

Three alternative Arctic shipping routes



Aker Arctic has reviewed the past season, compared alternative Arctic itineraries and evaluated future options for Arctic shipping.

“First of all, it is essential to distinguish between transit shipping and destination shipping,” underlines Alexey Shtrek, development engineer at Aker Arctic Technology.

“Transit shipping utilises a certain route to transport cargo between non-Arctic ports. It is therefore shorter and saves time when compared to, for instance, passing the Suez Canal or Panama Canal. Destination shipping is cargo shipments of oil, liquefied natural gas (LNG), ore or coal from Arctic production sites to the market.”

Sharp decline on the NSR

The Northern Sea Route (NSR) following the Russian Arctic coast is the most known and established Arctic

route, with high levels of destination shipments year-round, utilizing specially designed Arctic vessels and supporting icebreakers to safeguard transports.

It has the longest seasonal window for lower ice-class vessels. With Polar Code Category C vessels, the NSR can be used 2–3 months (August to October). With Category B vessels, the NSR can be utilised 4–5 months (end of July to beginning of December).

“However, Arctic international transit shipping is sensitive to disturbances, and with the current political situation, a sharp drop was seen the past two years. A similar decline happened in 2014, when Russia changed the rules and regulations for the NSR transit,” Shtrek explains.

No real international transit

Despite the official Rosatom statements on the resumption of NSR transit in 2023 to the volume of 2.1

million tons, there were no real international transit voyages. The main part of the cargo (1.5 million tons) was crude oil exports from the Russian Baltic ports and Murmansk, a few voyages of large bulk carriers from Murmansk, and one LNG cargo from Gazprom's Portovaya terminal.

Three subsidized round-trip voyages with general and container cargo ships between western and eastern Russian ports were also made, two of them by nuclear containership *Sevmorput*. In addition, the Chinese company known as NewNew Shipping sent a few containerships to Russian ports; on the last voyage, timber was exported from Arkhangelsk.

"Thus, despite the fact that the NSR remains the most favourable Arctic transit route by ice conditions, geopolitical risks prevent its use by international shipping companies," Shtrek highlights.

For Russia, the NSR has become even more strategically important, but Russian shipowners do not have a sufficient number of suitable ice class vessels to further extend the traditional transit navigation period.

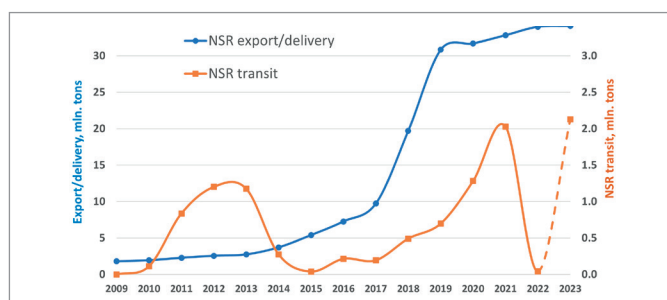
Constraints on the NWP

The Northwest Passage (NWP), along the Canadian Arctic coastline and archipelago, is an alternative route to NSR transit traffic. However, it has more severe ice conditions with multi-year ice and narrow straits, restricting the time it can be utilised. The availability of icebreaker assistance is also limited.

There are strict environmental constraints and an approval process in place to use the route. Destination shipping is mostly seasonal, except for a couple of mining projects in the Canadian sub-Arctic.

"The transit distance on the NWP is almost equal to the NSR. Furthermore, it is an established route, which, for instance, Wagenborg uses regularly," Shtrek says.

"The seasonal window, however, is very short. With Category C vessels, the route can only be used in September, for about a month. With a Category B vessel, the NWP can be sailed for approximately two months (August–October)."



While most international organisations have stopped reporting on shipping cargo on the NSR, Aker Arctic has continued to follow shipment volumes. In 2023, there were no real international transit shipments on the NSR.

The future option

The Transpolar Route (TPR) is a high-latitude route envisaged straight across the Arctic Ocean. It covers the shortest distance and uses only international waters outside national jurisdictions.

Due to high seasonal variability of ice conditions throughout the entire Arctic basin, the TPR does not exist as one fixed shipping lane but could follow a number of optional navigational routes.

Yet, the area is currently the most unexplored, uncertain, least known, with severe ice conditions of multi-year drifting ice. The known data is also old and should be updated to provide more detailed conclusions.

