

Chapter 2

A Brief History of Navigation on the Northern Sea Route

Abstract This chapter outlines the history of navigation on the Northern Sea Route. Shipping routes along the coast of the Russian Arctic were discovered by local people during their travels. In the year 1648, a route was found connecting Europe and the Far East. Half a century later, the first chart showing how to cross the Arctic Ocean in this area was created. The first known instance of crossing the NSR, which occurred in the years 1878–1879, was commissioned by Siberian merchants, industrialists, and the king of Sweden. Many subsequent expeditions did not manage to reach their destination or even lost their ships. Initially, cargo shipping did not involve transit voyages and its only purpose was to supply Siberian ports with goods from the West and the East. It was only before the Second World War that the NSR was successfully completed within one navigation season. Successful crossings of the entire NSR by cargo vessels within one navigation season began in the years 1935–1937. During the Second World War, numerous cargo vessels headed for ports located on the NSR, mainly from the East. In the vast majority of cases these were not transit voyages. After the Second World War, the USSR had only a few icebreakers, which were not able to secure the entire route. The economic development of Siberia meant that vessels which could navigate without icebreaker assistance started to be introduced into service. These were gradually stronger and stronger until the first nuclear-powered icebreaker was introduced. During perestroika, cargo shipping on the NSR collapsed. From the year 1987 the USSR government and then the Russian government began to allow foreign vessels to navigate on the NSR. Numerous international research projects were carried out. Statistical information indicates that it is only from the year 2009 that the NSR has been functioning as an international transport corridor.

Shipping routes along the coast of the Russian Arctic were discovered gradually by local people living and travelling along the coast of the Arctic Ocean until—in 1648—S.I. Dezhnev found a route connecting Europe with the Far East (Starkov 2001). Between the years 1691 and 1692, the first map showing how to cross the Arctic Ocean from West to East was drawn up.

The first known instance of crossing the NSR occurred in the years 1878–1879, when Siberian merchants and industrialists along with the king of Sweden commissioned Nils Nordenskjöld, a polar explorer, to do so. He crossed the NSR from West to East on a small ship called *Vega* (displacement of 300 tonnes; a 60 horsepower steam engine; speed of up to 6–7 kn). After leaving Tromsø, the ship passed through Yugorsky Shar on 1 August 1878 and then, sailing on ice-free waters, reached Dikson and the Dmitry Laptev Strait. Beyond the strait, ice conditions deteriorated so dramatically that the ship was forced to winter. When summer came, the ship was freed from the ice and could proceed to the Bering Strait, which she passed through on 18 July 1879. Based on his experiences on the route, after returning to Europe Nils Nordenskjöld stated that the NSR would not be of much significance for regular sea trade (Centkiewicz and Centkiewicz 1959).

Nordenskjöld's claim was confirmed by later expeditions, which either lost their ships (*Sviataya Anna* in 1913 off the northern coast of Franz Josef Land; *Hercules* in 1914 in the vicinity of the Minina Skerries) or were unable to cross the NSR within one navigation season due to very severe ice conditions (*Taymyr* and *Vaygach* in 1910–1915) (Centkiewicz and Centkiewicz 1959). Only in the 1930s, when ice conditions became lighter for over a decade, crossing the NSR became possible. The first ship to do it within one navigation season was the icebreaker *Sibiryakov*, even though she did encounter some difficulties. The ship left Arkhangelsk on 28 July 1932. On 3 August she replenished coal supplies in Dikson and—taking advantage of particularly light ice conditions in the north-eastern part of the Kara Sea—passed to the north of Severnaya Zemlya. In the Laptev Sea it turned out that proceeding was impossible due to very difficult ice conditions, as a result of which *Sibiryakov* had to go south towards the coast, because coastal waters were free of ice. After leaving Tiksi, the icebreaker had no difficulty following the route. Between Bear Islands and the Bering Strait, however, she had to pass through ridged ice which was up to 12 m thick. Despite the damage she suffered, after 65 days (on 1 October 1932) the icebreaker managed to reach the Bering Strait (Centkiewicz and Centkiewicz 1959). The crossing completed by *Sibiryakov* should be considered an experimental attempt.

