



The Evolving Arctic in the World-System

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Abstract

Global climate change's continuing effect on the Arctic has brought about a fundamental shift in the region's identity as it becomes an ever more active area in the world-system. Economic opportunities such as new shipping routes and a bounty of natural resources that were hitherto ice-locked are becoming accessible as the pace of climate change quickens, garnering increasing attention from actors around the world-system. This article explores the new geopolitical and economic realities of the Arctic through the lens of world-system analysis by examining the region's budding role in the world-economy and emerging economic opportunities, its unique core-peripheral nature, and its potential to spark a regional hegemonic rivalry between NATO and a Sino-Russian partnership. This article aims introduce the evolving Arctic to world-systems studies and promote further research on the region using the theoretical framework.

Keywords: Arctic, Climate Change, Resources, Shipping



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Global climate change's continuing effect on the Arctic has brought about a fundamental shift in the region's identity as it becomes an ever more active area in the world-system. The economic opportunities which were hitherto ice-locked have now become accessible as the predicted warming trend in the region makes itself more apparent. The global actors who are capable of pursuing these opportunities and are involved in the Arctic's regional affairs constitute the overwhelming majority of global military and economic power, and despite grandstanding and saber rattling in other theaters, the Arctic has been a model for multilateral diplomacy and restraint. Below the surface however, serious issues regarding globalization, economic access, and environmental stewardship remain unresolved which could sow the seeds for varying degrees of conflict in the future. This paper will analyze the Arctic using core ideas and terminology from world-systems studies, most especially Arctic core-periphery relations, the Arctic within the world-economy, and hegemonic competition in the Arctic. The author's goal for this paper is to encourage further study of the Arctic using the lens of world-systems analysis which, with its flexible scope, is well suited to investigate the intricacies of this rapidly evolving region.

Divided into sections, this paper will first define the Arctic within its physical and human geographic scopes in the modern world-system. Next, the paper will analyze the remote Arctic's relationship with the rest of the world-system using a core-periphery model, including an overview of the Arctic's growing participation in the world-economy, focusing on the Arctic's two key economic outputs: natural resource extraction and shipping. Finally, the geo-politics of the Arctic are introduced using the lens of hegemonic rivalry and competition to analyze actors' motivations and the formation of power blocs in the region. Closing the paper is a conclusion which presents open-ended topics for discussion within the world-systems analysis academic community.

Defining the Arctic

The Arctic (also referred to as the High North) straddles the top of the Geosphere and is geographically demarcated by the Arctic Circle which rings the planet at 66°33'N. The region encompasses the Arctic Ocean and is hallmarked by low year-round temperatures with short summers, long winters, and boreal/taiga forests which give way to tundra steppes in higher latitudes. Culturally, the Arctic has no set border, and dips further south into areas which experience many of the characteristics associated with the region such as ice-floes, midnight sun/polar night, and long periods of below-freezing temperatures (Medby 2017).

Geopolitically the Arctic is defined largely by the Arctic Circle with eight actors having territory above 66°33'N: Canada, Finland, Iceland, Norway, Russia, Sweden, the United States, and Denmark via Greenland. The region is populated by nearly ten million people who are largely concentrated in urban and coastal areas with infrastructure linkages to the south; however an important, yet shrinking, minority lives in remote settlements which are only accessible by plane or dogsled for significant portions of the year (Heleniak 2020).

The Arctic in the Twenty-First Century World-System

The Arctic entered the twenty-first century in a state of evolution. The progressive impact of global climate change has become more apparent as permanent and seasonal ice cover has receded year by year, and what was thought of as permanently frozen land has begun to thaw. With this evolution comes a structural change in the Arctic's identity, from a wasteland to an active theater, as the region garners increasing geopolitical and economic attention from the actors in the world-system. This section examines key events which highlight this structural change in the Arctic and their effect on the wider world-system.

The reduction and loss of permanent and seasonal sea ice in the Arctic is doubtlessly the largest single contributor to the Arctic's structural change. Summer ice levels have declined by over 40 percent since observations began via satellite in 1979, and current projections predict the complete loss of summer sea ice by 2030, with a widening ice-free season throughout the remainder of the century (Wang and Overland 2012). The loss of sea ice has a compounding nature, wherein the solar energy which is normally reflected off of the white sea ice is instead absorbed by the ocean which retains the energy as heat and inhibits the formation of new ice (Pistone, Eisenman, and Ramanathan 2014).

This physical change in the Arctic environment is a mixed blessing for the Arctic regional-system. Foremost, the loss of sea ice facilitates the development of the region economically, as access to the littoral Arctic grows with the lengthening of the shipping season along the Northern Sea Route (along Russia's northern coast), the North West Passage (through the Canadian archipelago), and eventually along the Trans-polar Route (across the North Pole). These sea lanes reduce shipping journeys between East Asia and the Atlantic coasts of North America and Europe by thousands of kilometers as well as allow shipping firms to bypass tolls at the Suez and Panama Canals. This translates into millions of dollars saved in fuel and overhead costs by shipping firms and improved efficiency for just-in-time commerce (Hong 2018). In addition to full-length transits across the Arctic, destination shipping—where a vessel has one or multiple stops on a route to a port—has shown promising growth as isolated Arctic communities grow alongside natural resource projects in remote littoral areas (Lasserre 2019). An increase in shipping, however, is likely to exacerbate sea ice melt as black carbon emissions rise in relation to the rise in shipping traffic (Messner 2019).

While the receding sea ice presents a boon for international corporations and state-level actors, it represents the end of traditional subsistence economics for tens of thousands of indigenous peoples who inhabit the Arctic (Larsen and Petrov 2020). The hunting and gathering cycles which developed over millennia in one of the least hospitable regions of the planet relied on the predictable patterns of fauna migration and ice pack movement to create a sustainable balance with the environment; which in turn, created a unique set of cultures and economies, which were highly specialized for the environment within which they existed. For many indigenous groups the loss of traditional economic outlets has intensified trends of migration to urban centers, especially among the youth who leave remote settlements for education and job

opportunities further south, creating a brain-drain that further impacts indigenous societies (Larsen and Huskey 2015).

