Climate change and commercial shipping development in the Arctic

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Abstract

The Arctic ice is receding, as ice extent in the summer is decreasing fast, faster than models predicted. The perspective of an ice-free Arctic in the summer is looming, with talks of riches to be exploited (oil, gas, minerals) and seaways developing across it between Europe and Asia. The perspective of a dramatic development in Arctic shipping triggered the debate in Canada as to how to assert Canada's sovereignty so as to protect the environment. But is shipping really going to develop this fast? What segments of the shipping industry could be interested in plying a seasonal, poorly mapped, unserviced northern route? Will containerized cargo liners between Europe and Asia rush to the route? The weak development of shipping in the region, despite several years of talks about the perspective of the opening of the Northwest and Northeast Passages, attest to the complexity of the question. Although some segments of the shipping industry might be interested in developing new routes across the Arctic, not all will be: what will then be the speed and shape of shipping development in the region?

Key Messages

- Much of the ongoing debate regarding governance of the Arctic revolves around control of shipping that is reportedly set to increase tremendously in the region because of climate change.
- Political debates often revolve around the idea shipping will develop fast in a region where sovereignty is not well established, at times even challenged. Therefore, there is a need to assess the likeliness of this shipping expansion and its nature: what kind of ships, what kind of cargo, with what routes?
- It appears that Arctic shipping is definitely growing, but will not explode, contrary to media reports. Traffic will remain mainly destinational (as opposed to transit) and dominated by bulk as opposed to containerized goods. But much fewer ships than expected does not mean the risk is nil, especially as bulk cargoes can be very dirty (oil, some ores...): regulations must be put in place and enforced, especially as the most likely driving force in Arctic shipping is natural resources exploitation: bulk ships are likely to represent most of the traffic.
- A better knowledge of likely scenarios will enable governments to provision for adequate policies and law enforcement tools, better than when relying on clichés about an out of control Arctic shipping expansion.

Objectives

The ongoing political debate about sovereignty in the Northwest Passage – and, to a lesser extent, the Northeast Passage – boils down to the extent of shipping that will result from the gradual opening of these sea routes.

At the present time, shipping is minimal in the Northwest Passage, and concentrated in the Barents Sea in the Northeast Passage, where traffic seems to be expanding since 2010: there is no rush – for now? – on behalf of shipping companies for transit in these new straits, and the Northeast Passage seems to be much more attractive than the Northwest Passage.

Although these new routes are shorter than the routes through Panama or Suez, shippers do not merely reason in terms of distance. Risks, reliability of service, costs of insurance, time of transit, cost of building ice-strengthened ships, availability of service along the route, regularity of ships rotations are also factors that affect the business process of selecting routes.

The first year of the research process enabled the team to highlight the fact that the shipping industry is not terribly attracted by arctic shipping routes for transit purposes: the perception of risks, high costs, and unreliable conditions of navigation has companies prefer to maintain classical routes that also present

higher market potentials. The second year enabled the team to be more specific on some elements of the shipping economics in the Arctic and confirmed bulk shipping is the main segment that will expand in Arctic passages.

Fine tuning is however necessary so as to complete a more detailed and accurate picture:

- What is the likely evolution of insurance premiums for Arctic shipping?
- How is the cost matrix of shipping in the Arctic evolving? To what extent is a direct-cost analysis hinting at potential savings with shipping in the Arctic, apart from marketing advantages and problems?
- If the container shipping segment is really not interested, to what extent would the bulk segment be definitely more interested? Would it be merely for destinational traffic or potentially for transit as well?
- What is the likely shipping intensity generated by destinational traffic linked to the exploitation of natural resources?
- What is the likely destinational traffic generated by fishing?
- What is the likely destinational traffic generated by cruise shipping?
- What is the likely traffic genereated by military ships - thus to what extent are the scenarios of a new cold war in the Arctic warranted?
- To what extent are large trading countries like China interested in shipping in the region?

