Climate Change, Geopolitics, and Arctic Futures

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Over the past decade, the Arctic has become the site of intense geopolitical intrigue among both practitioners and spectators of geopolitics and international relations (Borgerson, 2008; Ebinger and Zambetakis, 2009; Emmerson, 2010; Sale and Potapov, 2010). While the Arctic (or perhaps more accurately, the Arctic regions) has its own history (see McCannon, 2012), contemporary fascination with the northern latitudes is intimately linked with experiences and predictions of Arctic climate change. Although such experiences may be mediated in very different ways – from the indigenous witness of a changing landscape to the satellite images of sea-decline over time (see National Snow and Ice Data Centre, 2015) and the far-away analyst relying on forms of 'geopolitical remote sensing' (Moisio and Harle, 2006; Nuttall, 2012) – what they share is an understanding that the future Arctic is likely to have very little in common with the Arctic of the past. The Arctic is very much a region 'in change', and climatic changes are among the main drivers (ACIA, 2005; Koivurova, 2010).

Of course, speculation about what possible futures lie in store for the Arctic – especially if the Arctic becomes increasingly connected to 'progressive' global economic and social forces – is not new. In the early 1800s, the whaler William Scoresby brought news to the British Admiralty that the sea ice around Greenland was in retreat, paving the way for another attempt to traverse the Northwest Passage (NWP) by ship. In the early 1900s, Viljalmur Stefansson claimed the Arctic would become the next great hub of human and economic activity, and the only question remaining was who would be the main beneficiaries (Stefansson, 1921). In the 1930s, Joseph Stalin sought to conquer nature in the Russian Arctic to provide an economic resource base for the Soviet Union (Emmerson, 2010). And in the 1950s, the Canadian prime minister, John G. Diefenbaker (1958) presented his 'northern vision' of opening up Canada's Arctic frontiers to economic development. What many of these visions had in common was their failure to materialise.

In the 21st century, Arctic visionaries continue to abound, as do sceptics who point to past failures. What is different today is how closely their arguments are coupled with the 'reality' of the climatic changes in the Arctic regions. Their confidence in the Arctic's potential can most easily be assessed in the month of September each year, when the summer sea-ice minimum is reported, marking the end of the melt season (March–September). In recent years, new records have been set in 2002, 2007 and 2012 giving confidence to those predicting a significant increase of human activity in the Arctic. However, although sea-ice minima have not recovered to the average level recorded between 1979 (when satellite measurements began) and 2002, its continued annual variability has been seized upon by sceptics of an 'Arctic bonanza' as evidence that, overall, the Arctic environment remains hostile to increased human activities.

Consequently, observed and predicted climatic changes are increasingly important to the way in which both residents of the Arctic (living in indigenous communities, towns and cities local to the Arctic regions of the United States, Canada, Finland, Sweden, Norway, Iceland, Denmark (Greenland) and Russia) and stakeholders from beyond the Arctic think about what the future holds for the Arctic, especially in terms of whether the Arctic regions are 'opening up' (Grímsson, 2015) or need to be 'saved' (Greenpeace, 2015) from increased human activity. The result is that decisions are being taken at all levels of governance, from indigenous/local communities to global institutions about what kinds of activity to allow, how they should be pursued and, more broadly, how to situate the Arctic in relation to the wider world (e.g. as a new resource frontier, a shipping highway or a global commons).

The rest of this chapter looks at some of the key dimensions of this struggle over the Arctic's future, exploring how climate change has the potential to influence existing and future human activity in the Arctic and investigating the intersection of indigenous/local, national and international interests (and the various alliances this has produced) that is emerging as a result.

Climate Change and Human Activity in the Arctic

Shipping

In the 15th century, European explorers sought navigable maritime passages through the Arctic region. Three possible routes were identified: a Northwest Passage (NWP) between the northern archipelagos of the North American continent; a Northeast Passage (NEP) following the northern coastline of the Eurasian landmass; and a Trans-Polar Route (TPR) straight across the Arctic Ocean. It is important to remember that at the time of the first European expeditions to seek out these passages, the Arctic region still represented a great unknown. Consequently, the search for northern passages from the 15th to the 19th century took on mythical, sublime, divine and even rational qualities as subsequent explorers sought funding for further expeditions to achieve a seemingly impossible transit through the Arctic (Spufford, 1996; Craciun, 2010).