Alongside the melting ice are millions of square kilometers of permafrost which for the first time in human history are thawing for significant portions of the year. This new cycle of freeze-thaw, and in some cases permanent thaw, of the permafrost has had significant impact across the affected areas of the Arctic. Until recently, permafrost acted as a firm foundation for infrastructure and buildings across the Arctic, providing similar stability to bedrock in temperate climates; however when thawed, the support provided by the permafrost is lost as the ground becomes saturated with melt water. With their structural support turned into marsh and mud, roads, houses, pipelines, docks, and other man-made structures begin to shift under their own weight and in many cases collapse or are made unusable due to damage. Similarly to sea ice, the thawing permafrost compounds to create runaway scenarios of environmental change. Trapped within the permafrost are huge stores of carbon, as much as 1600 gigatons worth, alongside methane and other harmful gasses; which, when freed into the atmosphere, trap heat in a greenhouse effect perpetuating the Arctic thaw (Welch 2019; McGuire et al. 2018). The gasses released during the thaw have the added danger of being extremely volatile, sparking unpredictable explosions which can leave craters large enough to swallow a building; the largest yet discovered in Siberia is nearly 50 meters wide (Wei-Haas 2020). Coping with the thawing permafrost adds significant costs to economic projects in the Arctic as additional building supports must be able to weather the freeze-thaw cycle. In addition to this, existing structures must either be renovated with new supports or must be abandoned, which can present substantial financial burdens to businesses, governments, and residents.

The Arctic in the World-Economy

Although it is entirely within the borders of non-peripheral states, the Arctic economy shares many characteristics with peripheral economies, such as limited infrastructure, wealth and wage inequality, and the domination of primary sector industries whose proceeds flow to core areas. As the Arctic continues to evolve due to climate change, its interactions with the wider world-economy evolve as well. The melting ice and thawing permafrost open new opportunities for infrastructure, development, and resource exploitation; however, the shifting environment also signals the end of many traditional indigenous economic practices and disrupts the fragile ecosystem, which is home to the region's diversity of living resources and wildlife.

This section will examine the Arctic economy and its place in the wider world-economy, first by focusing on the region through a core-periphery lens, where similarities between the Arctic and peripheral regions of the world-system are compared and contrasted with each other and with the core regions of Arctic states. Next is an outline of two key economic sectors found across the region: resource extraction (hydrocarbon, mineral, and living resources), and shipping. This section will also consider the impact of these sectors on traditional indigenous economies, as well as the future of traditional indigenous economies in a rapidly changing climate.

Core-Periphery Relations of the Arctic

The Arctic exhibits a dualistic nature in the world-economy; it is located entirely within the territory of core states of the Arctic NATO members and the semi-peripheral world power Russia, yet when examined through the lens of a regional-system it shares many characteristics with peripheral regions. This is largely due to two key factors which compound with one another: the Arctic's remote location and its small local population. It is important to note that the peripheral qualities of the Arctic are not equally shared among Arctic areas; for example, the Scandinavian Arctic shares many more commonalities with the core than with the periphery, whereas the Russian and Canadian Arctic are comparatively peripheral. Three indicators of the Arctic's peripheral nature are examined in this subsection: primate cities, social infrastructure, and the dominance of the primary industry in regional economics.

Due to its remoteness and its economic structure which is detailed further below, the regional subdivisions of the Arctic are home to primate cities, meaning cities which disproportionately dominate their political or regional subdivision demographically, economically, and culturally. Using the Canadian territory of Yukon as an example, the city of Whitehorse, with an estimated 2021 population of just over 33,000 dwarfs the territories next largest urban area, Dawson, which has a population just under 2,300 (Yukon Bureau of Statistics 2020). Similarly, the Russian oblast of Murmansk which encompasses the Kola Peninsula is dominated demographically by the city of Murmansk which during the latest national census (2010) had a population of roughly 307,000, five times larger than the next largest city in the oblast, Apatity (Federal State Statistic Service 2010).

The High North primate cities, similarly to those in peripheral areas throughout the world-system, are not only are disproportionately populated, but are also significantly better equipped with social and transportation infrastructure compared to regions outside of their urban areas. As the distance between rural areas and these primate cities or other urbanized areas increases, the quality of social infrastructure such as hospitals, schools, fire and police protection, and cultural outlets exponentially decreases to the point of absence. In the U.S. state of Alaska, one in three communities has no local law enforcement, and must rely on state police to respond to emergencies and disputes; due to only about 14 percent of Alaskan towns and villages being connected to a road network response times can range from hours, to days (Hopkins 2019). Medical services in the Canadian Arctic, which are guaranteed by the state, drop significantly in quality and rise significantly in cost for the state in peripheral areas, disproportionately affecting indigenous communities. A study by Oosterveer and Young (2015) found that access to emergency medical services in the Canadian Arctic were particularly difficult due to the lack of infrastructure to remote communities, and that during periods of adverse weather (a common occurrence during Arctic winters) emergency flights to fly-in only communities might take between four hours and six days before conditions could allow a safe landing. While conducting the same study, a rural nurse was interviewed about the circumstances of medical emergencies in her community, on the topic of medical evacuations she was quoted "I call for a plane, let the emergency room in Yellowknife [primate city] know that the patient is coming, and the plane

comes and picks them up. But if you had a heart attack here, you would never survive” (Oosterveer and Young 2015).