Introduction

This fact is extensively reported in the media, although a more nuanced discourse is emerging: the gradual withdrawal of ice coverage could open navigation to commercial shipping in the Northern Sea Route (NSR) north of Russia, as well as in the Northwest Passage (NWP) and all Arctic waters, especially for natural resources exploitation.

Several paths for an increased shipping can be considered. A navigable NWP could become an important route for transit shipping between Europe and Eastern North America and Asia, and this scenario is the most often quoted by the media and government circles, because of the absence of transit fees, which are imposed by the Russian Government on the NSR.

However, recent facts point to a different picture:

- The NWP remains largely ignored for commercial transit. Only research, cruise ships and small pleasure boats use it. The NSR, to the contrary, is witnessing an expanding traffic since 2010, with 46 commercial transits in 2012. Not much, but progressing on a steady pace.
- Destinational traffic is by far the fastest developing cause of traffic at the moment. Hydrocarbon exploitation as well as mining in the Arctic, increasing traffic to bring supplies and machinery to mines, and transport back valuable minerals to their markets (oil, gas, gold, diamonds, silver, zinc and copper) in a time of increased demand for natural resources because of a steady economic growth in China and India, is likely to be a powerful engine for growth. Expanding traffic along the Northern Sea route in 2011 and 2012 attest to this trend: most ships went to the Eurasian Arctic to load resources and then sailed to final markets, Europe or Asia.
- Fishing also seems to be a major economic stake as Norway, Russia and Greenland try to maximize the value of fish stocks: the number of trawlers is showing a significant increase around the coasts of Greenland and Baffin Island, for instance.
- Tourism is also expanding fast in several Arctic regions, Greenland, Svalbard notably. However, cruise traffic in Arctic Canada is remaining low. What can explain the fact that cruise traffic fails to expand in Canada as it did in Svalbard or Greenland for instance?

Economic incentives for increased navigation are thus high; with natural resources to exploit in a vast area, the need for monitoring and surveillance is heightened. There is fear that Canadian assertions of sovereignty and desire to monitor traffic and exploitation, already questioned in the past by the United States, could be seriously challenged now that the economic and political prospects for navigation are real. However, these fears could prove misplaced, as transit traffic is remaining sketchy in the NWP, and as new actors like China and Japan asserted they did not intend to question Arctic coastal claims to internal waters.

Activities

1. By researcher:

Guy, E.: Participation to the NEXTAW Expertise Network on Arctic Shipping, led by Transport Canada (program responsible: Janice Festa) with a special focus on cooperation with the Nunavut and NWT governments. The Network of Expertise on Transportation in Arctic Waters (NEXTAW) is part of the Northern Transportation Research Initiative (NTRI) that was established in 2008, following ministerial support to allocate a notional $1 million in Gateways and Border Crossings Fund (GBCF) funding to conduct studies of northern transportation issues.

Comtois, C.: ongoing research about bulk logistics systems; port systems competitiveness; transportation infrastructure governance.

Lasserre, F., Pelletier, S.; Doyon, J.F., Huang, L., Alexeeva, O. (associate researcher): Ongoing interviews and visits with shipping companies, port authorities and shipyards (field trips paid for by FQRSC and SSHRC):

- Italy, France, Germany, Greece, Norway, Russia
- China
- Nunavut

Lasserre, F.: Development of a shipping cost-analysis simulation platform; development of research on insurance companies with a graduate student.

Lasserre, F. and Boyer, A.: Ongoing research about the development trends of shipping in the Canadian Arctic. Field trip by A. Boyer to Iqaluit and Pangnirtung, Oct. 2012. Administration of questionnaires.

Lasserre, F. and Têtu, P-L.: Ongoing research about the development trends of cruise tourism in the Arctic, especially in the Canadian Arctic. Field trip by PL Têtu to Nain (May 2012); trip with a cruise ship, analysis of tourist management and of tourists' centers of interest, Nunavut and Greenland, August 2012. Analysis of questionnaires to cruise operators, to tourism officials in Nunavut, Greenland, Norway/Svalbard, and to tourists onboard the cruise boarded by PL Têtu in August 2012.