2.1 The Beginnings of Cargo Shipping on the Northern Sea Route

The initial impetus for cargo shipping on the NSR was provided by the expansion of the Trans-Siberian Railway. For this purpose, as early as in 1893 huge quantities of rails and construction materials were delivered by sea to the Yenisey River. In 1905, 22 ships delivered similar materials to the same region from Germany and Great Britain (Nałęcz 2009).

At the beginning, cargo shipping on the NSR did not involve crossing the entire route, but rather was limited to its western and eastern sections (up to the mouths of

the Lena and the Kolyma Rivers, respectively). In the years 1911–1936, the segment from the Bering Strait to the mouth of the Kolyma River was navigated by up to nine merchant vessels annually. Most of them were headed to the Port of Ambarchik or Nizhnekolymsk and brought supplies for penal colonies in Kolyma (Bollinger 2010). Ship traffic on the western segment was smaller at the time and—as stated by Armstrong (1952)—the segment was completed by up to five vessels a year. The biggest number of ships could be found at ports located on the Ob and Yenisey: up to 10 ships annually in the years 1920–1928, and between 16 and 46 in the years 1929–1939, with statistics at particular ports showing a steady upward trend.

In its entirety, the NSR started to be used in 1935, when—during a single navigation season—four vessels crossed the entire route in both directions. The vessels in question were cargo ships *Vanzetti* and *Iskra*, which at the very beginning of September transported a load of wheat from Murmansk to Nikolayevsk-on-Amur (Centkiewicz and Centkiewicz 1959) and *Anadyr* and *Stalingrad*, which left Vladivostok in June and, after calling at the Port of Ambarchik at the mouth of the Kolyma River, continued their voyage to Murmansk and then further to Antwerp and London (Centkiewicz and Centkiewicz 1959; Bollinger 2010). In the same year, the cargo ship *Rabochiy* travelled from Murmansk to Ambarchik and back, which was a considerable achievement in terms of navigation (Bollinger 2010). Favourable ice conditions existing in 1935 in the Kara Sea and along the coast of Siberia made it possible for as many as 19 vessels to pass north of Severnaya Zemlya and for many others to get from European ports to the mouths of the Ob and Yenisey (Centkiewicz and Centkiewicz 1959).

Unfortunately, a considerable deterioration of ice conditions in the Kara Sea in 1937 hindered further development of the NSR for a few years. During the navigation season of 1937, out of 64 vessels navigating on the route, only 11 managed to complete the entire NSR, and 26 had to spend the winter beset in ice (Centkiewicz and Centkiewicz 1959). The assisting icebreakers (*Krasin*, *Lenin* and *Fyodor Litke*) were also beset in ice and a few vessels sank (Bollinger 2010). In the spring of 1938, polar aviation evacuated about 400 people from drifting vessels (Nałęcz 2009). When in 1939 ice conditions in the central section of the NSR improved, all voyages planned for the year were successfully completed. The navigation season of 1940 was also successful.

2.2 The Period of the Second World War

After lengthy negotiations between Germany and the USSR, the Soviet Union agreed to make the Northern Sea Route available to the Germans, who could then use it to move their ships between the Atlantic and the Pacific. Initially, both countries agreed on 26 ships and warships, but at a later stage the number was reduced to just one warship—the auxiliary cruiser *Komet*, built as a merchant ship (<http://silenthunter.pl/raidery-kriegsmarine-t168.html>; accessed Feb 2014). She was

115.5 m long, had a draught of 6.5 m, a range (autonomy) of 35,100 NM and moved at the speed of up to 16 kn. Before being sent to the NSR, the vessel was equipped with specially strengthened hull and sides, and propeller blades appropriate for moving through ice. *Komet* departed from Gdynia (Gotenhafen) on 3 July 1940 and—disguised as the Soviet icebreaker *Semyon Dezhnev*—passed along the coast of Norway to Teriberka (Novaya Zemlya, the region of the Matochkin Strait), where she spent July and August of 1940 waiting for a convenient moment to set out on her voyage. With the help of the Soviet icebreaker *Lenin*, *Komet* passed through the straits of the NSR in August 1940 and at the beginning of September went through the Bering Strait (http://en.wikipedia.org/wiki/German_auxiliary_cruiser_Komet; accessed 28 Feb 2014). During the final stages of the voyage, *Komet* was assisted by the Soviet icebreaker *Joseph Stalin* and later by the icebreaker *Kaganovitch*. This was the only crossing of the NSR completed by a German ship during the Second World War.