Finally, Arctic economics are a strong indicator of its peripheral nature within the world-system and the world-economy. The region relies heavily on the primary sector for employment and tax revenue, with export infrastructure and related services centered in primate cities, which are linked to remote extraction sites with little to no inter-settlement infrastructure. Similarly to other peripheral areas in the world-system, the resources produced in the Arctic are exported to core areas for processing where they dramatically increase in value, creating a profit which benefits core industries while the Arctic only sees comparatively marginal returns, which largely remain within the ownership structure of the extraction industry. While these proceeds are taxed—at times heavily—the geographical realities of the Arctic, which increase the cost of living and doing business, translate into a smaller impact when tax revenues are spent on Arctic communities. The Arctic’s indigenous peoples are disproportionately affected by the negative consequences of the primary industry; and since large-scale extraction operations began at the end of the nineteenth century have seen their traditional economic structures dismantled, as they are pushed off of their ancestral lands and find themselves unable to compete within the constraints of modern capitalism.

Below is an in-depth look at the resource extraction industries that drive the economy of the High North which fall into three categories: hydrocarbon extraction, mineral extraction, and living resources. Following this is a growing industry within the Arctic outside of the primary sector, shipping, which holds the potential to further expand the profitability of Arctic resource extraction in the future as well as increase the prominence of the Arctic within the world-system and the world-economy.

Resource Extraction

Resource extraction has long been a cornerstone of Arctic economics and is its primary contribution to the world-economy. Many of the modern settlements in the Arctic exist solely to support the countless oil rigs, gas fields, mining operations, lumber mills, and fisheries, which dot the region’s coast and interior. The receding ice and warming temperatures brought about by climate change have created new opportunities for extraction enterprises to expand into areas previously too inhospitable for profitable ventures, generating an economic boon for Arctic states and territories. These new opportunities come at a price however: man-made disasters such as oil spills, gas leaks, and mining runoff can cause irreparable damage to the delicate Arctic environment that is already under severe strain from climate change; overfishing by an armada of factory ships can leave Arctic waters and sea beds barren; and native peoples can be coerced off their ancestral lands in order to make way for resource development projects.

Hydrocarbon Extraction. Hydrocarbons are the catalyst for a significant portion of the Arctic economy. The rigs and wells which extract the valuable hydrocarbons from the Earth are serviced by hundreds and thousands of service workers, who are in turn supported by hundreds

and thousands of workers who provide housing, consumer outlets, food, and various other services at remote settlements. The supplies for these remote settlements are shipped in by an army of truck drivers, bush pilots, and boat captains from larger Arctic population centers such as Anchorage, Arkhangelsk, and Yellowknife, which are better connected to the larger world-economy. This economic ecosystem is vulnerable to a number of outside factors such as fluctuations in the international oil and gas market, changes to environmental regulations, the quality and condition of infrastructure along the supply chain, and the development of alternative energy sources (Gosnell 2018).

Hydrocarbon extraction is the largest industry in the Arctic, making a considerable impact not only in regional economics, but it is also the largest commodity from the Arctic into the world-economy (Olesen 2017; Keil 2015). A 2008 United States Geological Service study assessed that the Arctic contains some 13 percent of the world's undiscovered oil and roughly 30 percent of its undiscovered gas, much of which lies offshore and within the exclusive economic zone (EEZ) of Arctic littoral states (Stauffer 2008). This does not include the already well-explored and vast onshore resources that have been worked for decades above the Arctic Circle, such as the shale and oil sands of North America and gas fields of Siberia (Stronski and Ng 2018). Non-littoral states are able to access these hydrocarbon resources only with the cooperation of the state which has sovereignty over the territory or EEZ and must negotiate their entry, often involving agreements to use local labor, exchange technology, invest in infrastructure development, and profit sharing among other concessions, which makes entry into Arctic hydrocarbon extraction viable for only a small number of deep-pocketed actors primarily from the world-system's core. An exception is China, which is the most proactive of the non-littoral actors involved in hydrocarbon extraction, and has a number of high-value investments and projects above the Arctic Circle. The most productive and prestigious of these investments are in Russia as part of the Polar Silk Road project, such as the multi-billion dollar Yamal LNG project; however China also has significant holdings in American and Canadian ventures, such as the future Alaska LNG project (via Sinopec Group, Bank of China, and CIC capitol) and Long Run Exploration's Alberta hydrocarbon production (via Sinoenergy) (Passut 2018; Dutta 2016; Hong 2018). China views these ventures as a necessary diversification of energy sourcing to safeguard the flow of energy to its demanding economy, which could be disrupted in times of geopolitical crisis (Lajeunesse 2018; Weidacher Hsiung 2016; Kröger 2019).

The profitable exploitation of the Arctic's gas and oil reserves, especially those which lay offshore in newly ice-free areas, faces a number of challenges both from the Arctic's characteristic environment, and from economic considerations. For one, the extraction and support equipment necessary for hydrocarbon extraction in the Arctic is extremely expensive compared to the conventional rigs and wells at work in other hydrocarbon producing regions, such as the Gulf of Mexico or the Arab Peninsula. This is due to the harsh climate in which they must work: persistent sub-zero temperatures for much of the year, impacts from ice flows, and poor foundation conditions from the permafrost and the ocean's freeze-thaw cycle which can cripple all but the most specialized machinery. Second, as described earlier, long supply chains

and limited transportation options require extraction operations to pay extraordinary fees in order to keep downtime to a minimum. Third, the international oil and gas market is currently in a down-trend due to renewable energy developments and advances in shale and fracking technology, causing low market prices; making many Arctic projects, particularly offshore drilling, a high-risk investment with the potential of little to no return under current production conditions. Finally, political developments, mainly concerning environmental stewardship, have caused a backlash against the “drill baby, drill” mindset, prompting politicians in many littoral states to limit the development of extraction operations.

Mineral Resources. Similar to hydrocarbons, the mineral resources of the Arctic are located exclusively in the territory of Arctic states, decreasing the likelihood of direct conflict over extraction rights. Also similar to hydrocarbon extraction are the communities and supply chains that exist only to support the mining of mineral resources, creating a delicate economic ecosystem which can see the closing of just one mine reverberate throughout a disproportionately large area. Currently the global price for minerals remains low, dampening the intensity of development; a spike in prices or the discovery of a valuable lode of rare-earth minerals, however, could significantly increase activity in the sector (Olesen 2017).

