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THE NORTHERN ROOTS OF A NATIONAL NETWORK

Terry Rudden

Just three decades ago the phrase "native communications" described a handful of tiny community radio stations on reserves and in arctic settlements. Today, a national Aboriginal television network reaches nearly every household in Canada, and a national Aboriginal radio network is poised to begin broadcasting in most large Canadian cities.

The success of Aboriginal media in Canada is an extraordinary example of what can be accomplished when need, opportunity and political will coincide. While a much larger essay would be required to do justice to the full story of Aboriginal communications, this overview provides a summary view of one of the least known success stories in Canadian broadcasting.

Television was first introduced to the north through CBC's Frontier Coverage Package, which from 1967 to the early 1970s provided videotapes of southern network programming to residents of 21 northern communities. There was no northern content: CBC's priority at that time was to extend its southern coverage area into the north, not to develop a northern-based service for northerners.

The north-south television gap was bridged by technology in 1972 with the launch of the ANIK A-1 satellite. In 1973, the CBC began delivering its complete southern television service to all regions of Canada, including the north, with the goal of extending full CBC radio and television services to all rural and remote communities with populations of over 500.

It is nearly impossible to gauge the impact that the sudden introduction of southern broadcast services had on language, culture and day-to-day life in the traditional settlements of the arctic. Some communities, such as Igloolik, initially voted to refuse television through a series of hamlet plebiscites, fearing irreversible damage to their lifestyle. Many national and regional Aboriginal organizations voiced the same fear, and insisted that native people had the right to define and contribute to any broadcast service distributed in their homelands.

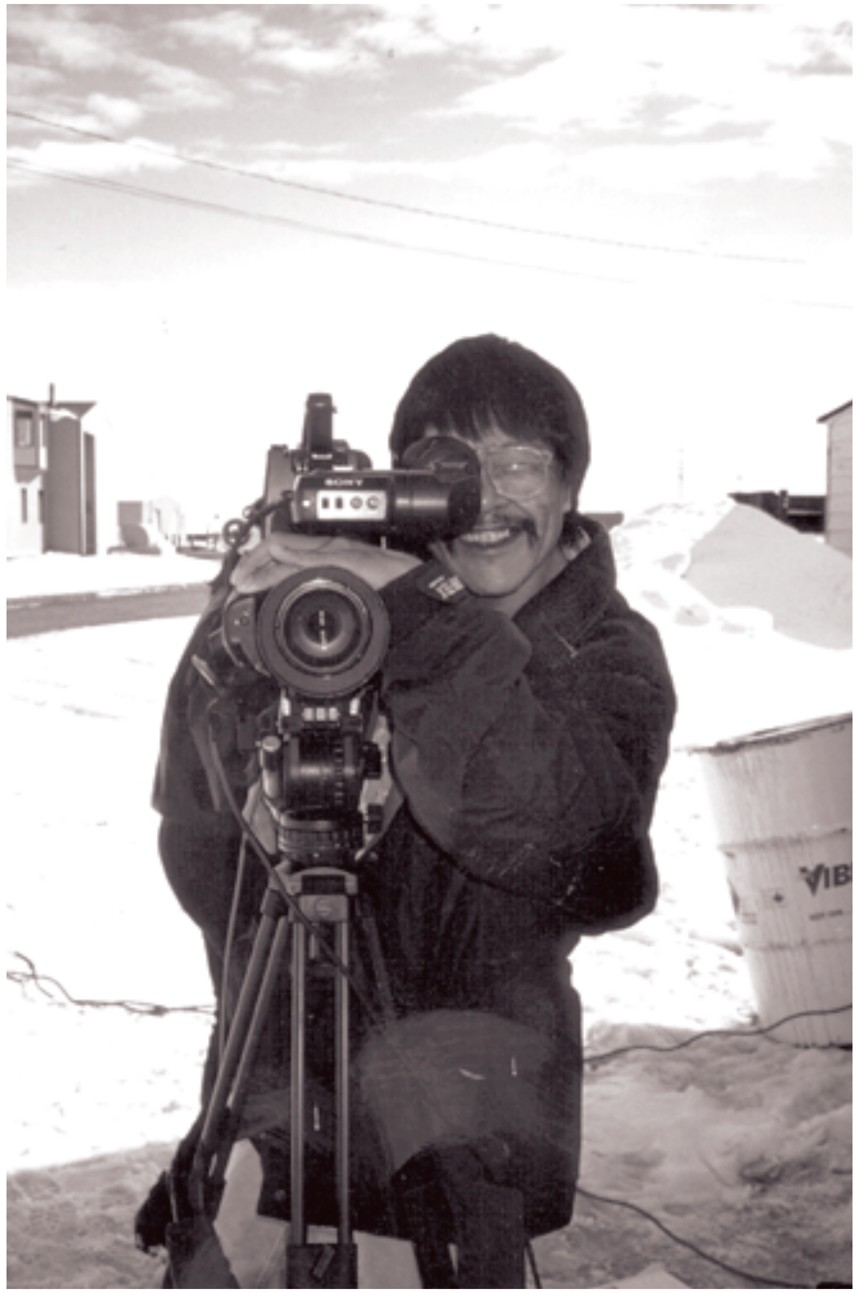
The newly formed Inuit Tapirisat of Canada (ITC, now Inuit Tapiriit Kanatami) was determined that Inuit would not become just a new market for existing southern services in English and French: they insisted that communities should be permitted to define their own communications environment, and that Inuit should be able to contribute to the Canadian broadcasting system in a significant way. One of ITC's first major policy statements called on the federal government to ensure Inuit control over the expansion of radio-telephone, community radio, videotape, and newspaper services into the arctic.