While attempts on the TPR and NWP were all but abandoned by the 20th century, the challenge of conquering the NEP became a priority for the Soviet Union. Soviet planners believed that by developing the NEP, or Northern Sea Route (NSR), as the Russian portion of the route is known, the Soviet Union would possess the shortest route between the North Atlantic and the North Pacific, a significant strategic advantage over both its European and Asian rivals. Soviet domination of the route would also enable the unfettered transfer of economics resources across its huge swathes of territory (Laruelle, 2014). The NSR was subsequently closed to international traffic.

Traffic along the NSR peaked in 1987 before going into decline. In 1988, the Soviet Union began working with Norway and Japan on the International Northern Sea Route Programme to assess the economic feasibility of opening the NSR to international shipping (Dunlap, 1996). The programme established distance savings of 61 per cent between Hamburg and Dutch Harbour, Alaska; and 36 per cent between Hamburg and Yokohama. However, the waters of the NSR were also found to be relatively shallow, forcing larger vessels to travel more northerly routes, involving longer distances and more severe ice conditions. Today, the *Arcticmax*-classed container ships are at least three times smaller than those classed *Suezmax*, suggesting that the economic potential of using the route for trade remains small compared to the traditional trade routes via the Suez Canal (Humpert, 2013). Other significant factors reducing the economic potential of the NSR is the lack of ports along the NSR and the risk that changing ice conditions could lead to delays in an industry that increasingly relies on 'just-in-time' delivery (Humpert 2013).

In contrast, the NWP is far less developed. Although there were a number of expeditions during the 20th century to traverse the NWP with the support of icebreakers, it never became a commercially viable option. Ice conditions in the NWP are even harsher than in the NSR, a consequence of the fact that sea ice tends to drift across the Arctic Ocean towards North America, increasing the density of the ice there. Meanwhile, the TSR has remained blocked by the presence of all-year-round sea ice.

As this brief overview suggests, the technology to transit the NSR and the NWP has existed for decades. The challenges for would-be-users of these routes are therefore rooted in economics and risk. Businesses are unlikely to use these routes unless they produce significant cost savings. For much of the 20th century and early 21st century, any savings from reduced fuel costs associated with distance savings have been offset by the costs associated with building ice-strengthened hulls, the chartering of icebreaker support, skilling crews, the lack of markets, the risk of delays from changing ice conditions, and high insurance premiums (AMSA, 2009).

A key question being asked today is whether climate change has the potential to change this picture. Climate modellers suggest that the average sea-minimum is likely to continue falling over the coming decades (with some arguing it will completely disappear in the summer months). This has at least two material consequences: an increased area of 'open water' (albeit with a risk of icebergs) in the summer months; and a reduced area of 'multi-year' ice (AMSA, 2009). The possible gains are particularly obvious along the NSR where an increased area of open water or reduced ice thickness could allow transiting ships to travel further out from the coast, in deeper waters (allowing bigger ships to be used). A TPR could also open up even further north of the NEP. Even along the NWP, where Arctic sea ice becomes more concentrated, the waterways are becoming more navigable.

These observed changes have encouraged shipping companies (state-owned as well as a private) to look again at the viability of developing northern maritime passages. In 2009, for the first time two international commercial cargo vessels used the NEP to travel between Europe and Asia. In 2010 this increased to ten ships; in 2011 the number rose again to 34; in 2012 the number was 46, and in 2013 there were 71 commercial transits. The main benefits of using the Arctic routes are the distance savings that have the potential to reduce fuel consumption and greenhouse gas emissions. However, in 2014 the numbers fell back down to 23 ships after a year of much more severe ice conditions. Over the same period, destinational shipping to the Arctic (to resupply communities, for tourism, for fishing or to evacuate resources from oil and gas platforms and mines) has also increased dramatically, and while many remain sceptical of the potential for regular transits through the Arctic, further increases in destinational shipping seem likely, especially if the tourism, fishing and resource sectors boom and open waters become more prevalent for longer periods.

Oil and Gas Resources

Like shipping, the hunt for Arctic resources is not particularly novel. When European explorers set sail in search of the northern passages, they returned with new maps and reports documenting their encounters in Arctic waters. Their search for the northern passages was also supported by land expeditions across North America and Northern Russia. And while the maritime passages eluded them, what they did find was an abundance of living resources that would fuel the development of whaling, sealing, fur-trapping and fishing industries in Arctic lands and waters, almost to the point of extinction for the most lucrative species (Emmerson, 2010).