During this market lull, China has been proactive, buying up the rights to existing mines and related real-estate in anticipation of more profitable times and to secure a diverse portfolio of available resources. This is most visibly taking place in Greenland, where the global giant’s weight is met with both adulation of a forthcoming economic boom, and a fear of straining already worn relations between the Greenlandic native government and their benefactors in Denmark (Bislev, Gad, and Zeuthen 2018). Chinese state-owned enterprises (SOEs) and Chinese private enterprises align themselves with the policies and interests of the central government when developing their investment strategies in order to obtain financing from state banks and support from Beijing, giving them an advantage over competitors and inviting criticism from other Arctic actors of secret geostrategic agendas (Jiang 2018).

The United States has mined its Alaskan territory for well over 100 years, with mineral extraction making up an important portion of the Alaskan economy. A study by the McDowell Group found that in 2016 mining exports represented 35 percent of the total exports from the state, a value of some \$1.5 billion (McDowell Group 2018). The same study found that payments to the state of Alaska (via taxes, licenses, etc.) totaled \$109 million dollars in 2017, not including an additional \$34 million paid to local governments. This income is vital for the budget of a state with a comparatively small population and immense geographic size. As with the state’s oil and gas industry, increasing concerns about the environmental impact of mining (especially open-pit mining) has created hurdles of red tape which mining enterprises must jump in order to receive a license. The Trump administration, as with other Republican administrations, vowed to simplify the process to create more growth in the sector as well as open hundreds of thousands of protected acres to mining tenders (Rosen J. 2017; DeMarban 2020). Conversely, the Biden administration, which came to office in 2021, began efforts to overturn many elements of the

Trump administration's resource development agenda within its first 100 days. It remains to be seen how committed the Biden administration will be to Arctic stewardship and the effect his resource policies will have on the Alaskan economy (Hanlon 2021).

Alaska's native peoples have begun to more effectively organize to dispute potential mining operations that adversely affect their traditional economics. Tribal governments have brought forth a number of lawsuits in which they claim that the environmental impact from current and proposed mining operations disrupt their livelihoods by poisoning water supplies and damaging fisheries, among other grievances (Kauffman 2019; Rosen Y. 2019). Despite some legal victories, it remains a "David and Goliath" struggle, as small tribal communities litigate against multi-billion dollar extraction firms who not only command more monetary resources, but often have non-tribal public opinion in their favor, as the prospect of new extraction projects promise to bring jobs and economic opportunity to remote areas.

Living Resources. The Arctic's remote location, harsh environment, and historically small population allowed its living resources to remain relatively undisturbed outside of subsistence harvesting and small-scale export operations until the late nineteenth century, when advances in transportation and refrigeration created viable opportunities for profit. Since that time, the exploitation of living resources in the Arctic has undergone a series of industrializations leading to the present day's factory fishing vessels, high-output lumber mills, and other hallmarks of modern living resource exploitation. This has affected not only the species harvested but also the indigenous peoples of the Arctic, whose livelihoods which have centered on the stability and availability of various living resources for millennia is now in question. The three primary living resources in the Arctic are marine living resources (primarily fish), timber, and reindeer.

Beginning with marine living resources in the Arctic, fish, seal, whales, and other ocean life have been harvested by indigenous communities for millennia and had been, until recently, largely protected from industrial fishing above the Arctic Circle by ice cover which made large scale operations unprofitable (Fernandez et al. 2016). Now however the changing climate has created an ice-free season, which opens new fishing grounds to fleets of factory ships able to catch and process more fish in one season than a traditional fishing community might be able to in a lifetime. Coupled with a predicted migration of fish stocks to higher latitudes due to warming waters further south, this emerging resource has the potential to create conflict between proponents of ideological conservation and reality of increasing global food demands (Wegge 2015).

For the time being, the voices of conservation have bested the lobbying efforts of the \$130 billion a year fishing industry looking to open new fishing grounds in the High North. A 2018 agreement between the Arctic littoral states, the European Union, China, Japan, and South Korea, banned fishing in the Arctic until 2034 while a battery of studies are carried out to better understand the region's delicate ecology and the impact industrial fishing might have on the region (Food and Agriculture Organization of the United Nations 2018; Sevunts 2018). Whether the parties involved will agree on the findings and suggestions from these studies is unclear, as

each has their own particular idea of conservation and conscientious resource management. As the world-system's population continues to grow exponentially, the demand for seafood will increase as well, and increasing pressure will be placed on governments to open the Arctic to fishing as stocks elsewhere shrink due to warming sea temperatures and overfishing.

Similarly to marine living resources in the Arctic, timber harvesting in the High North is being shaped by the forces of climate change and concerns over environmental stewardship. The boreal forests which form a belt around the Arctic from roughly 50° to 60°N latitude provide the raw materials used in wood industries around the world-system and comprise roughly 17 percent of the global wood harvest (International Union of Forest Research Organizations 2012). Though the timber industry employs considerably fewer people than the hydrocarbon and marine living resource extraction industries, it plays an important part of many local economies within the Arctic, due to the long supply chains which reach out to and support remote logging camps, similar to the supply chains seen in the hydrocarbon and mineral extraction industry (Marcille et al. 2015).

The global timber industry is undergoing a number of changes as demands and supplies shift with advances in harvesting, processing, and by-product recycling technology. In the boreal forests of the Arctic this takes the form of improved forest management techniques which lower the environmental impact of timber harvesting compared to traditional clear-cutting methods, and an increasing diversification in the use of by-products from the harvesting and forest management processes (International Union of Forest Research Organizations 2012). One such use of timber by-products is an increasing interest in the creation of pellet biofuels for heating and power generation, especially in Nordic countries which are currently able to use these biofuels in combined heat and power (CHP) plants which have a high energy efficiency of between 90-95 percent (International Renewable Energy Agency 2019).