Komet was not the only German warship operating on the NSR between 1941 and 1944. Many other Kriegsmarine ships operated on the waters of the Barents Sea and the Kara Sea. Their number ranged from 10 (in August 1943; in the Kara Sea close to the entries to ports and naval bases, in straits and at the mouth of the Ob River) up to 29 (in July and August of 1943; in the Pechora Sea, Yugorsky Shar, and at the entry to the Port of Naryan-Mar). The purpose of these vessels was to disrupt deliveries of military equipment from the USA and Great Britain and to fight the Soviet Navy. Their activity was so effective that deliveries of military equipment from Europe to the USSR along the NSR had to be temporarily suspended and then—during the polar summer of 1942—altogether abandoned.

Because the bulk of the cargo moved under the Lend-Lease programme was transported to the USSR from the West Coast of the United States, cargo carrying vessels used the eastern section of the NSR and reached the eastern regions of Siberia. They called at Tiksi, Provideniya, Pevek and Ambarchik; the temporary harbours at the mouths of the Yana, Indigirka, Olenek, Anabar, Chatanga and Yenisey; and—relatively rarely—at the Port of Arkhangelsk. According to Armstrong (1952), in the years 1943–1945, approximately 131,400 metric tonnes of cargo (ranging from dismantled aircraft to food) were moved along the above-mentioned every year.

2.3 Shipping on the Northern Sea Route After the Second World War

Immediately after the end of WWII, the fleet of ships operating on the Northern Sea Route was severely depleted. Nine icebreakers survived the war, but three of them had been lent to the USSR under the Lend-Lease programme and were returned to the USA between 1949 and 1951. This complicated the situation on the NSR, because the remaining icebreakers were not able to secure the entire route. The

number of freighters which could be used on the NSR was limited to as few as 14 vessels (Kubiak 2012).

Growing transportation needs on the NSR caused by the rapid economic development of Siberia meant that new vessels had to be ordered in shipyards. This helped to rebuild the shipping fleet. First, between 1952 and 1953, *Lena* type vessels were introduced into service. They were sufficiently ice-strengthened to be able to move through 1-year ice without icebreaker assistance. Later, in the years 1954–1956, still stronger vessels were introduced, and in 1959 they were followed by the first nuclear-powered icebreaker *Lenin*, which could break through ice up to 2.5 m thick (Zaleski 1978).

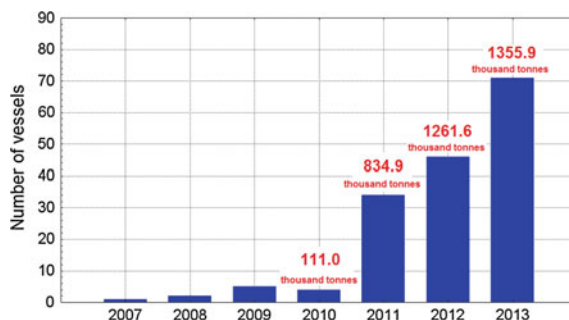
In the following years, more and more modern vessels were sent to the Northern Sea Route, ranging from vessels adapted to transporting timber through ice-covered waters, through multipurpose cargo ships with high ice classes (*Norilsk SA-15* type) and specialised cargo ships for Arctic operations (*Norilsky Nickel* type), to other, even more powerful nuclear-powered icebreakers (among others Arikaynen 1990; Mulherin et al. 1994; Sodhi 1995; Kitagawa 2001; Kjerstad 2011).

In the 1960s and 1970s, rapid economic development taking place in northern Siberia resulted in increased ship traffic on the Northern Sea Route (Fig. 2.1). From 1978 onwards, thanks to nuclear-powered icebreakers and *Norilsk SA-15* type vessels, it was possible to provide all-year-round shipping services to Dudinka, a port servicing the mining and industrial complex built in Norilsk area (Ragner 2000). Apart from the exported timber and ores, another important type of cargo on the NSR was coal transported from West to East and oil delivered to wood processing industry centres in Siberia. Further increase in the amount of shipping on the NSR should be seen as related to the development of oil and gas extraction industry, including work conducted on the Yamal Peninsula (Peresyphkin and Yakovlev 2008).

Industrial development went hand in hand with the establishment of new towns and settlements, which needed to be supplied with construction materials and fuel. The population of Siberia was growing and so was the demand for supplies, which—in turn—caused increased shipping on the NSR. As a result, the amount of cargo transported along the route grew from less than 1 million tonnes in the 1950s to 6.5 million tonnes in the last years of the USSR.