Growing global demand for crude oil and gas in the 20th century gave the Arctic a new material value. With growing enmity between Western world, the Middle East oil giants, and the Soviet Union, the Arctic regions were caught up in the search for new oil and gas fields. Less constrained by economic factors, the Soviet Union started to develop on-shore oil and gas fields in the Arctic in the 1930s. In North America, small amounts of oil were being pumped in Canada in the 1920s and 1930s, but it was not until the 1950s that the potential of Alaska was realised by the US Geological Survey, and more than a decade passed before the first major, commercially viable, discovery was made on-shore in Prudhoe Bay.

However, as in the case of Arctic shipping, the cost of developing oil and gas fields is far higher than it is in other parts of the world (such as the Middle East, Latin America and Africa). Even the use of complex technology for extracting oil and gas from shale reserves has proved more commercially viable. In part, this is because of the cost of operating in the Arctic, where conditions are especially challenging due to the cold weather extremes. More important though is the vast distances and the relative lack of infrastructure necessary to evacuate oil and gas to markets. For example, Prudhoe Bay's commercial viability is critically linked to the Trans-Alaska Pipeline, built in the aftermath of the 1973 oil crisis, when oil prices were high. When the price of oil falls, so does investment in the infrastructure needed to get it to market.

Today, the prospects of an Arctic oil and gas bonanza remain difficult to assess. Commercial interest in the Arctic region has increased significantly since the turn of the 21st century contributing to the popular idea that the Arctic is 'opening up' to human activity. A number of widely cited reports published by the US Geological Survey (USGS) estimated that the Arctic probably contained up to 13 per cent of the world's undiscovered oil, 30 per cent of its undiscovered natural gas and 20 per cent of its undiscovered natural gas liquids (USGS, 2015). However, these figures only estimated the quantities of fossil fuels 'technically recoverable' from the Arctic, without commenting on their commercial viability. In the first decade of the 21st century, the Organisation of the Petroleum Exporting

Countries (OPEC) (2015) basket price of oil rose significantly, from US$24 a barrel in 2002 to US$94 a barrel in 2008. Despite a dip in 2009, between 2011 and 2013 the price rose again to over US$100 a barrel before crashing again in 2014 in what many analysts predict will be a sustained period of lower oil prices (around US$50 a barrel). A general rule of thumb for new developments in the Arctic is that their commercial viability rests on a basket price far closer to US$100 per barrel, meaning that the prospect of major oil and gas development in the Arctic has once again fallen for the time being. Nevertheless, this has not stopped a number of exploratory attempts by major oil companies, such as Shell, to locate proven reserves to add to their books which even if left undeveloped will buoy the stock price of their businesses.

Whether oil and gas fields in the Arctic regions are developed is for the most part a commercial question related to the global price of oil. Nevertheless, climatic changes could affect conditions in different ways. On the one hand, the retreat of summer sea ice creates a wider area of open water where the risk of ice to drilling infrastructure and support vessels is much reduced, meaning that it should prove easier to develop more offshore fields, especially in the Russian Arctic and the Beaufort Sea. Greater access along the NSR (see above) could also make it easier to ship resources recovered from Norway and Russia to markets in Asia where demand is currently greatest. On the other hand, the reduction of sea-ice cover and warmer atmospheric temperature increases the risk of storms and increased wave height (exacerbated further by global sea level rise), which could make drilling more difficult. Another factor to take into account is that as the Arctic warms, the permafrost layer that covers large parts of northern Russia, especially, is melting. The destabilisation of this permafrost layer is causing subsidence which in turn could disrupt the operations of on-shore oil and gas fields, as well as supporting on-shore infrastructure for off-shore developments. Such factors could increase the cost of some oil and gas operations in the Arctic, further chaining the commercial viability of many Arctic oil and gas development to the global price of oil (or heavy state subsidies, as seen, for example in Russia).