The health of the region's forests has been heavily affected by factors that can be directly attributed to climate change. Perhaps the most obvious of these factors is the shift in growing seasons and freeze-thaw cycles to which the regions flora has been unable to adapt. As well, the changing climate in the Arctic has produced drier weather patterns; which, in conjunction with shorter periods of snow cover, have created ideal conditions for wildfires that are able to clear hundreds of thousands of acres of timberland in a season (NOAA 2020). Warmer summer temperatures and milder winters have also allowed the population of various wood-pests and fungi to explode in and extend their range further north than has historically been possible. One such pest found in Alaska, the spruce beetle (*Dendroctonus rufipennis*), whose populations had previously been kept in check by the freeze-thaw cycle has increased its range northward by 63 miles (101 kilometers) between 2018 and 2020, leaving in its wake an uncountable number of dead standing trees (Syrotchen and Stehn 2020).

Finally, reindeer husbandry remains an important industry in the Eurasian High North, where it is practiced by semi-nomadic indigenous groups who migrate with their herds across the region with the changing seasons. The right to practice reindeer husbandry is legally exclusive in many areas to these indigenous groups, and despite only a fraction of the indigenous populations

practicing reindeer husbandry it remains an integral part of their culture (Torp 2013). Reindeer are raised for their meat, hides, antlers, and other products, as well as used as beasts of burden in a number of different tasks in the semi-nomadic life of indigenous peoples. In 2014, the reindeer industry, including production, processing, and a budding tourism sector, is estimated to have contributed 1.3 billion euros to the economies of Sweden and Finland, and employed some 15,000 people (Finnish Reindeer Herders' Association 2014).

Due to the seasonal and nomadic nature of reindeer husbandry, its practitioners face growing difficulties in an Arctic evolving from climate change. The traditional routes and pastures that have been used for thousands of years in predictable seasonal cycles are now in flux as changing weather patterns affect the freeze-thaw cycle of the High North, jeopardizing calving success and slaughter income. As herders adjust to the changing environment they face additional issues, including encroaching urban and industrial areas which can lead to less pastureland and legal challenges to their centuries old right to free migration with their herds (Hovelsrud et al. 2012; Sapmi 2018; Torp 2013).

The living resources in the Arctic have the least potential to spark inter-actor conflict in the region out of all of the natural resources that have been mentioned. The fish stocks presently in the region and those which are expected to migrate north in the future exist primarily within the EEZ of Arctic littoral states. These states have shown that ecological conservation is an important factor in their collective stewardship and, along with forging multilateral moratoriums on fishing, have also implemented bans on fishing individually within their own EEZs (Nilsson 2018). Similarly, logging and reindeer husbandry are practiced largely without crossing national boundaries; and when boundaries are crossed, such as during reindeer herd migrations, there is often legal precedent and ample regulation to avoid contention outside of isolated incidents. Points of contention do however have a possibility of rising in the future between the Arctic littoral stewards and the non-Arctic states whose food security will be put into jeopardy as traditional fishing grounds are depleted from the ongoing exponential growth in the global population as well as future fish migration. Illegal fishing activity is likely to, at least in the short term of this scenario, increase before littoral states become more adept at policing such activity in the region (Gosnell 2018).

Arctic Shipping

The modern world-economy relies on global maritime shipping to move goods quickly and cheaply from manufactory to market, often from one side of the planet to the other. Navigable and efficient sea routes linking the North Atlantic and Asia that can bypass the costly Suez and Panama canals, and avoid pirate havens such as the Malacca Straits and the Horn of Africa have become a long-sought reality due to climate change. Three routes have opened with the receding ice: the Northern Sea Route (NSR), which crosses over the Eurasian Arctic; the North West Passage (NWP), which passes through the American and Canadian Arctic; and the Transpolar Sea Route (TSR), which crosses the North Pole and exits between Greenland and Eurasia. Each route has advantages and disadvantages which shipping firms must weigh accordingly, such as

length of shipping season, development of search-and-rescue (SAR) infrastructure and ice-breaking capabilities, and the territorial claims of littoral states, among other considerations when planning shipping routes in the High North. Below is an outline of the strengths and weaknesses of each Arctic sea route, as well as a brief examination of the Bering Strait's importance in Arctic shipping.

Bering Strait. All three routes pass through the Bering Strait, which separates Eurasia and North America and links the Pacific Ocean to the Arctic Ocean. This natural choke point is roughly 85 kilometers wide and is split territorially between the United States and Russia at the Diomedes Islands which themselves are separated by less than 5 kilometers. Currently, the strait is navigable for over half of the year beginning in mid-June, with accessibility diminishing in the late-Autumn months. During the winter months, an ice-pack averaging a meter and a half in thickness and severe, unpredictable weather limits accessibility to only the most hardy of vessels, making commercial traffic impossible (Chief of Naval Operations 2014). Geo-strategically, the strait has the capacity to halt east-west sea traffic passing through the Arctic, though this is unlikely to happen outside of a period of significant conflict within the world-system. The strait's status under the United Nations Convention on the Law of the Sea (UNCLOS) allows vessels "the right of transit passage, which shall not be impeded" (United Nations UNCLOS, 1982 Part III). This freedom of navigation is presently a non-issue as Russia is a party to the convention and the United States, though a non-signatory to UNCLOS, has been a long-standing proponent of navigation rights.

Northern Sea Route. The NSR is the most navigable and well-developed of the three Arctic passages and is the most trafficked by a significant margin, with over 1,000 permissions for navigation granted in 2020 by the Russian Northern Sea Route Administration (Olesen 2017; Ministry of Transport of the Russian Federation 2020). Situated over the top of the Eurasian landmass, it offers the shortest route from manufactories in East Asia to markets in Western Europe, reducing the traditional journey via the Panama Canal or Suez Canal by thousands of kilometers, and saving roughly two weeks' worth of overhead costs and shipping time (Hong 2018). Currently, the NSR has the longest shipping season, spanning from late spring/early summer to the beginning of October, and the best coverage of support vessels and SAR capabilities (Melia, Haines, and Hawkins 2016). The waters of the NSR are overwhelmingly controlled by one Arctic actor, Russia, who views the opening sea lanes as paramount to its economic future (Schulze 2017). The NSR not only facilitates the shipment of hydrocarbons from the oil and gas fields in the far Siberian north, but also stands to provide the Russian government with a boon of transit license fees and service charges from shipping firms. However due to economic troubles in Russia over the last decade, there has been a shortage of domestic capital to develop the region, forcing Moscow to look internationally for investors (Roseth 2014).

