

Potential impacts of 21st century Arctic shipping.

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As the summertime Arctic ice retreats, this opens up possible shipping routes that have been coveted since the 1800s. In 2007 and 2010 both the Northwest Passage and Northern Sea Route were navigable by unreinforced ships for a short period of time. Increased shipping through the Arctic, however, has implications for the emission of airborne pollutants, in particular black carbon aerosols. Hypothesized shipping emission inventories, taking into account these potential new shipping routes, have been developed for the next 30-50 years. We have performed a series of 21st century experiments, using these shipping inventories merged with forcing from 21st century IPCC scenarios for the AR5 in the Community Earth System Model version 1, to investigate the possible impacts on Arctic sea ice. We find a small overall Arctic response, but do find significant regional responses in areas nearest to the hypothesized ship tracks. The relative roles of the direct aerosol and the surface albedo effects will be discussed.