Climatic changes are also driving global interest in de-carbonisation, as represented by the two decades of international negotiations through the UN Framework Convention on Climate Change (UNFCCC). While many remain pessimistic that a global deal will ever be realised, there is widespread recognition among policymakers, businesses and scientists that the world will have to de-carbonise its economies if environmental catastrophe is to be averted (World Bank, 2015). The problem has been thrown into sharp relief by the Carbon Tracker Initiative (2015) which reported that to remain within ‘safe’ atmospheric carbon dioxide limits (calculated in terms of parts per million), the world as a whole cannot afford to burn all its existing fossil fuels reserves, let alone those which are unproven (as is the case for many of those estimated to exist in the Arctic). This has led a number of scientists and environmental campaigners to argue there is no point in trying to find and develop Arctic oil and gas reserves (McGlade and Ekins, 2015). Perhaps more significant, however, is that regardless of whether global de-carbonisation is achieved through a reduction in burning fossil fuels or an increase in the use of renewable energy sources (or a combination of both), the pressure on the basket price of oil will be the same; it will most likely fall, making Arctic development unviable from a commercial perspective. Consequently, the claim that climate change will open the door to an Arctic oil and gas bonanza, as in the case of *transit* shipping, remains heavily contestable.

Environment

The Arctic is often described by environmental campaigners as a pristine environment, rendered so by its long history of isolation from the industrial activity of humans. However, the Arctic Monitoring Assessment Programme (AMAP), a working group of leading international environmental scientists, are more cautious in their claims; arguing that while the Arctic may be considered ‘one of the least polluted areas of wilderness on the planet’, it is far from pristine (AMAP, 2015: 2).

Specifically, AMAP scientists point to the ‘unique geographical, climatic and biological characteristics’ (including prevailing atmospheric and oceanic currents, as well as large populations of mega-fauna such as whales and seals) that render the Arctic ‘a “sink” for certain pollutants transported into the region from distant sources’, including persistent organic pollutants (POPs) (such as a number of flame retardants and pesticides), heavy metals (e.g. mercury and lead) and radioactivity (in the form of radionuclides) (AMAP, 2015: 2). Further types of long-range pollution found in the Arctic include ‘black carbon’ – a form of soot that enters the atmosphere from the incomplete combustion of fossil fuels, biofuels and biomass –, as well as the discharging of oily wastes and the dumping of contaminated ballast water by ships (which may introduce invasive species into the Arctic ecosystem). Such pollutants can pose significant health risks to humans as well as the animals and plants of the wider Arctic ecosystem.

According to AMAP, climatic changes can interact with these pollutants in numerous ways (AMAP, 2011). For example, as the sea ice melts, previously immobilised contaminants including POPs, mercury and radionuclides may be taken up by the ecosystem (penetrating food chains). Similarly, contaminants trapped in the Arctic tundra (the largest sink for radioactive contaminants on Earth) are likely to be released into the surrounding environment as warmer temperatures drive permafrost melt. Overall, in a warmer Arctic, a whole range of contaminants are likely to become more mobile, spreading more widely across human communities and ecosystems.

Furthermore, if climatic changes do facilitate increased human activity in the Arctic, more localised forms of pollution are also likely to increase. Growing human populations and industrial activity will also produce more pollution from sewage flows, mining waste and the burning of fuels for heating, industrial processes and transportation. There is also an increased risk of pollution by oil spills whether through damage to infrastructure or support ships.

As a consequence, the (albeit contested) prospect that climatic changes could lead to increased human activity across the Arctic regions also brings with it a host of dilemmas about how best to protect the health of both local communities and the wider community. This has left many local leaders caught between on the one hand embracing new economic development opportunities and, on the other hand, trying to mitigate the increased risks to human health and the environment which threaten the viability of traditional ways of life (especially among the indigenous peoples of the Arctic). National leaders are similarly caught in a dilemma about how best to achieve sustainable economic development in the Arctic, while the transnational aspects of environmental pollution mean that the international community has also become embroiled in debates about how best to strike a balance between economic interests and environmental protection.

Intersecting Interests

While the changing climate is not the only driver of broader changes in Arctic regions, it does matter to how various Arctic stakeholders are thinking about the Arctic's future. Changing perceptions, interests and activities relating to shipping, oil and gas resources and environmental pollution are brought together in claims that the Arctic is 'opening up' or 'needs saving'. Both claims are rooted in material changes, encompassing sea-ice melt and increased human activity. And both claims are producing new alliances among stakeholders at the local, national, regional and global level.