China has provided much of this international investment, buying stakes in hydrocarbon extraction ventures, funding infrastructure projects, and improving the region's telecommunication capabilities (Lukin 2020). These investments are a part of the "Polar Silk Road," a branch of the larger Belt and Road Initiative, which China revealed in their 2018 Arctic strategy (The State Council Information Office of the People's Republic of China 2018). The Polar Silk Road will be an important link from the resource rich Arctic to the energy demanding economies of East Asia, as well as an alternate route for goods to and from European markets which is able to avoid traditional choke points such as the Malacca Straits that could be made inaccessible in more hostile geo-political climates (Stronski and Ng 2018). COSCO, the largest state-owned shipping enterprise in China, increases their usage and interest in the NSR year-over-year. In a company sponsored study, 14 trips on the NSR had saved a total of 220 days of shipping time, 6,948 tons of fuel, and \$9.36 million USD worth of costs compared to using traditional routes (Sun 2018).

Russia perceives and treats the NSR as internal waters, while other actors, most vocally the United States and the European Union, insist it is an international waterway per UNCLOS, and question the legality of fees and regulations imposed by Russia (Congressional Research Service 2021). China meanwhile has shown itself willing to accept Russia's claims, keeping in-step with assertions it has made on similar issues regarding navigation rights closer to its shores and ensuring that its relationship with Moscow and the billions of dollars it has invested in the Arctic remain stable (Olesen 2017).

North West Passage. The once mythical NWP, sought after by the likes of Henry Hudson and William Baffin, has become a reality with climate change and receding ice. It crosses the American Arctic over Alaska before proceeding through a maze of islands in the Canadian Archipelago and exiting between Baffin Island and Greenland, making the NWP a more intricate route to navigate than the NSR as well as a slightly longer journey to European ports. The route is best suited for shipping between North East Asia and the North Western Atlantic coast along the upper American and Canadian seaboard; however a study by (Melia et al. 2016) showed that savings in time and distance by using the NWP versus the Panama Canal were relatively modest, and the volume of shipping was likely to continue using the Panama Canal route, assuming efficient passage and short queues through the Canal. The NWP also has a shorter shipping season on average than the NSR by roughly one month; though as climate change intensifies, the route's period of open water navigability will extend to longer periods throughout the late summer and early autumn months.

The NWP has not received the same level of development as has the NSR. Environmental concerns over resource extraction projects, its distance from major population centers, the rights of native peoples over their ancestral lands, and budgetary concerns have all slowed down efforts to improve infrastructure along the route by the United States and Canada. Signs however point towards a renewed interest in the route by both powers as they see the potential that the NWP has as both a subject of national security planning and for their respective economies as climate

change makes the route, and the North American Arctic as a whole, more accessible. Future development projects will focus on SAR capabilities, disaster response (especially related to oil spills), and enhancing law enforcement cooperation between the United States and Canada (Lajeunesse, 2018; Lackenbauer and Huebert 2015).

Like the NSR, the NWP's status as either internal waters or an international strait is controversial, and is an area where the United States and Canada, normally close partners on Arctic policy, diverge in their approach to the Arctic. The United States, in conjunction with states who conduct a large amount of international maritime shipping, assert that the NWP is an international strait according to Article 38 of UNCLOS, which would limit Canadian sovereignty over the route and open it to international regulation. Canada by contrast claims that the waters of the Canadian Archipelago have historically been internal waters and are exempt from the enforcement of Article 38 by Article 8(2), which covers pre-existing claims (U.S. Department of Defense 2016). Though the dispute over navigation rights between the close partners is not likely to spark conflict, it does have the possibility to cause disruptions in the future between the two as traffic on the NWP increases (Lajeunesse 2018; Schulze 2017; James and James 2014).

Trans-polar Route. The TSR is currently the least accessible route of the three. The polar region at the global axis is still locked in ice for much of the year and is normally only navigable by large ice-breakers. Summer ice levels however have declined by over 40 percent since observations began via satellite in 1979, and are continuing to recede, allowing for more ambitious voyages yearly with “ice-free” summers forecasted to begin as soon as 2030. The route is particularly appealing to shipping enterprises as it is the fastest route from Asia to Europe and is able to avoid most territorial waters and regulations (Hong 2018). Although the TSR has enormous potential to revolutionize shipping when the waters clear of ice, the route will still pose many challenges to shippers, including snap changes in weather, multi-lateral action by the Arctic littoral states to turn the region into a protective reserve, and unpredictable shipping seasons (Melia et al. 2016).

Hegemonic Rivalry in the Arctic: The Formation of Competing Power Blocs

The Arctic is exemplary in the modern world-system for its multi-lateral approach to peaceful governance and collective stewardship. Dubbed “Arctic exceptionalism,” the region has been conflict-free since the end of the Cold War in the early 1990s; with Arctic states resolving points of contention through diplomatic means rather than through forceful coercion, such as the 2010 treaty between Norway and Russia that successfully delineated the two states' respective EEZs in the Barents and Arctic Seas (Øystein 2011; Kämpylä and Mikkola 2015). This precedence of cooperation is best demonstrated by the Arctic Council, the premier body of governance in the High North. Since its founding in 1996, it has been the forum for Arctic states to negotiate and promote Arctic interests, focusing on issues surrounding environmental stewardship, economic development, joint SAR readiness, and scientific cooperation, among other pertinent issues.