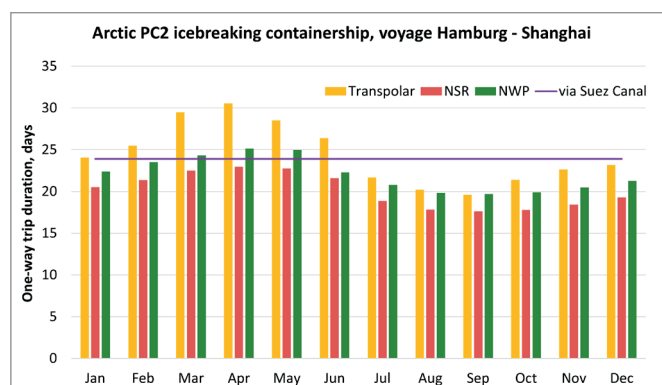
"In the future, maybe in ten years, if climate conditions allow this route to become feasible, it will have potential. Utilising [route optimisation](#) with satellite imagery to find open water paths, could open the TPR for seasonal transit shipments," Shtrek says.

"With icebreaker assistance and proper tactical navigation, a Category B vessel could already utilize high-latitude routes outside official NSR water areas during one to two months," he adds. "The Aker Arctic designed polar expedition cruise ship *Le Commandant Charcot*, a Polar Class 2 (PC2) vessel, has made regular tourist voyages to [the North Pole since 2021](#), without any assistance."

Advice on ice trends

Aker Arctic continues to follow the situation on different cargo shipping routes. We have also evaluated how our designs are feasible to use in changing situations and on new routes.

"We are available to advise our customers on ice trends, what ice class, level and kind of power is needed for particular routes. Don't hesitate to contact us with any questions," Shtrek reminds. ■



A theoretical comparison of the duration to transit on the various routes according to season, with an 8000 TEU Arctic containership. Read more about our design in [Arctic Passion News issue 21](#).

NWP Transits

Although Northwest Passage transits are still somewhat exceptional, there was nonetheless an over 40 % increase in 2023, compared to previous year.

In 2023, there were 24 complete transits by 22 large commercial vessels: 17 westbound (eight cruise ships and nine cargo ships) and seven eastbound (three cruise ships and four cargo ships). Two of the transits were return voyages within the same season.

Six of the ships were first-timers on the Northwest Passage; 12 ships had completed the voyage once before and four ships more than once. PONANT's cruise ships *Le Boreal* and *L'Austral* each completed their fifth Northwest Passage transit.

While this year saw some new operators on the route, most ships belonged to companies with prior experience from sailing the Northwest Passage. One of the regulars, Royal Wagenborg, increased its total number of full transits to 31.

Unlike on the Northern Sea Route where the media has tracked a number of non-ice-strengthened oil tankers this year, all of the transits on the Northwest Passage were by ice-strengthened vessels: three ice-class 1C cruise ships, eleven ice class 1A cargo ships, six Polar Class (PC) 6 cruise ships, one PC 5 cruise ship, and one PC 2 icebreaking cruise ship.

The Northwest Passage was ice-free for much of the season and only the first few ships were escorted by Canadian Coast Guard icebreakers. Choosing an ice-strengthened ship for such Arctic voyages is still a prudent precaution.

Scott Polar Research Institute maintains an exhaustive [list of Northwest Passage transits](#). ■

Doctoral thesis on brash ice channels approved

Riikka Matala, Aker Arctic's senior research engineer, has been investigating brash ice channels since 2018 through both full-scale and model-scale tests. She successfully defended her doctoral thesis, **Verification of vessel resistance in old brash ice channels through model scale tests**, in a public examination at Aalto University School of Engineering in December 2023.

The winter navigation system in the Baltic Sea is vital for ensuring year-round supply security. The system revolves around an icebreaker fleet escorting ice classed merchant ships, whereby the ice classification imposed on such merchant ships are intended to ensure a safe and efficient winter navigation system in the Baltic Sea. The ice class imposes requirements on, among other aspects, the ship's performance in brash ice channels that form in shipping lanes after frequent traffic. Such performance can be verified by model scale tests.

Changes in the fleet

The winter navigation system has functioned well with the current ice performance determination procedures. However, recent environmental standards have resulted in substantial changes to the merchant fleet, with new hull shapes to meet the regulations. Thus, the thesis analyses the processes and forces contributing to a ship's resistance in an old brash ice channel to assess whether current model test practices can simulate all significant factors accurately for all bow shapes.

Based on her research, Matala proposed a new approach for perform-



ing model-scale tests in an unconsolidated old brash ice channel. The new scaling approach improves the simulation of the interaction between the ice fragments to better mirror the resistance component caused by moving ice fragments sideways.

"The merchant vessels currently being replaced by new ships were constructed 30 years ago, when the fuel price was not as important as it is today," Matala explains. "In addition, new EEDI-standards limit engine power. This development will limit the ice performance of the merchant fleet, which may impact the whole system's functionality."

Reasonable transportation costs

Accurate determination and understanding of the ice performance of ships in different ice classes are vital to monitor, control, and ultimately improve the winter navigation system.