Bartenstein, K.: Joint communication with F. Lasserre at the IPY 2012 Convention on Canadian regulations on shipping in the Arctic. Ongoing research on law issues in the Arctic, especially regarding potential challenges to Canadian law and the possible adaptation.

Lalonde, S.: Ongoing research on law issues in the Arctic. Preparation of an edited book on Arctic research in human sciences, published with Brill Editions.

Roussel, S.:

- Organization of two conventions:
  - » La Chine et l'Arctique, International convention, Observatoire de la politique et la sécurité de l'Arctique (OPSA), UQAM, Montréal, April 30, 2012.
  - » Chine, Arctique et Plan Nord, national conference, Observatoire de la Chine and Observatoire sur la politique et la sécurité de l'Arctique (OPSA), UQÀM, Octobre 4, 2012.

- Creation of a non-refereed journal, Chronique Nord-Nord-Ouest, hosted by the Observatoire sur la Politique et la Sécurité dans l'Arctique (OPSA), UQÀM.
- Ongoing research on national discourse and the instrumentalization of the security dimension in domestic politics.

Plouffe, J.: Participation to Operation Nanook with the Canadian Defence Forces, Inuvik, Tuktoyaktuk and Tsiigehtchic, August 2012.

Lamarre, L.: Eight undergraduate and graduate students had the opportunity to get a specialized formation in in-camera special effects, using the Holo Editorial Layering Process, a new technology we received an American patent for. Here I believe it is important to mention that 2 of the undergraduate students participating in the July 2013 shoot applied to the Master Program.

As planned, our small crew worked in studio from July 2nd to July 16th, and we succeeded to shoot the last prospective scenes that were required to finalize this part of the content of our film to be titled BEYOND SIGHT / VOIR L'INVISIBLE. These prospective scenes are solely related to the effect of the opening of the North West Passage to maritime navigation. We shot in real time, composited images to be used in the film to illustrate the point of view of Inuit denizens that have been interviewed in the Great North, as well as the point of view of well-known specialists of the North: lawyers, geographers, journalists, natural scientists, and the captain of the ship.

We still have one more interview left to be shot. It is scheduled to be done over the reading week on the 20th of February 2013. We are still collecting the release forms sent to 34 Inuit Artists. Until now we have received 12 of them back. We are in the process of re-contacting the missing ones to make sure that they sign their form, enabling us to use the images of their Works of art that were shot at the National Museum of Fine arts. This is not an easy process. Some of them are very old, some are dead and we have problems identifying their heirs, some of them have moved without known addresses, etc.

Regarding the financing of the post-production, the launching and the distribution of the film, we are in the process of writing an application to the Connexion program with the SSHRC. The application should be ready and sent by the end of January. The results are to be communicated 8 weeks later, at the beginning of April 2013.

2. General developments and research synergy:

Ongoing development of core area research dimensions:

- Shipbuilding trends and the market for ice-strenghtened ships (Guy, E. and Lasserre, F.)
- Strategic options for globalized shipping firms (Lasserre, F.; Guy, E.): a book chapter was published.
- Modelization of cost structures of ships operating in the Arctic (Lasserre, F.): an article was submitted.
- The development of the cruise tourism industry in Canada (Têtu, P-L., Lasserre, F.): an article was submitted.
- The development of the fishing industry in Arctic Canada (Boyer, A.).
- The development of shipping insurance policies products for the Arctic (Lasserre, F.). an article is being prepared.
- Natural resources exploitation and transportation : what risks ? What are the strategies of bulk shipping firms ? (Doyon, JF, Pelletier, S. and Lasserre, F.). An article is being prepared.
- The increase of local communities servicing by the shipping companies like Desgagnés or NEAS (Turmel, M.; Guy, E. and Comtois, C.). An article is being prepared.

- The strategies of shipping firms servicing mines and communities in Arctic Canada (Guy, E.; Comtois, C.; Turmel, M.). An article was published.
- The impact of mining development on port infrastructure and destinational shipping (Comtois, C.; Guy, E.; Lasserre, F.; Laframboise, K.; Turmel, M.).