Broadly speaking, the claim that the Arctic is 'opening up' is supported by an alliance of indigenous peoples organisations, local leaders, scientists (modelling climate change and assessing environmental risks), international businesses (especially international oil companies [IOCs] but also others interested in fishing and mining), Arctic and non-Arctic nation-states, and regional organisations such as the Arctic Council. For example, in Alaska, Shell (an IOC) was working closely with the Alaskan government and the Arctic Slope Regional Corporation (ASRC) to search for oil fields in the Chukchi Sea. The decision to allow Shell to drill in the US Arctic region was supported by the federal government on the basis that it was important to national energy security. The Arctic Council established the Arctic Economic Council in 2014 precisely to promote such alliances between local/indigenous peoples, international businesses and national government. Countries such as the UK and Italy, which collect tax revenues from IOCs and seek to maintain stable global energy prices, add a further dimension of international support for the development of Arctic oil and gas fields. A similar story can be told for Greenland, Norway and Russia. In each case indigenous, local, national, international and economic interests, buttressed by scientific observations, models and assessments, mutually reinforce the view that climatic changes are creating new economic opportunities for a whole host of stakeholders.

At the same time, another alliance has emerged around the claim that the Arctic 'needs saving'. This alliance also involves indigenous peoples organisations, local leaders, scientists, international environmental non-governmental organisations, Arctic and non-Arctic nation-states and regional organisations such as the Arctic Council. In addition, the United Nations (UN) and the European Union (EU) are relevant players here due to their emphasis on establishing suitable regulatory frameworks to mitigate climate change, safeguard human activity (e.g. through rules on shipping) and protect the environment from pollution. Consequently, Shell's activities in Alaska have been contested by other indigenous peoples' organisations, such as the non-profit group called Resisting Environmental Destruction on Indigenous Lands (REDOIL), who have been working with international environmental NGOs (e.g. Greenpeace) to resist plans to drill for oil in the Chukchi Sea. Their claim that the Arctic is 'under threat' has a degree of global resonance to the extent that it is supported by civil society groups that want to 'save' the Arctic environment from both climate change and increased human activity.

While the nature of these alliances has perhaps been over-generalised here (there are, for example, also businesses and environmental NGOs which are working together in the Arctic), they are indicative of the way in which the geopolitics of the Arctic is being shaped by the intersecting interests and actions of a range of different stakeholders from both within and beyond the Arctic regions. This is a consequence of the Arctic's connectedness to the global environment, global economics, global technologies and global ethics. What happens in the Arctic does not stay in the Arctic. Likewise, what happens in the rest of the world does not stay out of the Arctic. Over the past decade, at least, observed climatic changes and predictions about future climate change (influencing issues relating to shipping, resource extraction and environmental pollution, among others) are affecting the ways in which these connections are thought about and pursued, especially in terms of whether the Arctic should be 'opened up' to increasing human activity or 'saved' from it.

Implications for Governance

The tension between 'opening up' and 'saving' the Arctic is also putting pressure on regional and international governance structures. The viability of increased human activity in the Arctic regions will largely be determined by the regulatory frameworks, infrastructure and services (e.g. search and rescue) which are put in place (as well as those already existing such as the UN Convention on the Law of the Sea (UNCLOS) and the Arctic Council) to manage the exploration, extraction and evacuation of resources, in addition to other forms of commercial activity (mining, tourism and fishing, etc.). However, questions about what kinds of regulatory frameworks, infrastructure and services need to be put in place are difficult to divorce from questions about what kind of future Arctic climate should be anticipated. Decision-makers at local, national, regional and global levels are reliant on assessments of observed climatic changes, as well as climate models and projections about future climatic changes. Whether climate modellers predict an ice-free Arctic in 2016 or 2060 has enormous implications for decisions, for example, about the kinds of rules needed to be put in place for shipping activity and how quickly they are negotiated.

Further decisions about search and rescue services, infrastructure and environmental protection are similarly affected by what kinds of futures are imagined for the Arctic. For example, in the absence of global demand for Arctic oil and gas resources, or under pressure from global civil society, it may be the case that 'saving' the Arctic rather than 'opening it up' becomes the basis for future decisions about Arctic governance. However, it is also worth noting that, over the past decade, just as international interest in the commercial prospects of the Arctic has increased in those years when the sea ice appears to be in rapid retreat, so too has international interest in assessing the effectiveness of Arctic governance structures. Both experienced and anticipated climatic changes are therefore demonstrating their potential to affect the status quo of Arctic governance.