After the collapse of the USSR, cargo shipping on the NSR faced considerable difficulties caused by the economic crisis. In the years 1988–1994, the amount of cargo shipped along the NSR plummeted and did not recover for several years (1994–2003). In 1998, it fell to 1.46 million tonnes, a value 78 % smaller than the one recorded in 1987. According to some authors (among others Nałecz 2009; Liu and Kronbak 2010), the economic crisis combined with the country's loss of leadership (icebreaker fleet, etc.) caused safety issues (inability to guarantee safe navigation in the Arctic), an uncontrolled, speculative increase in transportation fees, and the collapse of the entire NSR infrastructure, both in numerous ports and along the route itself. Another reason behind the decrease in cargo shipping on the NSR was a population decline in Siberia observed at the time (Ragner 2000; Liu and Kronbak 2010).

Fig. 2.1 The number of vessels transiting the NSR in the years 2007–2013 (according to Balmasov 2011a, b, 2012, 2013)



Growing global demand for oil and gas resulted in gradual economic recovery of Siberia, which translated into a slow increase in the amount of cargo shipping on the NSR noticeable after the year 2003. Exploiting new deposits of these resources had a positive impact on the amount of cargo shipping on the NSR, and forced new investments into port and navigation infrastructure along the route. With the opening of new terminals, there was a rapid growth in cargo shipping on the NSR after the year 2010 (Fig. 2.1). In 2012, 3.87 million tonnes of cargo were moved along the NSR and it is estimated that in 2019 the number will exceed 5.0 million tonnes (<http://www.proatom.ru/modules.php?name=News&file=print&sid=3866>; accessed 28 Feb 2014).

2.4 Creation of Legal Amenities for International Traffic on the Northern Sea Route

In 1987, according to the policy of openness, the president of the USSR Mikhail Gorbachev suggested that the Northern Sea Route should open for foreign vessels. The official opening took place on 1 July 1991 (Ragner 2000; Blunden 2012). However, due to unsettled formalities and (except for the coastal route) poor hydrographic reconnaissance of the NSR, up until 2009 transit voyages on the NSR were only carried out by Soviet (and then Russian) ships. In 1991, 15 vessels transited the NSR carrying 210 thousand tonnes of cargo; in 1992, it was 12 vessels with 186 thousand tonnes; and in 1993–22 vessels with 226 thousand tonnes (Balmasov 2011a; www.arctic-lia.com/nsr_transits, accessed 28 Feb 2014). The following years saw another collapse: the number of transit voyages fell to 7–2 vessels and the amount of cargo to 120–30 thousand tonnes. At the time, cargo shipping from Europe to the East involved mainly chemical products (potassium salts, fertilisers), rolled steel and timber from Scandinavia; from the East to Europe it was mainly agricultural products (rice and soy). Between 1998 and 2006 not a single transit voyage took place.

The fact that the government of the Russian Federation was genuinely interested in opening the NSR for foreign vessels was confirmed in 1993, when a big

international (Russia, Norway, Japan) research programme was launched. It was known as the International Northern Sea Route Programme (INSROP), was carried out until the year 1999, and involved over 50 research organisation and transportation companies from various countries. The aim of the programme was to evaluate the NSR as a modern marine shipping lane and to work out what the optimal vessel for the route would be (among others Brubaker and Ragner 2010). Under the same programme, between 1 and 28 August 1995, an experimental voyage from Yokohama to Kirkenes was completed (1–28 August 1995) by *Kandalaksha* (Norilsk SA-15 type vessel). The voyage proved that transit shipping via the NSR was much more cost-effective than via the Suez and Panama Canals. It was established that shipping cargo via the NSR could result in shortening travel time by 15 days, which reduced transportation costs by up to \$500,000. All the collected research data were published in 167 technical reports. At the end of the programme, in 1998, the First International Euro-Asian Conference on Transport was held in Sankt Petersburg. It passed a resolution giving the Northern Sea Route the status of an international Euro-Asian transport corridor (Peresyppkin and Yakovlev 2008; Nałęcz 2009).