Parallel ongoing development of research about global environment dimensions:

- Legal developments regarding Nordreg as well as international legal aspects like the Polar Code (Bartenstein, K.; Lalonde, S.).
- Legal and political developments regarding the controversy around the status of the Arctic passages (Lasserre, F.; Lalonde, S.; Bartenstein, K.): a book chapter was published, an article is accepted.
- China's interest about the Arctic (Alexeeva, O.; Huang, L.; Lasserre, F.; Huebert, R.). Three articles published; an article being written (Lasserre F. and Pelletier S.) about the irruption of the Chinese icebreaker Xuelong in Canadian waters. An SSHRC research grant proposal was submitted.
- The US and the European Union interest as strategic position regarding the Arctic (Plouffe, J.).
- The so-called militarization of the Arctic : towards a real arms race? (Roussel, S.; Lasserre, F.; R. Huebert - cooperation with Huebert's ArcticNet research program). An article is accepted.

Results

Core research areas:

New extensive interviews and economic analysis conducted in 2012-2013 about transit traffic confirmed the conclusion that most shipping firms are poorly interested in Arctic transit routes:

- High investment are needed to enter the market as Arctic coastal states seem keen on enforcing a stricter regulation, as attested by recent moves by Norway regarding cruise traffic in Svalbard. There are also high recurrent costs (ice-strenghtened hulls, special machinery, trained crew, specific fuel and a higher consumption rate...).
- There is a wide discrepancy in the literature as to the direct cost profitability of shipping across Arctic sea lanes. We ran our own simulations based on the compiled literature and on data gathered from the shipping industry. Summer transit between ports located fairly up north can prove profitable, but transit between ports located more to the south prove unprofitable.
- Insurance premiums are very high, especially for ship crews and firms that do not have experience of Arctic navigation, conforting the impression that there is a high opportunity cost of entering the Arctic shipping market.
- High variability in ice movement, melting and reformation patterns in Spring and Fall, which makes the establishment of reliable timetables impossible, a weakness that proves insurpassable for the container shipping industry that is structured along just-in-time constraints. Technical solutions do exist that enable shipping in heavy ice: high strengthening, double-acting ships... but they prove costly and do not necessarily prove profitable for transit purposes if compared with more classical routes like Panama or Suez. However, they are compatible with destinational traffic like the servicing of mining sites, even year-round as done for Deception Bay and considered for Mary River (Baffin Island).
- There is no intermediate market in the Arctic, as opposed to routes through Malacca/Suez or Panama, and this marketing weakness of the Arctic

routes, especially as the load factor remain low on Europe-Asia and North America-Asia legs, is perceived as a major liability by container shipping firms.

- Port infrastructure is symbolic in the Canadian Arctic, as there are only three wharf-equipped ports: Nanisivik (former mining port due to be transformed into logistical port for the Navy), Churchill and Deception Bay (private). Greenland is much better equipped as well as Siberia. Stopovers for the servicing of a damaged ship is thus very difficult to consider.

Thus, transit traffic, especially for high value-added goods characterized by just-in-time organizational structures (containerized, roll on/roll off or general cargo) does not seem to be set for a sharp increase, which is reflected in actual traffic figures: transit remains minimal in the Northwest Passage; increases along the Northern Sea Route, but mainly driven by destinational resource traffic (34 ships in 2011 along the NSR, 46 in 2012).

Bulk shipping could be more interested, not necessarily for transit (the industry shows a reluctance to invest in expensive ice-strenghtened vessels merely for shorter routes) but for destinational traffic : the servicing of natural resources extraction in Arctic regions. This is already apparent in Canada, but also northern Norway and Siberia, where most of the commercial traffic is driven by natural resources extraction and transport.

Tourism and the fishing industry also seem set for expansion in the region. This is already apparent in Canadian waters and in the Barents Sea for fishing; around the Svalbard islands and Greenland for cruise tourism. However, cruise shipping did not take off in Arctic Canada nor in Siberia the way it did around these other Arctic regions.

