmental standards), allow or deny ships' access to the NSR, and develop international cooperation, incl. the Polar Code implementation [16, Sergunin A., Konyshev V., pp.

[54] Federal Law "O Vnesenii Izmeneniy V Otdel'nye Zakonodatel'nye Akty Rossiyskoi Federatsii" [On Making Changes in Some Legislative Act of the Russian Federation]. URL: http://docs.cntd.ru/document/552045960 (accessed 15 April 2019).

6-7]. This reform was ostensibly made to help the NSR to fulfill the presidential task to increase annual goods volumes shipped along the Arctic route to as much as 80 million tons by the year 2024, a highly ambitious target [16, Sergunin A., Konyshev V., pp. 6-7].

There is a myriad of agencies coordinating operational support, SAR, and development across the Northern Sea Route. The Federal Service for Hydrometeorology and Environmental Monitoring and the State Space Corporation are responsible for providing the governmental organs and ships with information on meteorological forecasts and ice conditions in the NSR area. The Ministry for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters is responsible for search and rescue operations and oil spill prevention and response in the Arctic – both on land and sea [16, Sergunin A., Konyshev V., pp. 7-8].

A number of government agencies such as the Defense Ministry, Ministry of Interior, and Federal Security Service (incl. the Border Guard Service and Coast Guard) are charged with providing the AZRF with internal and external security. The Ministry of Transport, together with the Ministry of Foreign Affairs, conducted negotiations with the IMO on the Polar Code. The Russian Coast Guard cooperates with the similar services of other Arctic coastal states, incl. the Coast Guard Arctic Forum established in 2015 [16, Sergunin A., Konyshev V., p. 8].

Analysis – Boris Vilkitsky Incident

The *Boris Vilkitsky* incident brings out that commercial interests will always try to violate safety norms whenever it is expedient to do so. In this case, the signaling in favor of pecuniary gain by the interested company, by the concerned Government authority as reported in the Russian media, is a cause for concern. It will be more relevant in the case of vessels which have flags of convenience. Among the greatest threats to Arctic biological processes are large-scale oil and chemical spills. Effects from spills are particularly acute given that the region is remote, insufficiently charted, and inadequately supported by spill response architecture [19, Nevalainen M., Helle I., Vanhatalo J., p. 90]. Luckily, the debate amongst various organizations involved in the administration of the Arctic resulted in the Ministry of Transport retaining regulatory powers whilst operational powers shifted to Rosatom by the Presidential decree of 27 December 2018[55]. The basic principle of regulation is that the regulator and operator cannot be the same entity. Only time will indicate how Rosatom can handle the additional responsibilities which are not within their previous domain of knowledge. These difficulties and the number of different agencies dealing with various aspects of the NSR delivery increase the difficulty of other countries who may be interested in exploiting the NSR.

[55] Marinin V., Burmistrova S., Podobedova L. Severny kompromiss: kak “rosatom” i mintrans podelyat Arktiku [The Northern Compromise: How the “Rosatom” and the Ministry of Transport Will Divide the Arctic]. URL: https://www.rbc.ru/business/26/06/2018/5b2cbcf79a794777ed047268 (accessed 26 June 2018).

Evolution of the Polar Code

Fig. 11. Diminishing Sea Ice 1999-2019 [56].

Ships operating in the Arctic and Antarctic environments are open to several unique risks. Poor weather conditions and the relative lack of good charts, communication systems, and other navigational aids pose challenges for mariners. The remoteness of the areas makes Search and Rescue [SAR] or clean-up operations difficult and expensive. Cold temperatures may reduce the effectiveness of operating ship equipment, ranging from deck machinery and emergency equipment to sea suction inlets. When ice is present, it could force added loads on the hull, propulsion system, and appendages[57]. As brought out in the example of SAR highlighted above, increasing sea and air traffic raised concerns regarding the area's Search and Rescue (SAR) capabilities regarding increasing ship casualties as tabulated below in Table 1.

Consequently, after protracted negotiations with ongoing diminishing sea ice, on May 12, 2011, there was an Arctic Council agreement on SAR. The move to develop a mandatory Code followed the adoption by the IMO Assembly, on December 02, 2009, of Guidelines for ships operating in polar waters [Resolution A.1024(26)], which was intended to address those additional provisions deemed necessary for consideration beyond existing requirements of the SOLAS and MARPOL Conventions, to take into account the climatic conditions of Polar waters and to meet appropriate standards of maritime safety and pollution prevention [20, IMO, p. 1]. The Guidelines were recommendatory.

[56]National Snow and Ice Data Center. United States of America. Diminishing Sea Ice 1999–2019 in Protection of Arctic Marine Environment. Arctic Shipping Status Report 2013–2019. op.cit.

[57] International Maritime Organisation, Shipping in Polar Waters (adoption of a Polar Code). November 2014. URL: http://www.imo.org/en/MediaCentre/HotTopics/polar/Pages/default.aspx (accessed 18 March 2019).

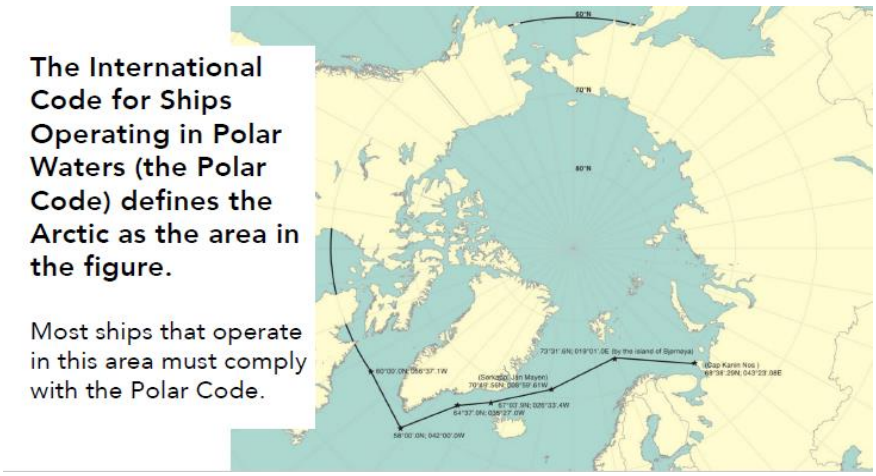


Fig. 12. Area of the Arctic for the Polar Code[58].

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[58] Protection of Arctic Marine Environment. Arctic Shipping Status Report 2013-2019. op.cit.

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