INSROP continued as ARCOP (Arctic Operational Platform), a project carried out in the years 2003–2005. The project was realised with the help of the European Union (5th RTD Framework Programme) and its purpose was to study various elements of oil and gas transportation process from the Arctic regions of Russia to Europe. In the light of the analyses conducted, it emerged that direct transportation of both oil and gas on vessels crossing the western part of the Northern Sea Route could be very profitable. The results of the ARCOP projects formed the basis for the creation and development of transport and technological systems for oil and gas export from the Gulf of Ob and the Yamal Peninsula to Europe (among others Peresyppkin and Yakovlev 2008; Eger et al. 2013).

The principles of Russia's state policy for the Arctic (Russian: Основы государственной политики Российской Федерации в Арктике на период до 2020 года и дальнейшую перспективу; <http://www.rg.ru/2009/03/30/arktika-osnovy-dok.html>, published 27 Mar 2009), signed by president Medvedev on 18 September 2008, indicated considerable interest on the part of the Russian government in the development of international shipping via the NSR. The document states that the development of the NSR shall come under centralised state management, the NSR shall be serviced by icebreakers and equal access to the route shall be granted to all interested transportation companies, including foreign companies.

Another piece of legislation of great importance to the international shipping on the NSR was Marine Development Strategy of the Russian Federation for the Period up to 2030 (Russian: Стратегия развития морской деятельности Российской Федерации до 2030 года) adopted by the Russian government on 8 December 2010. Appendixes 2–4 contain information on the development of marine transportation, including the development of the so-called Northern Maritime Corridor the NSR was to become a part of. One of the assumptions of this strategy, which is becoming increasingly more interesting to the European Union

(Moe and Jensen 2010), is a rapid increase in the amount of shipping carried out on the NSR: up to 40 million tonnes by 2020 and 70 million tonnes by 2070 (Kozmenko et al. 2012).

Particularly promising for the development of international shipping on the NSR is Federal Law No. 132-FZ “On amendments to certain legislative acts of the Russian Federation regarding state regulation of merchant shipping in the waters of the Northern Sea Route” (<http://www.arctic-info.com/News/Page/vladimir-putin-signs-law-on-the-northern-sea-route>; accessed 21 Aug 2012), signed by the Russian president on 28 July 2012. It specifies, among others, management rules for the NSR, rules of making the route available to foreign vessels, fees for the services provided and rules regarding marine environment protection.

2.5 The Use of the Northern Sea Route for International Traffic

In 2009, all formal barriers affecting the use of the NSR by non-Russian vessels were lifted. This was when the first two commercial voyages were completed by the MV *Beluga Fraternity* and the MV *Beluga Foresight*, owned by nominally German Beluga Shipping Company (GARD 2014; Melenas 2013). Throughout their voyage on the NSR, the vessels were accompanied by two icebreakers. The voyage turned out to be 3,000 NM and 10 days shorter than a voyage via the Suez Canal would have been. The lifting of formal barriers, however, was effectively taken advantage of only in 2010, when the route was completed by the first non-Russian vessel, which did not call at any of the ports of the Russian Arctic. The vessel was a bulk carrier under the name of *Nordic Barents*. She carried iron ore from Kirkenes to China and completed the entire route in only 12 days.

The fact that using the NSR may bring such major savings is the reason why the growth of transit shipping on the NSR has been gaining momentum. While in 2010 four transit voyages took place on the NSR and the total amount of transported cargo was 111,000 tonnes, including 70,000 of gas condensate and 41,000 tonnes of iron ore concentrate, in 2011 there were 34 such voyages and 10 ballast voyages (Ruksha 2012). The total cargo tonnage was 834,931 tonnes, including 600,607 tonnes of gas condensate (nine voyages), 85,909 tonnes of jet and heavy fuel (six voyages), 109,950 tonnes of iron ore concentrate (three voyages), 27,535 tonnes of frozen fish (four voyages) and 10,930 tonnes of packaged cargo (four voyages) (Gunnarsson 2012).

In 2012, the number of transit voyages on the NSR reached 46 and the total cargo tonnage amounted to 1,261,545 tonnes, which included 22 voyages with the total of 923,589 tonnes of cargo going east, and 11 voyages with the total of 337,956 tonnes of cargo going west. Out of 46 vessels involved, only 18 were Russian (Balmasov 2012). As was the case a year before, oil products dominated.

The vessels transported also 194,743 tonnes of iron ore from Murmansk to Huanghua in China and 71,786 tonnes of coal from Hamburg to Vancouver.

