

Prospects and impacts of commercial navigation along the Northern Sea Route

Discussion paper for the International Transport Forum

Date: 17 / 04 / 2019

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Record Traffic on Northern Sea Route as COSCO Completes Five Transits



Important for the Murmansk region the Northern Sea Route should be developed by the Chinese

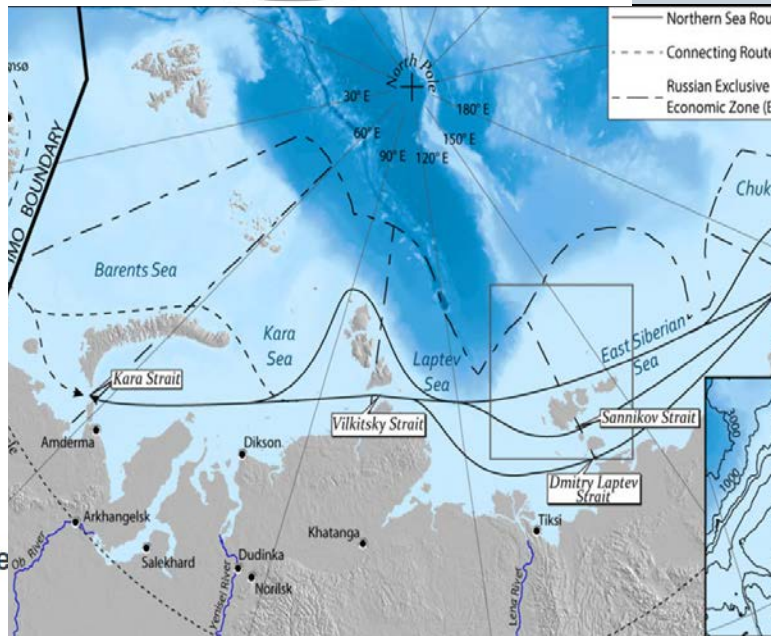


Climatic Change

Towards a balanced view of Arctic shipping: estimating economic impacts of emissions from increased traffic on the Northern Sea Route

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National Geographic "Endurance" sets sail for the Northern Sea Route in 2020. Illustration: National Geographic Expeditions

Luxury comes to Northern Sea Route

Purpose-built for polar navigation, the «National Geographic Endurance» is one of two high-end cruise ships to sail deeper into Russia's Arctic waters than anyone before.

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Venta Maersk Completes Northern Sea Route Passage



Venta Maersk

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On September 28, Venta Maersk called the port of Saint Petersburg, Russia, successfully completing her trial passage of the Northern Sea Route.