Importantly, however, the Arctic Council does not address security issues as is explicitly mentioned in its founding document, the Ottawa Declaration (Arctic Council 1996). This has allowed the council to function normally and carry out its stated mission without becoming mired in non-Arctic affairs; for example, during periods of Russian aggression in the Caucasus and U.S. interventions in the Middle East, which have disrupted the functioning of other international bodies. However under the surface is a growing unease, as the Arctic becomes more accessible due to climate change (Congressional Research Service 2021). This new accessibility has brought other actors from the world-system into the region who seek to stake out their own share of the Arctic bounty, most importantly China.

China's interest in the Arctic stems from two intertwined existential realities: its reliance on inexpensive raw materials and fuel to perpetuate its export-oriented economics, and its dependence on just-in-time supply chains that pass through multiple choke-points (Hong 2018). This has prompted Beijing to increase its political and economic capital in the Arctic where it perceives investments in extraction projects and the NSR as alleviations to vulnerabilities elsewhere. Labeling itself a "near-Arctic" state, China asserts that the Arctic should be open to international development from actors throughout the world-system, rather than strictly at the pleasure of Arctic states; and as a near-Arctic state, it, along with other non-Arctic actors, should be included in Arctic governance processes (Grieger 2018).

Due to tensions triggered by its rapid political and economic growth elsewhere in the world-system, China has turned to Russia to facilitate its Arctic ambitions, which in turn is largely isolated economically due to international sanctions for its military actions against Georgia and Ukraine, and is unable to finance many of its own projects in the High North (Pezard 2018). In return for Arctic access, China has heavily invested in the build-up of Russia's Arctic region's infrastructure, and is a significant stakeholder in several high-profile Russian extraction projects, most prominent of which is the Yamal LNG project which has 30 percent Chinese ownership through the National Petroleum Corporation and the Silk Road Fund, in addition to covering two-thirds of the project's external lending needs (Stronski and Ng 2018). Chinese investments in the Arctic have allowed Russia to shift resources into rebuilding and refurbishing several Soviet-era military bases in the Arctic and construct new outposts that dualistically serve as bases for SAR along the NSR, as well as a projection of military power into the High North (Forsythe 2018).

The establishment and refurbishment of remote Russian outposts in the Arctic, such as the air bases at Nagurskoye, Temp, and Sredny Ostrov, point to a revitalization and possible expansion of the "bastion concept" defense used by the Soviet Union throughout the Cold War. This concept was meant to ensure Soviet access to the North Atlantic and protect access to the Northern Fleet's headquarters on the Kola Peninsula, and was a balancing strategy to NATO's naval superiority (Osthagen 2021). As the Arctic evolves and melting ice increases access to the region, these outposts, dubbed an "Arc of Steel" by U.S. Navy Admiral Mark Ferguson, will provide A2/AD coverage for Russian forces and interests in the theater; securing not only the

NSR and hydrocarbon projects, but also provide staging grounds for power projection (Franiok 2020; Garamone 2015).

Despite the increase in cooperation between China and Russia in the Arctic, potential fracture points exist which warrant attention. At the center of these issues is the growing disparity in global power between China, a rising power, and Russia, which has seen its power fluctuate since the 1990s (Guo and Wilson 2020). Most pressing of these issues is an increasing reliance by Russia on Chinese funds for its economic development in the Arctic, and potentially losing aspects of its sovereignty to Chinese economic power; this presents itself most vividly along the NSR which Russia sees as key for its rejuvenation as a world leader in the twenty-first century (Kobzeva 2020). While both powers presently consider continued strategic cooperation fruitful, their mutual drive for supremacy on the global stage, a “Chinese Century” and nostalgia for Cold War superpower status, are mutually exclusive.

The synergy of Russian might and Chinese money in the Arctic, and a gradual move towards policy alignment in key areas indicate the formation of a power bloc in the High North, wherein both powers work in conjunction to fulfill geopolitical goals that would be unattainable otherwise. This mimics other developments in the world-system where China and Russia find themselves as partners of necessity due to diplomatic and economic isolation. As climate change continues to reshape the Arctic, this budding bloc will increasingly find its interests opposed by another, well-established power bloc: NATO.

Originally designed as a deterrent against Soviet aggression and influence during the Cold War, NATO has evolved beyond its original purpose into an organization, which, in its own words, focuses on “utilizing collective defense, managing crisis situations and encouraging cooperative security” (NATO 2018). In the Arctic, all but one of the littoral states are NATO members, and five out of the eight votes on the Arctic Council are chaired by NATO members. As well, the two non-littoral states Sweden and Finland are closely aligned to NATO, strategically and diplomatically both on the Arctic Council and on the global stage. While it would appear at face value that a comparison of NATO and the Sino-Russian partnership would be asymmetrical in favor of NATO, as outlined below, the two blocs for the time being maintain a strategic equilibrium.

The multiplicity of different policies, strategies, and viewpoints on the Arctic is the largest single factor preventing NATO from establishing a collective hegemony over regional affairs. While members remain steadfast on collective security as enshrined by Article 5 of the NATO treaty, there is disunity on Arctic strategy in respect to individual actors. This is exemplified by the individual Arctic policies and regional actions taken by two of NATO’s Arctic members: Canada and Norway. Their attitudes exist on a spectrum spanning from Canada’s prioritization of sovereignty to Norway’s efforts to promote regional security collaboration (Lackenbauer and Huebert 2015; James and James 2014; Coffey and Kochis 2018).

Canada is NATO’s largest Arctic member with extensive territories in the far north and control over the majority of the NWP, which runs through the Canadian Archipelago. Canada is concerned that a larger role from NATO in the Arctic would increase the influence of non-Arctic

states in the region, possibly putting aspects of Canadian sovereignty in jeopardy (James and James 2014). Even bi-lateral security arrangements in the Arctic with the United States, Canada's closest ally politically and physically, have proved unpopular with the Canadian electorate, especially those in the Far North (Lackenbauer and Huebert 2015). It remains to be seen how Ottawa's position will be affected by the pace of sea ice melt in the Canadian Arctic. It is possible that with the predicted increase in traffic along the NWP that Canada will be forced to accept outside assistance in policing the route and surrounding areas at the sacrifice of its policy of exclusivity in the region, as its own coast guard and navy struggle to compensate for the increased area of responsibility. This move would be welcomed by NATO allies, especially the United States, who has indicated that it is interested in pursuing holistic security options with Canada in the Arctic (Forsythe 2018). When coupled with an increasing trend among Canadians to favor social spending over defense spending, the likelihood of a shift in Canada's dogmatic interpretation of sovereignty in the Arctic increases, bringing about a mindset which could be more accepting of sharing the burden of securing its vast Arctic territory.