Political and regional frame:

The often described arms race seems here again to be a far-fetched media-developed image. Indeed, Arctic coastal States do develop military patrols and the tools they need to enforce their sovereignty over sea expanses that were barely patrolled before ice melted. Military strategies do hint at the need to better control these areas, so as to prevent illegal natural resources exploitation, pollution, illegal shipping that would not respect regulation. But they do not underline tensions that would account for a military build-up. Quite the contrary, negotiations seem to prove fruitful, after the 2010 border agreement between Norway and Russia in the Barents Sea, and the 2012 agreement between Canada and Denmark in the Sea of Lincoln.

Besides, Russia, often described as planning a strong military expansion in the Arctic, is in fact confronted with a fast ageing navy. Even if planned construction goes ahead as planned, withdrawals of obsolete units will lead to a decrease in force levels in the next years.

China is increasingly described as very assertive in the Arctic and seems to be looming as a potential threat in the media accounts. Analysis of the Chinese policy underlines that if China is indeed interested in Arctic issues:

- Its interest is mainly focused on natural resources, which it intends to buy on the regular market, and for which the Arctic is a market among several others China is actively exploring.
- Shipping is certainly not the main interest for China as only one Chinese shipping firm expressed interest, a limited interest albeit that can be doubted given the poor financial situation for the company and its lack of ice-strenghtened ship.
- China also wishes its voice to be heard and intends to play a role in international fora to be consistent with the international status it aspires to, but that does not mean it wishes to question the sovereignty of Arctic coastal states.

The Polar Code is still in the process of being negotiated. Canada's strategy of sovereignty enforcement rests mainly on the claim of internal

waters justified by a historic title, a strategy that could prove weak if officially challenged. This does not seem to be the case, as the US seems satisfied with merely refusing to recognize Canada's claim. Washington's position is justified by the fear of creating a precedent, but the analysis shows this fear is largely rhetorical, as very few straits in the world can indeed be legally compared with the situation that prevails with the Northwest Passage.

Discussion

Core research areas

Findings concur to preliminary results already gathered: transit may not be the main driving force behind Arctic shipping as container shipping firms prove definitely poorly interested and as bulk shipping firms are somewhat hesitant. However, destinational traffic seems to be much more interesting for bulk shipping firms.

Cost analyses point to the high variability of the break-even point and the wide discrepancies between simulations conducted up to now (Laulajainen, 2009; Wergeland, T., 2012; Schøyen, H. and Bråthen, S., 2011; Liu, M. and Kronbak, J., 2010). A new simulation we set up based on 12 simulations we gathered in the literature and on shipping data underlines the fact that summer transit can be profitable, if the load factor is high, and if the origin-destination couple of ports is not too southerly. Winter transit can barely be profitable. Rather than being directly dependent on the variable of fuel cost, the profitability of Arctic routes depend on average transit speed, that determine the number of possible rotations, and on the load factor, underlining the importance for shipping companies of securing a large enough market for a direct transit route to make a profit. The simulation thus indirectly confirms fears many expressed during the survey we conducted: without a strong load factor, Arctic routes will hardly be profitable.

Insurance companies point out the small market size of Arctic insurance to explain why general industry guidelines have not been established yet. A few companies have been in the market for long, like Osborn & Lange, CNA or Skuld, and a few others have recently entered the market, but the number of players remains low as competition would be too fierce for a service where risks remain to be assessed precisely by actuaries. Insurance firms underline costs are high (premiums between 30 and 75%) and stress the main factors in insurability are the ship architecture (ice strength), the experience of the crew, the experience of the shipping company with Arctic navigation. Therefore, there is an insurance cost premium for a newcomer to the Arctic shipping market, as its navigation record would be blank of course.

The bulk segment of the shipping industry seems to be more interested in destinational traffic, servicing northern communities and mines (Pelletier and Guy, 2012).This trend calls for two comments regarding sovereignty enforcement. Should this trend be confirmed, it would be easier to enforce strict regulations regarding shipping as the legislation of the port state would then be triggered; however, the growing development of traffic generated by mineral and oil & gas exploitation also underlines the risks attached to this kind of shipping, as oil especially is very polluting: an accident would have catastrophic consequences.