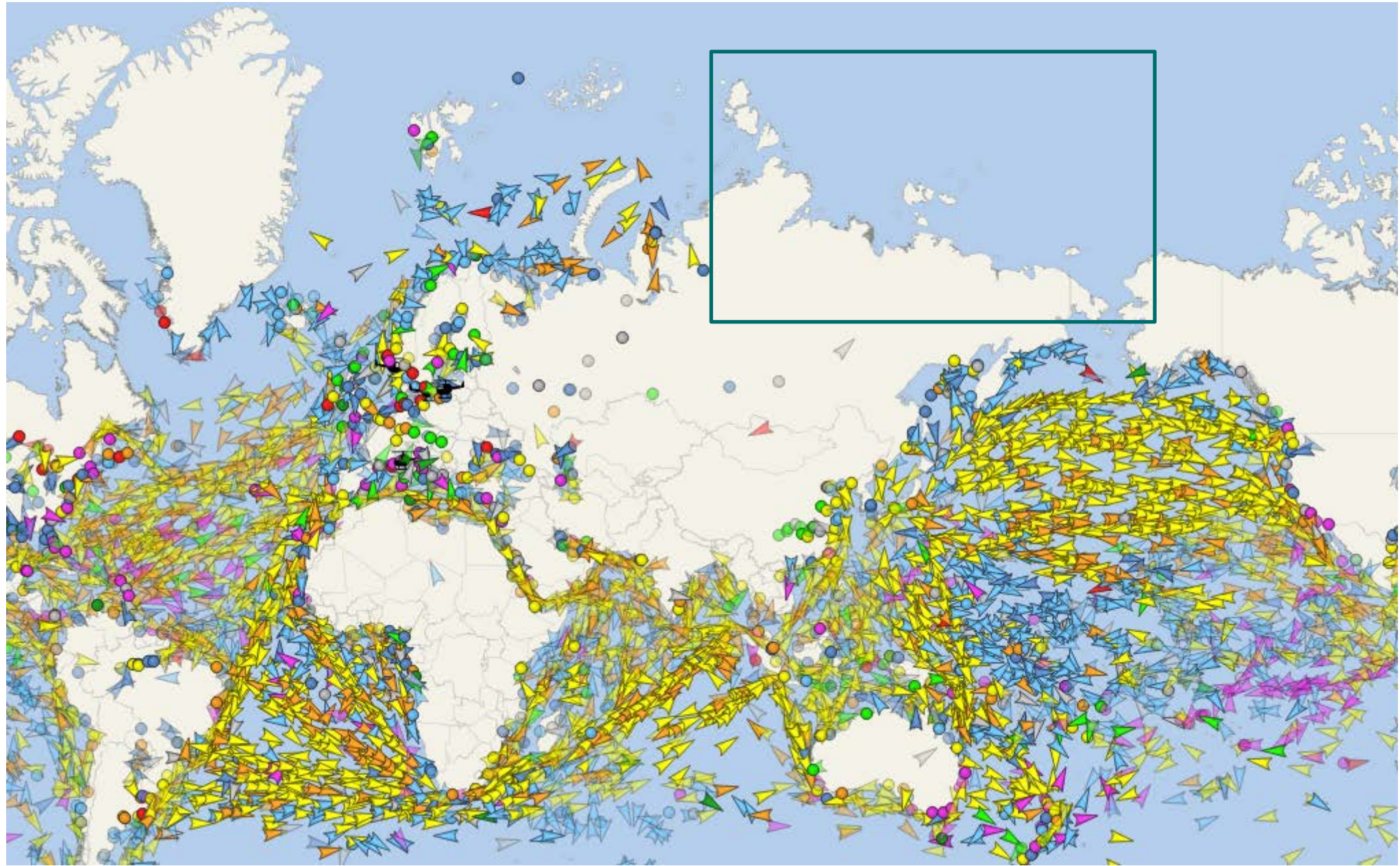


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Context for NSR utilization

Arctic sea ice

- Sea-ice decline has been faster during the past ten years than in the previous 20 years

Global trade flows

- In 1869 the Suez Canal opened and reduced shipping distances by 23%.
- Travelling on the NSR reduces travel times (with 40%, 14 days) compared to the Southern Sea Route (SSR).



Route	Trip from Hamburg to Yokohoma		
	Distance (Nm.)	Speed (knots)	Travel time (days)
Suez Canal	11.585	15	32
NSR	7.356	14	18