The largest proponent of increased NATO action in the Arctic is Norway, a country that is not only a littoral state, but also shares a land border with Russia (U.S. Department of Defense 2016). Norway's Arctic forms a more integral part of its national economy than the Arctic territory of any other NATO member. One third of all Norwegian land lies above the Arctic circle, and with it 10 percent of the national population (roughly 500,000 inhabitants, more than all of the Arctic territory of all other NATO members combined), as well as many of the hydrocarbon, mineral, and living resources that have made Norway's economy one of the most prosperous in the world. Concerns have risen in Norway over Russia's military build-up in the Arctic, especially on the Kola Peninsula where the Russian Northern Fleet is based and where the two share their land border. Despite comments from the Norwegian Defense Ministry downplaying the threat that Russia poses, Norway has worked to strengthen its position in the Arctic militarily. Measures include the stationing of 1,500 British and American troops in the North, increasing the national defense budget by 7.3 percent (4 billion NOK, over 450 million USD), and reinvesting in defensive infrastructure in Finnmark (Snow 2018; Watts 2019).

An area where policy unity remains is in adherence to the collective defense spelled out in Article 5 of NATO's founding treaty. As the Arctic's strategic importance grows, so does the attention it receives from NATO command. The alliance's presence in the Arctic waned after the end of the Cold War and only began to receive renewed interest after an increase in military activity from Russia in the late 2000s. In 2018, this renewed interest culminated in the largest NATO exercise since the collapse of the Soviet Union. Named "Trident Juncture," the two week exercise tested the readiness of NATO forces to respond to aggression in the Arctic with mock air, naval, and land operations staged in Norway, Sweden, and Finland, the latter two being active members of NATO's "Partnership for Peace" program. Taking part in the exercise, which NATO Secretary Jens Stoltenberg called "ambitious and demanding," were some 50,000 personnel, 10,000 land vehicles, 65 naval vessels, and 250 aircraft from 31 participating countries (Jozwiak 2018). A resounding success, Trident Juncture served not only to bolster the

cohesiveness of NATO members in combat scenarios and test new strategies and equipment, but it also showed the effectiveness of NATO to outside actors, namely Russia, who have been conducting large scale military exercises aimed at the West over the past decade (Garamone 2019). Despite the grand show of force during Trident Juncture and its successes, an enduring problem for NATO in the Arctic is a lack of manpower and specialized equipment permanently stationed in the theater compared to Russia (Congressional Research Service 2021).

In the coming years NATO will be pressured to formulate a common position on the Arctic by a rapidly changing physical and political environment. Increases in traffic along Arctic maritime routes will put pressure on the alliance's naval capabilities to police previously inaccessible areas, which might be relieved only at the expense of dogmatic sovereignty. Saber rattling by a historical rival who is encouraged by its domineering position in the theater will need to be answered resolutely by all allies, not just those who are in immediate physical uncertainty. These issues can be met head-on through compromise within the organization, through risk-sharing, and a through a continued reliance on multi-lateral cooperation overcoming common obstacles.

Conclusion

The Arctic has begun an irreversible evolution from a frozen, inaccessible wasteland to a theater of growing geopolitical and economic importance within the world-system. The small number of actors with influence over Arctic regional affairs maintain the bulk of global military and economic power, and include the previous hegemonic rivals the United States and Russia, as well as the rising global power, China. At stake in the Arctic are a wealth of natural resources such as hydrocarbons, fish, and minerals, and access to shipping lanes that could present a boon to destination shipping and just-in-time international trade. Though multilateralism and diplomacy have thus far shaped the geopolitics of the region, largely thanks to the success of the Arctic Council, there remain lingering questions regarding governance and access, which, if not addressed with care, could form flashpoints in the near future.

The region shows a dualistic nature within the world-system: a strong geopolitical connection to the core and economic characteristics of the periphery. The Arctic maintains a visible colonial history that continues to affect the region's indigenous peoples through the demise of traditional economies, destruction of heritage land for the resource extraction industry, and marginalization of indigenous culture. The primate cities that dominate the region demographically exist in stark contrast to remote settlements, which in addition to being inaccessible for much of the year often lack key education and health infrastructure found elsewhere within the respective Arctic states. This has prompted a migration to urban areas that further exacerbates the degradation of indigenous culture and economies, and compounds the financial strains on small municipalities. The resource extraction industries that dominate the regional economy maintain much of their refining and processing infrastructure outside of the Arctic in the core, where labor and other associated costs are cheaper. The boom in resource

extraction seen in recent decades has not translated into increased economic opportunities for individuals, while governments are only able to tax a raw, and therefore less valuable, product for revenue.

This paper's goal has been to introduce the Arctic and its evolving nature to world-systems scholars in the hope of promoting further study on the region through the lens of world-systems analysis. As the Arctic continues to emerge from ice-lock and integrate itself more fully within the wider world-system and world-economy, questions regarding its present impact, its future trajectory, and its unique characteristics, issues, and realities will become more clear, evident, and pressing. The region is a particularly interesting subject of study for:

- Hegemonic and rivalry studies
- Core-periphery studies
- Post-colonial impact studies within core actors
- Climate change's impact on the world-system

These, among other topics of interest related to the Arctic, have yet to be studied by world-systems scholars. They provide an opportunity to use the flexible scope and multi-disciplinary toolbox of world-system analysis to study this emerging region in the world-system that is still largely overlooked by social and political sciences.

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