The cruise tourism industry was supposed to enter into a rapid growth in the Canadian Arctic just like in other polar regions (Stewart et al, 2012; Stewart et al, 2010). However, traffic in Canada remains very limited, especially when compared to other destinations like Greenland, Svalbard or Iceland. It is unlikely that cruise tourism in the Canadian Arctic will experience the rapid and unprecedented growth predicted, in particular, by some researchers and by the media. Most of the cruise operators surveyed communicated their disinterest in expanding their business activities or to enter the Canadian cruise tourism market. True, all polar destinations were stricken by the economic downturn as of 2008, but Canada's traffic remains

stagnant whereas most other destinations resumed growth in 2010 or 2011. It remains to be seen in detail what can account for this stagnation - rigid regulation? poor marketing? lack of port infrastructure that precludes the coming of large ships? But the short term conclusion is that cruise tourism is certainly not a driving force behind shipping in Canadian Arctic waters.

The lack of port infrastructure in the Canadian Arctic seems to hinder the growth of several shipping market segments: fishing - as it reduces the flexibility needed for the fast processing of the catch in the cold chain; transit - as it makes repairs and servicing more complicated, a point noted by insurance companies; tourism, as the logitics of large cruise ships is more complicated should the service of onshore excursions be maintained; local servicing of communities - as consumer goods must be offloaded on barges that then go to shore. However, several Canadian shipping firms have adapted to these constraints and, taking advantage of the longer iceless season, have expanded their activities in the Canadian Arctic, like Desgagnés, NEAS, NTCL, Woodward/Coastal Shipping.

The military is not going either to be a driving force of traffic in the Arctic. If patrols are indeed more frequent, the so-called arms race in the Arctic seems to be more of a media image than an accurate account of the reality. Arctic coastal States are eager to patrol adequately sea zones they pledged to patrol under the Arctic Council Search & Rescue treaty of 2012. They also fear increased illegal fishing or pollution. But there barely is a confrontational posturing in navies development in the Arctic; even Russia, that definitely would like to assert more markedly its sovereignty in the area, lacks the financial and technical resources to prevent the northern fleet from declining and gradually evolving from a blue water navy to a coastal defence force, except for the nuclear deterrence submarines (Henrotin, 2010).

Russian ambitions in the Arctic may be very real, but they are still far from being realized and they are not necessarily implying the will to confront the other riparian Arctic States. Russia may nourish high ambitions for its Arctic and armed forces, but plans to recreate a powerful navy, to lay down new icebreakers to replace a declining fleet, to establish new FSB border control units and search & rescue units are a daunting task; it is hard to imagine that Russia has the financial, administrative efficiency and technical capacity to meet these objectives (Zysk, 2010; 2012).

Arctic militarization is largely defended in Russia by the security and defense establishments, who naturally wish to expand their budgets and see an opportunity with the sovereignty in the Arctic issue, to advocate for greater investment in hardware. But the government does not seem to adhere to these views, rather using this strong rhetoric as a public relations tool. Military programs by other riparian countries do not show either a strong intention to significantly upgrade military capacities in the Arctic.

The overall picture of Arctic military evolution is one of limited modernization, limited increases or change in equipment. Some of these changes, like the strengthening of the Canadian Rangers or the moving north of Norwegian units and headquarters, have little to do with power projection into contested areas, but are rather for the patrolling of recognized national spaces. There has indeed been some modest military buildup by the Arctic states, and often the new equipment was replacement, not expansion. But that buildup hardly signals aggressive designs. Rather, it seems little more than a prosaic response to expanded jurisdictional space with the melting of the ice, and continued resource development.

Legal, political and regional frame

Legal aspects must be clarified as claims of sovereignty by Canada, resting on the idea of a historic title, may prove weak for Canada (Bartenstein and Lasserre, 2012). Ongoing negotiations about a mandatory Polar Code, if they would not enable to maintain a claim a sovereignty for Canada should it be directly challenged (which is not the case for now, as Washington tolerates the disagreement with

Canada), would grant a stewardship role for Canada as there would be enforceable international legislation that could enable Canada to control shipping in Arctic waters (Jensen, 2008). This seems all the more necessary as bulk shipping, as mentioned above, is likely to form the core of shipping in a few years, with potentially very polluting cargo.