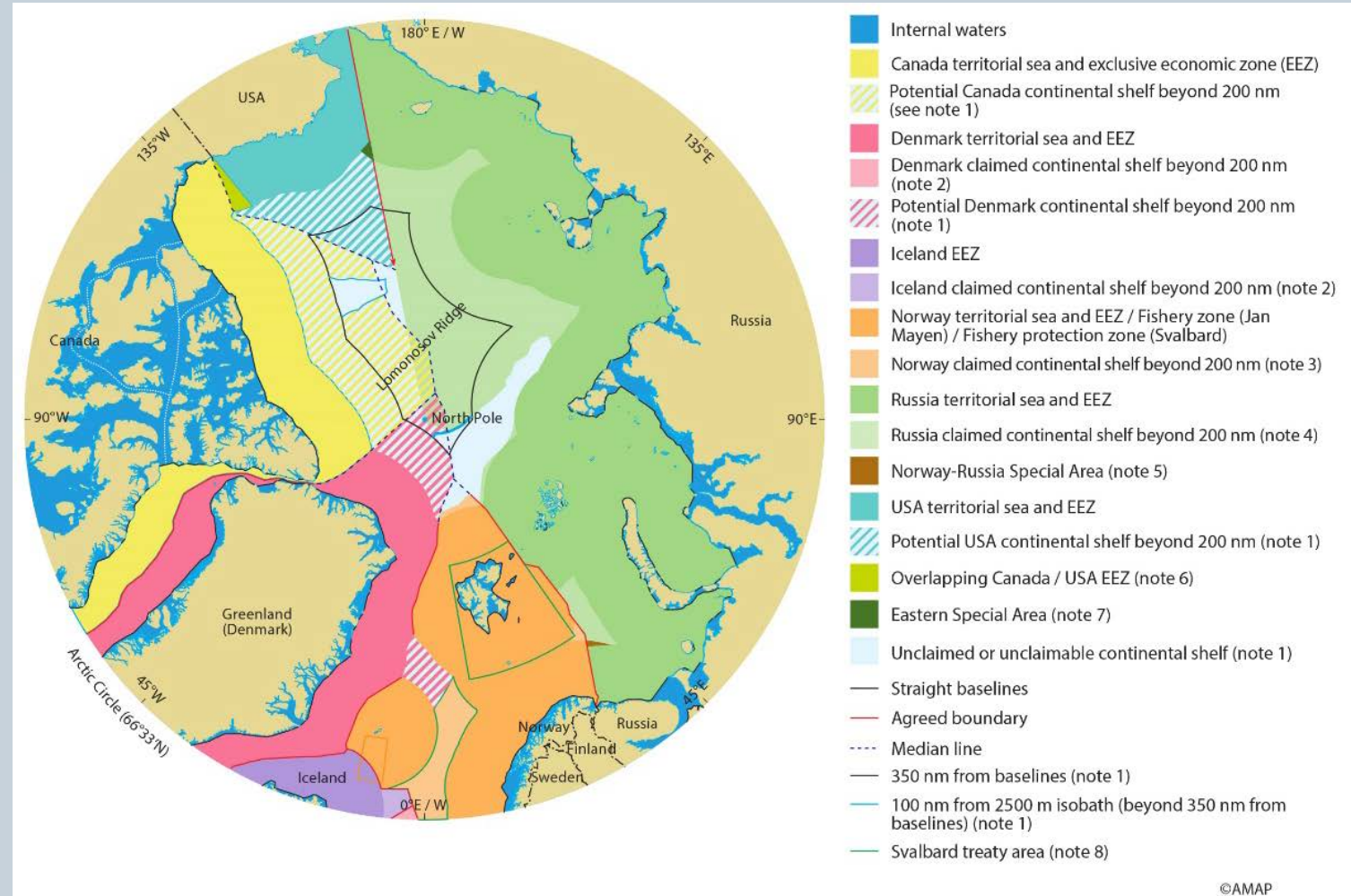
Complex geopolitical situation

Geo-political situation

- Possible disputes and overlapping claims in the polar region
- NSR falls dominantly in EEZ Russia (200 nM zone)

Polar Code

For sea transport on the NSR Russia has *the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone*



The long term case for the Northern Sea Route (NSR)

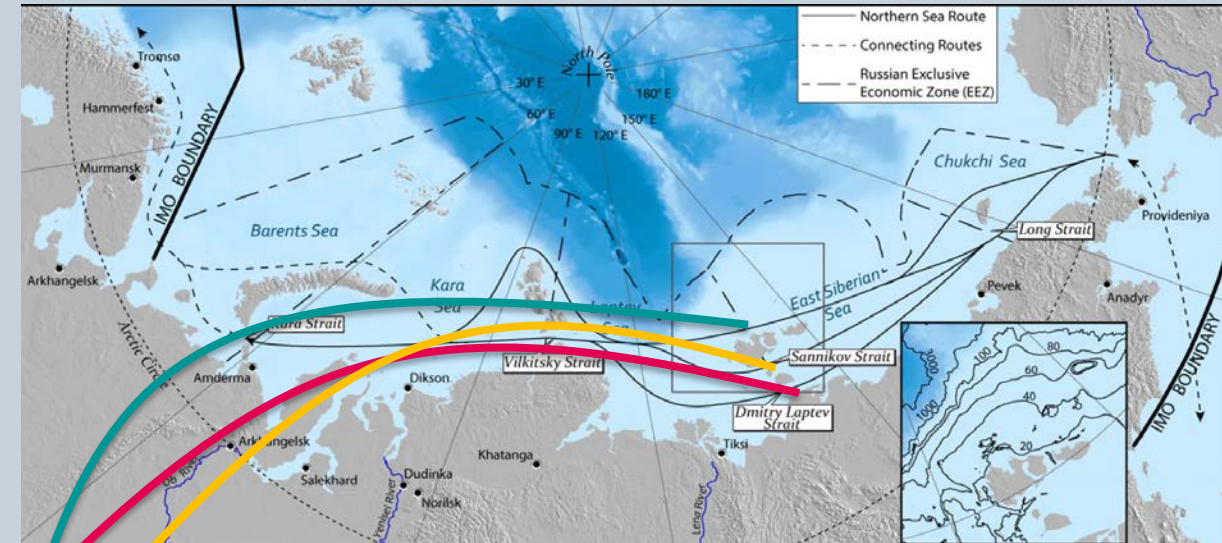
Sea ice level constraint

- Yearly variations of sea ice are relatively unpredictable;
- “Ice massifs” might block certain routes;
- Extreme weather conditions: fog, extremely low temperatures

