Arctic shipping, opportunities and environmental implications

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Photo: The supertanker «Vladimir Tikhonov» behind an icebreaker in 2011
Outline

• Current traffic pattern
• Destination versus transit traffic
• Recent development (including 2012)
• Some environmental impacts
• Sea ice – the wild card?
• Potential future development
• The Fram Centre, Tromsø

• Which industrial developments may occur in the Arctic Ocean?
• What will be their impacts on the environment and society?
• How could they be managed sustainably?
Traffic Density – Norwegian Waters Dominate

Polar basin: 2010.11.01 - 2011.05.31

Polar basin: 2011.06.01 - 2011.10.31

Plot resolution = 5-7 km depending on area.
Two types of shipping in the Arctic Ocean

Destinational traffic

- Resupply of communities
- Shipment of raw materials extracted on land: crude oil, LNG, minerals, timber etc.
- Shipment of products from maritime activities: fish, crude oil
- Equipment needed for these activities
- Maritime activities: Fisheries, cruise tourism, research, military vessels

Transit traffic

- Transport of industrial products and raw materials between Europe/Asia and Asia/N-America
An important source of information
A main conclusion from AMSA:

“Arctic voyages through 2020 will be over-whelmingly destinalional, not trans-Arctic”

Lawson Brigham (project manager for AMSA):

“Destinalional shipping is Arctic shipping as good as anything!”
- Northern Sea Route (NE-passage)
- Northwest passage
- Transpolar Route
The Northern Sea Route (NSR)

Deepwater Track

Alternative DW Track

Traditional Track

Hydrographic Station

Условные обозначения

© ФГУП “Гидрографическое предприятие” 2010
Recent past development for NSR

- Falling traffic
- 200 communities closed in the Russian north, esp. east
- 25 of 50 ports no longer operational
- Need upgrading of ports, navigational systems, search and rescue and icebreakers

**Russian ambition 2011 – 15:**
Build and develop infrastructure for the NSR making transit between Europe and Asia possible.

Economic capability? Tarifs and state investments – a fine balance
Transits of Northern Sea Route

• **2009**: 4 ships
  – Equipment for power plants 4

• **2010**: 7 ships
  – Fuel 3
  – Iron ore/metal 2
  – Passengers 1
  – Icebreaker 1

• **2011**: 33 ships (+7 Norilsk Nikel)
  – Fuel 14
  – Iron ore 3
  – Fish 4
  – General cargo 1
  – Ballast 10
  10 of these sailed the whole North-East Passage

• **2012 (20.6 – 15.10)**: 35 ships – 1 022 577 tons

- Source: Rosatomflot / Midtgard et al 2012

**Comparison**: 18 000 ships used the Suez canal in 2011.

*Far from changing world trade, but an important change in the Arctic and a niche with potential*
For the first time in 2010 a non-Russian bulk carrier used the NSR as a transit route departing from a non-Russian port and arriving at a non-Russian port – “Nordic Barents” of Arc 4 with 41,000 tons of iron ore from Kirkenes (Norway) to Lianyungang (China). Only 8 days spent on NSR with an average speed 12 knots.
The Transit of Nordic Barents

Distance Kirkenes (Norway) - Lianyungan (China) via Suez: 12,180 nm
Expected average speed on Suez Route: 13 knots
Expected voyage time for Suez Route: 40 days (plus 1)
Suez Canal Fees
Insurance costs; extra piracy insurance

Same voyage via NSR Route: 6,500 nm
Average transit speed on the NSR Route: 12.03 knots
Total time spent on Route: 22.5 days
Tariffs (cost of icebreaker assistance): 5 USD/ton
Insurance costs: 40,000 USD

Estimated time saved via NSR: 17.5 days
Total fuel saved at 28,2 MT per day: 493 MT
Fuel cost saved in USD; at USD 610/ton: 300,000 USD

Environmental savings on NSR (all figures approx.)
CO2: 1560 tons
NOx: 50 tons
SOx: 35 tons
A Suezmax tanker “Vladimir Tikhonov” of 160,000 dwt carrying 120,843 tons of gas condensate from JSC NOVATEK sails through NSR 23-30 August, 2011, with record average speed of 14.0 knots.
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Number of Vessels going West-East: 19; going East-West: 16
Environmental concerns

- Accidents: oil spills, leakages of chemicals and other hazardous freight
- Regular discharges to sea (oil, garbage, anti-fouling paint)
- Discharges to air (black carbon)
- Introduced species (photo)
- Conflicts with valuable and sensitive areas/species
- Noise
Younger and thinner sea ice

Age of Arctic Sea ice in March. Maslanik og Fowler, Univ. Colorado
Implications for shipping along NSR

- Summer sea ice is predicted to vanish.
  => Only first-year ice in winter, easier to navigate. Difficult to predict when. Complicates long term planning
- Large variability is expected; years with much ice and little ice. Complicates shorter term planning and “just in time” concepts.
- Seasonality of sea ice will remain a challenge for year-round operations but;
  - *Seasons may become longer (i.e., longer season without ice and thin ice in late autumn and early winter) and*
  - *the preferred route may shift northwards as ice retreats*
Large volumes of transit shipping require:

- SAFETY: The risk must be acceptable (crew, cargo, ship)
- RELIABILITY: “Just-in-time” and preferably year-round operations
- PROFITABILITY: It must be cheaper to send goods over the Arctic Ocean than with rail or via other sea routes

Large investments in ice-strengthened ships, harbours and all kind of infrastructures supporting the fleet is needed to achieve this.

But “opportunists” find transits attractive even today and the combination of a proven concept and retreating sea ice can increase the transit transport significantly.
Other factors that will influence the volume of Arctic shipping

- Developments in ship technology: Icing, energy use, winterization etc

- Logistical solution for crossing the ice: Ice strengthened ships going all the way to and from non-Arctic ports (larger need for Ice breaker support) or Ports in each end of the Arctic Ocean for reloading the cargo to special ice strengthened ships?

- Environmental regimes: Post Kyoto and shipping/transport, CO₂-pricing, new energy sources etc

- Environmental regulations: Emissions to air and water, ballast water, hulls, search and rescue etc

- New trade patterns and implications for transit: Where will production and markets be located? Shift or modification of trade regime: From globalisation to regionalisation?

- Conflicts and tensions versus peaceful cooperation?

The scenario study "Arctic shipping 2030: From Russia with oil, Stormy Passage or Arctic Great Game", ECON 2007
Thank you for your attention!

The Arctic is changing fast - future may bring surprises.