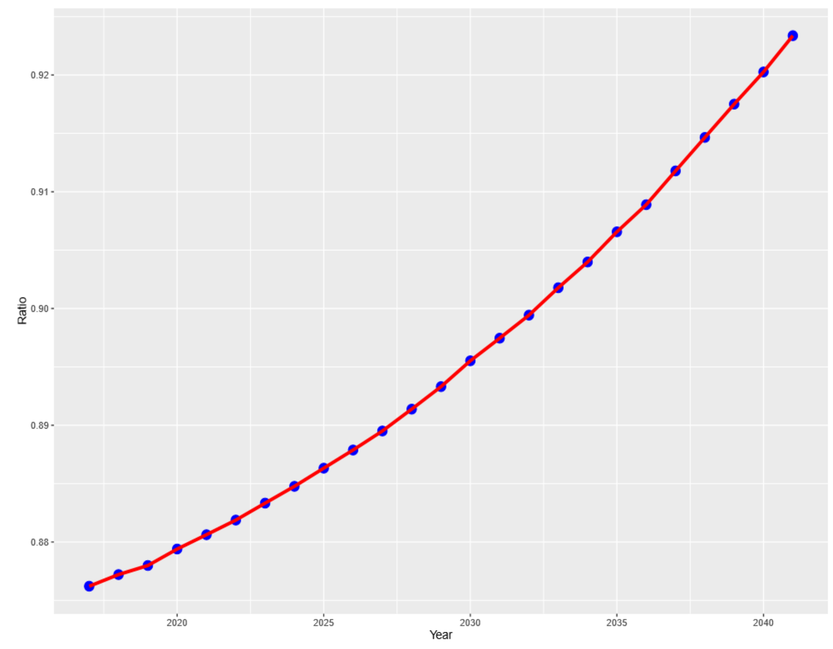
Infrastructure development is critical to safely navigate the Arctic.

Arctic Maritime Navigation Routes

The Northern Sea Route (NSR), which is the Arctic alternative route to the Suez Canal Route (SCR), is approximately 35% shorter in distance.
[Bekkers, Francois, & Rojas-Romagosa. 2018. The Economic Journal]

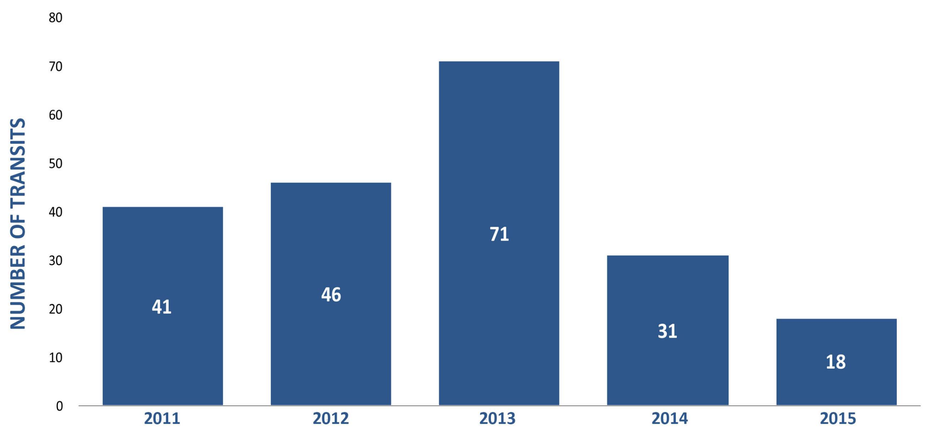
Cost Ratio of Arctic Navigation



The probabilistic simulation shows an increasing trend in the ratio of the cost of navigating SCR over that of NSR. Considering the uncertainty of future scenarios and infrastructure needs, Arctic navigation cost may improve after 2040.
[Freitas & Baroud. 2017. 12th International Conference on Structural Safety & Reliability]

The U.S. Coast Guard Cutter Healy (WAGB-20) in the ice, Oct. 3, 2018, about 715 miles north of Barrow, Alaska, in the Arctic. The Healy is one of two ice breakers in U.S. service and is the only military ship dedicated to conducting research in the Arctic.
[U.S. Coast Guard photo by Senior Chief Petty Officer NyxoLyno Cangemi]

Northern Sea Route Transits



Harsh environmental conditions and lack of infrastructure affect the number of Arctic transits in the short-term.
[Graph by the Protection of the Arctic Marine Environment]
[Statistics from the Northern Sea Route Information Office]

Melting sea ice in the Arctic has drawn the attention of international marine transportation. Arctic routes are shorter and can save time and money. However, navigation conditions in the Arctic are highly uncertain due to climate variability and extreme weather. As a result, the increased risk of incidents may limit the expansion of Arctic transit in the near-term. Data-driven probabilistic simulation can assess the risk and impact of Arctic navigation to guide future Arctic maritime infrastructure development.

Hiba Baroud
Vanderbilt University

VANDERBILT UNIVERSITY