Bathymetry constraints

- The Vilkitsky strait (100-200m) and the long Strait (33m) are not considered a constraint
- The Dmitry Laptev has a draft of 6.7 m;
- The Sannikov Straits has a draft of 13 m;

Ships carrying cargoes of > 50.000 DWT will be limited to fewer days of operation



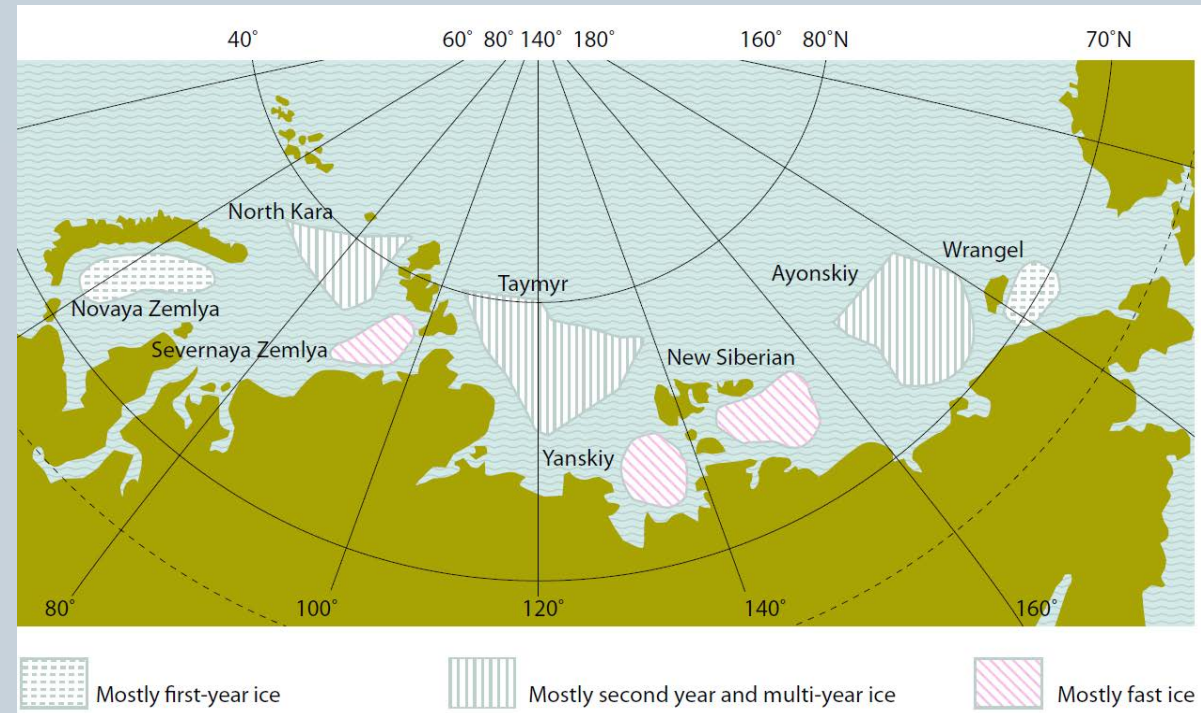
Ship size	Container load	Non-container (tankers and bulkers) load	Routes
Low cargo and size	<2.500 TEU	<50.000 DWT	Sannikov and Dmitry Laptev Strait
High cargo and size	>2.500 TEU	>50.000 DWT	North of the islands

The case for the Northern Sea Route (NSR)

Ice massifs along the NSR

Factors affecting Northern Sea Route (cost) attractiveness:

- Initial investment of ice-class vessels is 20-30% higher compared to a benchmark vessel;
 - Higher fuel costs (net result of specialized fuels and 'slow steaming');
 - Training of crew members;
 - Ice-breaker convoys (tariffs by Russia yet unknown);
 - Insurance rates and other costs (estimates 50-200% higher than usual)
-
- Limited length of the navigability window, uncertainty;
 - Extreme weather conditions (a.o. fog), ice massifs



The case for the Northern Sea Route (NSR)

- The RCP 8.5 scenario results show that the first route through the straights, where only “small” ships of 50.000 DWT/2500 TEU can operate, becomes profitable around **2035** for non-container ships and **2051** for container ships.
- The RCP 4.5 results show that the NSR will be utilised much later in the future, never with year-round operations and that the business case for rerouting will **not become positive for >2500 TEU container ships**.