Conclusion

The visual spectacle provided by satellite images of retreating summertime sea ice in the Arctic makes it easy to assume that climatic changes are determining a new future for the Arctic by paving the way for increased human activity. However, decisions about whether to pursue different kinds of economic development in the Arctic are shaped by more than just environmental factors. Commercial and technical viability are key, and while climatic changes may lead to a reduction in sea ice, they also threaten to bring about more disruptive environmental conditions (such as a permafrost melt). Decisions about what kinds of governance arrangements should be put in place are not clear-cut either. These arrangements will be shaped by questions about what the future climate of the

Arctic is expected to look like and whether this should lead to a greater focus on 'opening up' or 'saving' the Arctic regions. The struggle between these two possible futures (and there may be other futures to consider as well) will be fought by competing alliances that seek to mobilise shared interests and connections at all levels from the indigenous/local to the national, the regional and the international. Consequently, the issue of how to best anticipate and respond to climatic changes in the Arctic regions will be a problem not just of local or regional politics, but of global politics.

References

ACIA (2005). *Arctic Climate Impact Assessment*. Cambridge: Cambridge University Press.

AMAP (2011). *Combined Effects of Selected Pollutants and Climate Change in the Arctic Environment*.

AMAP (2015). *Summary for Policy-makers: Arctic Pollution Issues 2015*.

AMSA (2009). *Arctic Marine Shipping Assessment*.

Borgerson, S. G. (2008). Arctic Meltdown: The Economic and Security Implications of Global Warming. *Foreign Affairs, 87*(2), 63-77.

Carbon Tracker Initiative (2015). *Carbon Tracker Initiative*.

Craciun, A. (2010). Frozen Ocean. *PMLA, 125*(3), 693-702.

Diefenbaker, J. G. (1958). *A New Vision*. Available at Arctic Sovereignty and International Relations. 3 August 2009.

Dunlap, W. A. (1996). Transit Passages in the Russian Arctic Straits. *International Boundaries Research Unit Maritime Briefings*, *7*(1).

Ebinger, C. and Zambetakis, E. (2009). The Geopolitics of Arctic Melt. *International Affairs*, *85*(6), 1215-1232.

Emmerson, C. (2010). *The Future History of the Arctic*. London: The Bodley Head.

Greenepeace (2015). *Save the Arctic*.

Grímsson, O. R. (2015). Iceland's President: 'Arctic Open for Business'. *BBC World Service. News Hour Extra*. Interview by Owen Bennett Jones. 20 October 2015.

Humpert, M. (2013). *The Future of Arctic Shipping: A New Silk Road for China?* Washington, D.C.: The Arctic Institute.

Koivurova, T. (2010). Limits and Possibilities of the Arctic Council in a Rapidly Changing Scene of Arctic Governance. *Polar Record*, *46*(237), 146-156.

Laruelle, M. (2014). *Russia's Arctic Strategies and the Future of the Far North*. London: M.E. Sharpe.

McCannon, J. (2012). *A History of the Arctic: Nature, Exploration and Exploitation*. London: Reaktion Books.

McGlade, C. and Ekins, P. (2015). The Geographical Distribution of Fossil Fuels Unused When Limiting Global Warming to 2˚C. *Nature, 517*, 187-190.

Moisio, S. and Harle, V. (2006). The Limits of Geopolitical Remote Sensing. *Eurasian Geography and Economics, 47*(2), 204-210.

National Snow and Ice Data Centre (2015). *Arctic Sea Ice News & Analysis*.

Nuttall, M. (2012). Tipping Points and the Human World: Living with Change and Thinking about the Future*AMBIO, 41*(1), 96-105.

OPEC (2015). *OPEC Basket Price*. Retrieved from

Sale, R. and Potapov, E. (2010). *The Scramble for the Arctic: Ownership, Exploitation and Conflict in the Far North* . London: Frances Lincoln.

Spufford, F. (1996). *I May Be Some Time: Ice and the English Imagination.* London: Faber and Faber.

Stefansson, V. (1921). *The Friendly Arctic: The Story of Five Years in Polar Regions*. London: Macmillan.

USGS (2015). *Circum-Arctic Resource Appraisal*. News & Recent Publications.

World Bank (2015). *Decarbonizing Development: Three Steps to a Zero-Carbon Future.* Washington, DC: IBRD/World Bank.

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