

Science for Environment Policy

Probability of rapid increase in trans-Arctic shipping routes is confirmed

New research on climate-driven reductions in Arctic sea ice has predicted that, by 2040 to 2059, new shipping routes will become passable across the Arctic, linking the Atlantic and Pacific oceans. An increase in traffic has implications for the ecosystems of this fragile area.

Reductions in Arctic sea ice and model predictions that this trend will continue have sparked discussions regarding potential new shipping routes linking the Atlantic and Pacific oceans, either by the Northern Sea Route, which runs across the Russian Arctic coast, or the Northwest Passage, which runs along the northern coast of America. However, few studies have combined climate change modelling with maritime shipping speeds to predict the number and type of ships that would be able to navigate across the Arctic Ocean.

This study merged data from seven [climate change](#) models to estimate the distribution and thickness of sea ice for the current period and for the middle of this century. The researchers estimated the most time-efficient routes that avoided obstructive sea ice for ships seeking to cross the Arctic Ocean between the North Atlantic and the Bering Strait. These 'optimal' navigation routes were determined for two Intergovernmental Panel on Climate Change (IPCC) scenarios of different greenhouse gas concentrations and two types of ships: open water (OW) vessels that have no hull strengthening against ice, and Polar Class 6 (PC6) ships that are moderately strengthened. The estimations were performed for September only, when the sea ice tends to be at its minimum.

The results indicated that by mid-century the possibility of navigating the Arctic Ocean will substantially increase under both IPCC scenarios. In 2005, the probability of OW transit of the Northern Sea Route was about 40%, whilst in 2040-2059, the predicted probability is between 94-98%, depending on the IPCC scenario. The breadth of the route would also expand, providing more possible routes to cross north of the Russian coast.

By 2040-2059 there will be greater potential for PC6 ships to cross the central Arctic Ocean using the Northwest Passage. Again there will be a northward shift of feasible routes for PC6 traffic, meaning that the shortest route becomes possible. The Northwest Passage will also become a possible route for OW ships and the probability of transit will increase from approximately 15% in 2005 to 53-60% in 2040-2059, depending on the IPCC scenario. The route using the Northwest Passage is nearly a third shorter than the alternatives. For moderately ice-strengthened PC6 ships, the fastest route will go directly over the North Pole.

The findings have important implications for environmental impacts to this area. If shipping increases, there will be increased pollution and disruption of ecosystems. The negotiation of a Polar Code within the International Maritime Organisation is already well advanced¹ but there is a pressing need for its implementation to ensure environmental protection and vessel safety standards.

This study only considered the impact of reductions in sea ice, however, there are additional factors that may influence the use of these new shipping routes, such as lack of accident-response and search and rescue infrastructure, high insurance fees and poor charting of the area.



16 May 2013

Issue 328

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Source: Smith, L.C. & Stephenson, S.R. (2013) New Trans-Arctic shipping routes

navigable by midcentury.

Proceedings of the National Academy of Science. DOI:

10.1073/pnas.1214212110

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To cite this

article/service: "[Science for Environment Policy](#)":

European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

1. See:

www.imo.org/mediacentre/hottopic/polar/Pages/default.aspx