Figure: NSR re-routing of four ship categories under RCP8.5

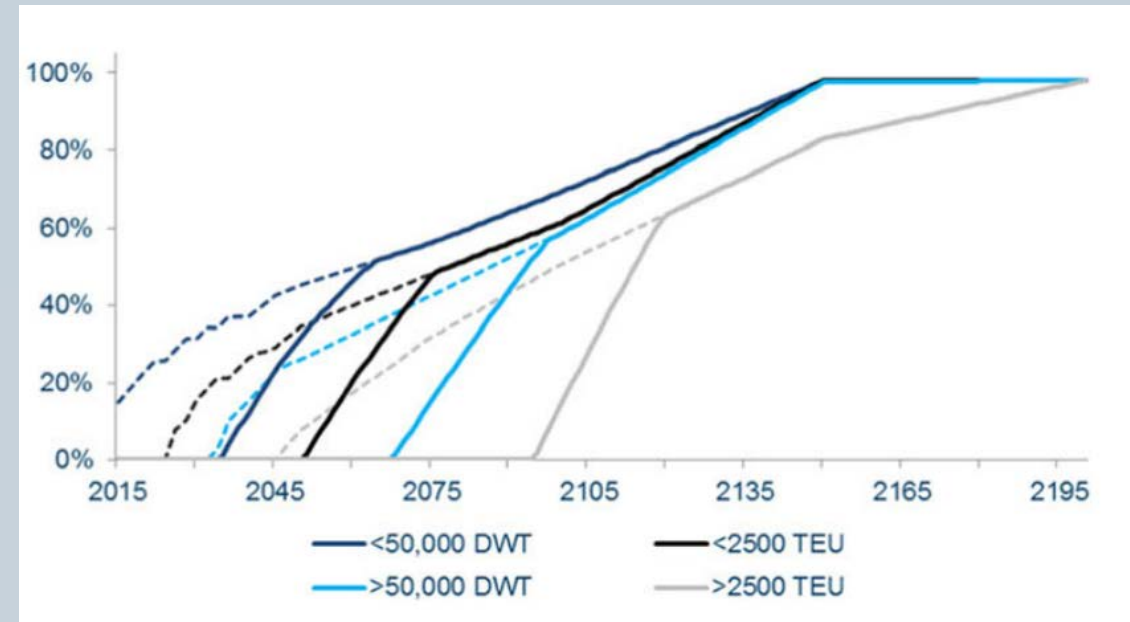