In 2013, there were 71 transit voyages on the NSR, during which 1,355,897 tonnes of cargo were transported: 895,515 tonnes were transported east (41 voyages) and 460,085 tonnes were transported west (13 voyages) (Balmasov 2013). Once again, oil products dominated.

It appears that the following years will see further growth of transit shipping on the NSR. It will mainly be the result of further exploitation of oil and gas deposits in the Arctic. Thanks to the activity of NOVATEK, a company which—since 2012—has been hiring ten product carriers to transport gas condensate in the Arctic (Gunnarsson 2012), transit shipping is no longer in its experimental stage. It has become a routine activity.

Also in 2012, seven big (45 m wide) LNG carriers started to be used on the NSR. They were meant to operate routes between Hammerfest (Norway) and Japan, and between Yamal and Japan. In 2012, LNG *Ob River*, owned by the Greek marine transportation company DYNAGAS, completed two voyages on the NSR. First, from 8 to 16 October, she completed a ballast voyage from Korea to Monitor in France. Afterwards, she picked up cargo (134,738 m³ or 66,342 tonnes) in Hammerfest, Norway, and crossed the NSR again 9–18 November on her way to the unloading port in Tobata, Japan (Balmasov 2012). A similar voyage was completed in 2013 by the LNG carrier *Arctic Aurora*, belonging to the same ship operator. First, from 6 to 18 August, she completed a ballast voyage from Vladivostok to Hammerfest, and then—between 22 September and 6 October—transported 66,868 tonnes of LNG from Hammerfest to Futtsu in Japan.

As part of the Yamal Project, the Yamal-Japan connection is supposed to be serviced by seven large LNG carriers with high ice classes (1A/Arc4): *Ob River*, *Lena River*, *Yenisey River* with the capacity of 156,000 m³, and *Veliky Novgorod*, *Pskov*, *Mitre*, *Melampus* with the capacity of 170,000 m³. The first three are already in service, and the remaining four are to join them in 2014 (Pospelov 2012). Bearing in mind that in November 2012 Rosatom and NOVATEK signed a 15-year contract for icebreaker support for these LNG carriers along the Northern Sea Route (<http://barentsobserver.com/en/energy/agreement-northern-sea-route-lng-transport-13-11>; accessed 25 Sep 2013), it may be stated that also in the case of LNG carrier voyages the experimental stage was quickly concluded and the voyages have become a routine activity. Due to the fact that in winter ice conditions in the Laptev Sea and the East Siberian Sea may still be difficult enough to pose a hazard even to vessels navigating with icebreaker assistance, it was agreed that in winter the Yamal-Japan connection will be realised via the western section of the NSR and then through the Suez Canal or around Africa, and in summer—via the eastern section of the NSR (Luxemburg 2012).

Apart from transit shipping, further growth of the NSR should be associated with the planned use of the route for container shipping (Laulajainen 2009, Chernova and Volkov 2010, Lasserre and Pelletier 2011). According to Laulajainen (2009), if ice conditions on the NSR remain as they were in 2007, it may be that in the future 20–35 % of global container shipping will be carried out via the route. The shipping

is supposed to take place mainly between Rotterdam and Hamburg and the Far East. These predictions seem all the more realistic because, according to Polyakova (2010), even today the cost involved in shipping one container via the NSR in summer season is 33–35 % lower than shipping it via the Suez Canal. However, as claimed by Verny and Grigentin (2009), the development of these connections will only occur once it is possible for container carriers to maintain the same running speed on the NSR as is possible while navigating along the more conventional route (via the Suez Canal), namely 22–24 kn. This opinion was verified when ice-breaking container ships of *Norilsky Nickel* type had been put into service on the Dudinka—China route. The first vessel of this type has been in service since 2006. It provides all-year-round shipping services between Dudinka and Murmansk, and sometimes goes further to Rotterdam and Hamburg. Now that four more vessels of this type have been put into service, container carriers operate regularly also between Dudinka and China. As a result, the plan for after the year 2015 is to introduce into service on the Rotterdam, Hamburg—Shanghai, Pusan, Yokohama route *NSR Express* type vessels, which can reach the speed of 15–17 kn on Arctic waters, and 24 kn on the open waters of Europe and Asia (Niini et al. 2006; Lammers 2010; Ivanov and Logvinovich 2008).

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