Regarding the United States' fear of a precedent should the Northwest Passage be recognized as Canadian, there are, in fact, very few cases where recognition of Canadian sovereignty over the Northwest Passage or some other type of jurisdictional arrangement could be invoked as a precedent and as such, unsettle or cast doubt on existing regimes. The only potential areas of concern appear to be the Northeast Passage, the Qiongzhou Strait and Head Harbour Passage, and to a lesser extent, the Japanese, Piombino, Palk and Kerch Straits.

Most of the strategic straits referred to in the academic literature as potentially influenced by the Northwest Passage precedent, are simply not relevant. Such straits are not within the internal waters of the States bordering them and are therefore not subject to their exclusive control. More importantly, these major maritime highways are now unquestionably considered to be international straits to which the regime of transit passage applies. Their designation as international straits, and the legal rights which flow from such a designation, can no longer be reasonably questioned, irrespective of the outcome of the Northwest Passage case.

The discrepancy between those cases where the Northwest Passage could be used as a precedent in favor of a coastal State, but are not referred to in the literature, and those cases put forth but which appear to be irrelevant regarding a possible precedent remains problematic. Political reasons might well be the driving factor. Another possible explanation could be that Washington is not in fact worried about creating a potential precedent for specific cases, but has rather chosen to adopt a general, conservative policy, fearing that a Northwest Passage under Canadian sovereignty could be another illustration of "creeping jurisdiction", an undesirable infringement on the freedom of navigation.

China is keen on voicing its world stature in international fora and is interested in exploiting or buying natural resources from the Arctic, but just like from Latin America, Central Asia or Africa: there is not Chinese rush to the Arctic nor is there a determined interest in Arctic sea lanes for Chinese shipping: Chinese imports or exports can still profitably be sent along more classical routes and can also be managed by Chinese as well as foreign shipping firms. China's interest for Arctic shipping is rhetoric and academic for now, as Chinese shipping firms have come to the same conclusion about the poor profitability and technical difficulties of Arctic shipping (Ho, 2010; Alexeeva and Lasserre, 2012).

Conclusion

The past year's research enabled the team to draw a much more specific image regarding the unfolding of shipping in the Arctic. First general conclusions regarding the lack of general interest by shipping companies for transit were confirmed. However, a more detailed picture underlines several facts:

- Commercial transit will probably remain very limited, which does not mean some shipping companies in niche markets will not decide to develop such a service.
- Destinational traffic, for the servicing of local communities, and for the exploitation of natural resources, in the Canadian Arctic as well as in Greenland, Svalbard and especially Russia, is going to experience a moderate but regular growth. It is already very apparent along the Northern Sea Route whereas this kind of traffic remains sketchy in Arctic Canada. This trend underlines, the need to control shipping as the cargo involved is potentially very polluting in case of accident: national legislation and the Polar

Code and privileged tools for this purpose.

- Cruise tourism is a maturing industry in Iceland, Svalbard and Greenland, but it remains underdeveloped in Canada and starts from next to nothing in Siberia. This kind of traffic will probably develop slowly but regularly too, as the ice keeps melting, but it too, like destinational traffic, calls for strict regulations, as ships with poor ice classes now begin venturing in Arctic waters.
- Military traffic is expanding indeed, but it is for sovereignty enforcement purposes, not as a sign of an arms race that does not really exists.
- The legal tools (international and national) are still maturing. A mandatory Nordreg attracted criticism in 2010 but it seems it is now admitted; the Polar code, for long rejected by the United States, is being negotiated.
- Insurance companies are also furbishing their risk evaluation methods and thus their policies regarding shipping in the Arctic.

A clearer picture of what directions Arctic shipping is taking facilitates policy definition, for governments as well as private insurance firms. It is an ongoing process as Arctic shipping remains a very fast changing transportation sector.

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