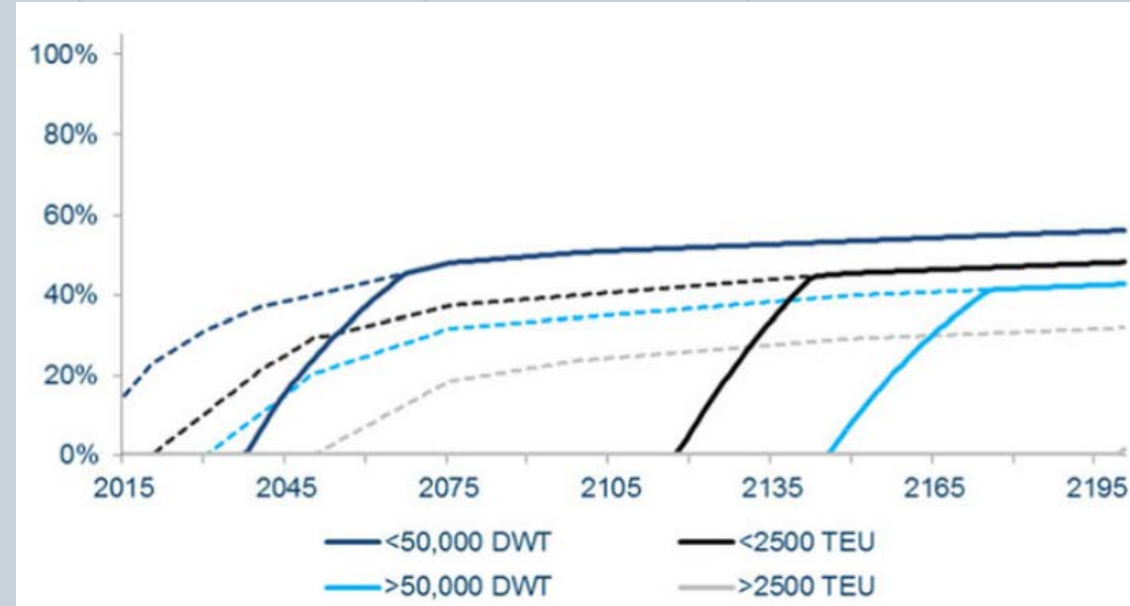
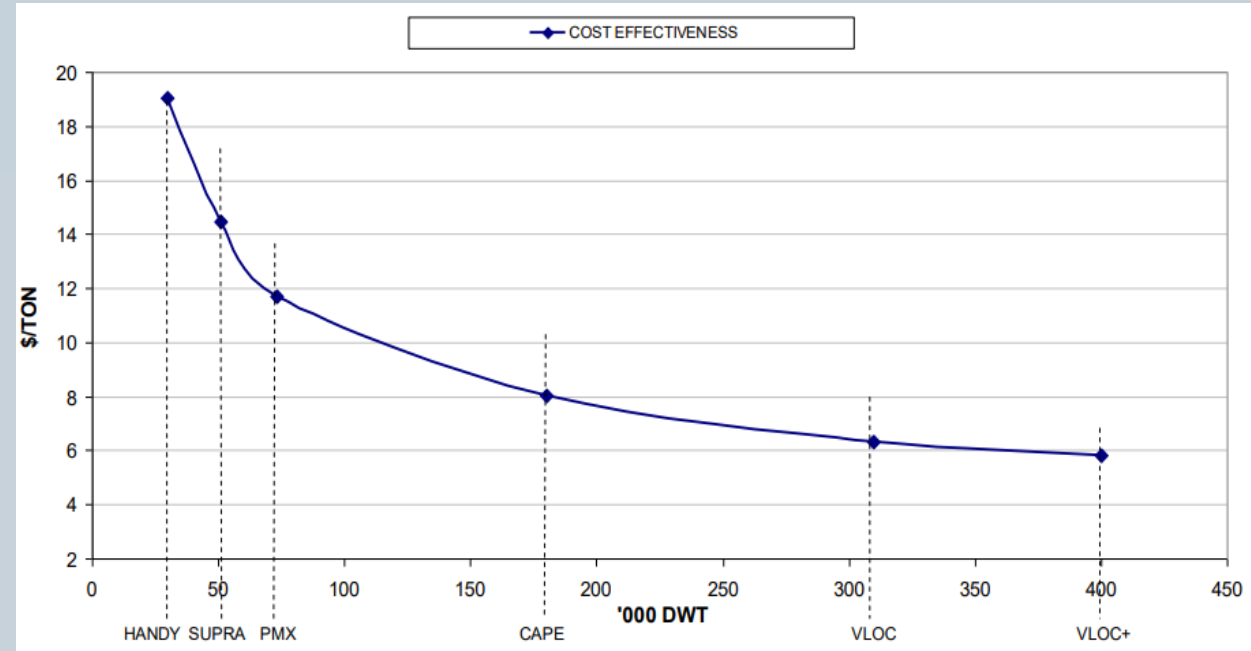


Figure: NSR re-routing of four ship categories under RCP4.5



Reflection on the business case for Arctic shipping

- Economies of scale and/or just-in time deliveries are vital for profitability
 - Costs per TEU/TON decrease significantly with the ships capacity.
- Uncertain conditions (i.e. ice-free window) are difficult for container ships carrying time sensitive cargo.
- Limited trade volume due to physical conditions and uncertainty are the biggest constraints for big commercial shipping on the NSR.



Total shipping capacity (TEU)	Price per TEU (\$)
12,500	12.43
18,000	10.99
22,000	10.04
24,000	9.57

Relevant markets and commodities for the Northern Sea Route

- Transit traffic counted in 2018 only for 0,5 million tons of the total 9,7 million tons transported on the NSR.
- Main commodities transported on the NSR are:

General and project cargo;

- *The Venta Maersk has completed a trial passage on the NSR*
- *Heavy lift shipping on the NSR*
- *COSCO trials*

Oil products and gases;

- *Yamal LNG Project*

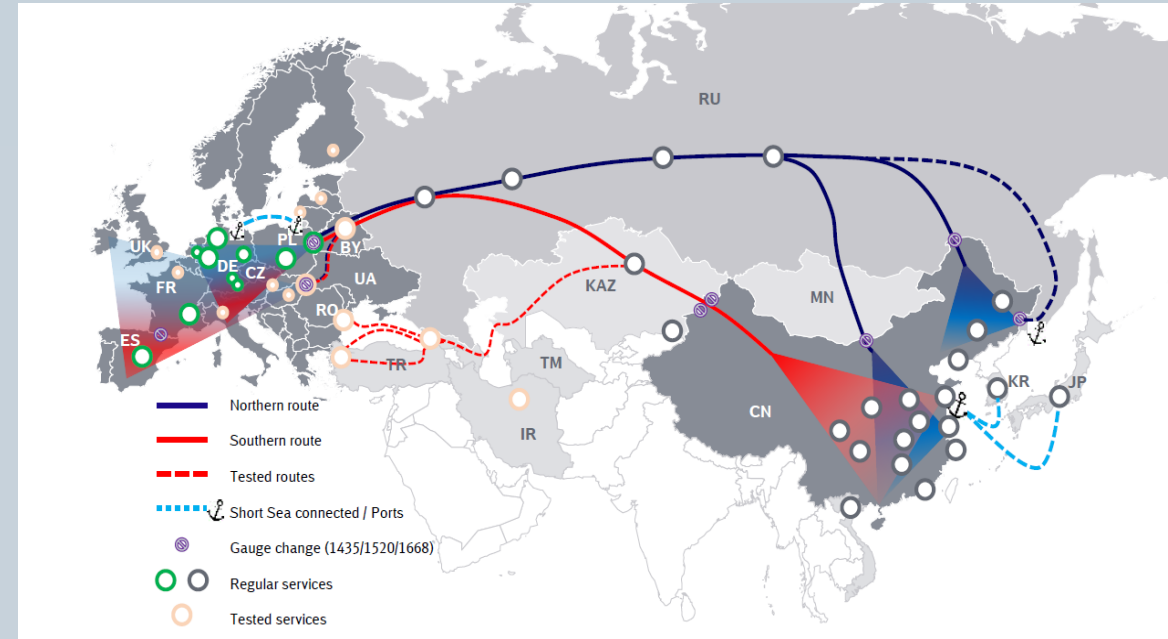
Passenger transport.

- *Cruises on the Northern Sea Route*

Impact of NSR utilisation: impact on global trade flows

Competition between the NSR and alternative routes (Suez Canal and OBOR):

- The NSR and OBOR experience time savings of respectively 14 and 12 days over the SSR.
- Uncertain conditions complicate a just-in-time delivery.
- Carriers call at multiple ports in fixed liner schedules.



The Northern Sea Route and OBOR are **second-tier alternatives**. Dependent on the future fuel price, reliability of the NSR and development of the regional market, the Arctic route could become an alternative for certain niche markets

Impact of NSR utilisation: environmental and regional consequences

Environmental and climatic impacts

- The local arctic ecosystem can be drastically impacted due to short-lived pollutants (e.g. black carbon and sulphate aerosols)
- Positive impact IMO2020, and further steps?

Regional development consequences

- The Russian Arctic harbours handled around 92,7 million tons of cargo. The majority (around 70%) is related to oil products and LNG
- Murmansk (and Arkhangelsk) position themselves as a container port for transit shipping
- In addition, Scandinavian countries (i.e. Norway and Finland) are seeing business opportunities in the Polar Silk Route.

Conclusion and discussion

The NSR remains a much studied, but much less used nautical sea route in at least the next 4 decades to come.

- We expect an increasing number of transits and local sea trips in the NSR area, with relatively small vessels, and aimed at niche markets (local O/D, project cargoes).
- NSR transit operations of <50.000 DWT ships start to become profitable after 2035 (under the most extreme RCP 8.5 climate scenario)
- Substantial bulk volumes will only take off around 2070 (in RCP 8.5), and may even take more than a century (RCP 4.5).
- The 4.7% of world trade using the NSR will definitely remain hypothetical within this century, and might only be reached by 2200 under the most extreme climate scenario.