First Nations and Métis communities voiced similar concerns. In response, the Department of the Secretary of State launched the Native Communications Program (NCP) in 1973, with the goal of fostering the expression of Native points of view and interests through the development of communications societies. The program funded community newspapers, trail and community radio services and, in Iqaluit, a successful film society. But these measures, though welcome, did little to build significant media production capacity in northern communities.

The first real milestone on the path to northern broadcasting arrived in 1978, when the federal Department of Communications (DOC) launched a program to test satellite applications, using Anik B. One area of particular interest to the government was the potential application of satellite technology to enable production and distribution of programming in the arctic. The Inuit Tapirisat of Canada recognized an opportunity, and launched the Inukshuk Project.

Inukshuk linked six communities: Iqaluit, Pond Inlet, Igloolik, Baker Lake, Arviat, and Cambridge Bay. By today's standards this proto-network was primitive: video and audio signals were broadcast by satellite from Iqaluit, and received locally in the remaining five communities. Sound was fed back from the communities to the studio in Iqaluit by phone line. Viewers were thus able to see what was happening in the Iqaluit studio, and hear audio from the other participating communities.

Working with engineers, NFB resource people, freelance trainers and producers and Inuit trainees, Inukshuk explored a number of community-based ways to use video. Like other NFB experiments in video-based community development (such as the Fogo Island project in Newfoundland), the emphasis was on interactivity between real people. The satellite time available to the project was virtually unlimited. Volunteer fire departments across the NWT used the system to hold a territorial meeting and to talk about new firefighting techniques and equipment; there were animated community discussions about the evolving land claim, the division of Nunavut, and the prospect of resource development. At Christmas, high school students at the Ukkivik residence in Iqaluit talked to their families back home in an emotional session that left parents in the communities tearful but relieved they could actually see that their children were doing fine in the big city.



Inuit Broadcasting Corporation technical producer Michael Ipeelie, in Iqaluit. Coutesy Inuit Broadcasting Corporation

It didn't look much like conventional television, nor did it try to. Inukshuk producers shunned smooth, packaged programming and sought innovative ways to help people in isolated communities talk to each other through the new technology.

As the Inukshuk Project took shape, the Canadian Radio-Television and Telecommunications Commission (CRTC) responded to northern and Aboriginal concerns by appointing Rheal Therrien to head up a committee mandated to investigate the extension of broadcasting services to northern and remote communities. After hundreds of interviews and community consultations, the Therrien Committee recommended in 1980 that satellites be used to relay Canadian television programming to the north, and that "urgent measures be taken to enable northern native people to use broadcasting to support their languages and cultures".

The release of the Therrien report coincided with the scheduled conclusion of the Inukshuk project. It had been a success by any conceivable yardstick. Community interest and viewership had been high, many Inuit had been trained in basic television production, and the project had proved that a northern television network was technically and administratively feasible. Based on the project's success, and armed with the recommendations of the Therrien report, ITC won a three-year project extension for Inukshuk, and began to plan a longer-term broadcast solution for the north.

The stakes were raised in 1981, when Canadian Satellite Communications Inc. (Cancom) was licensed to provide radio and television services to remote and underserved communities. Cancom proposed to introduce a much wider range of TV channels into the community: it was clear that some permanent source of Inuktitut programming would have to be established in order to balance the new wave of southern programming. It was also clear that ITC, as a political body, would not be able to continue as sponsor of an independent television service.

The solution was to create an independent Inuit production organization; so in 1981 the Inuit Broadcasting Corporation (IBC) was incorporated, and licensed by the CRTC to produce and distribute Inuktitut-language television programming.

One of the new broadcaster's first actions was to release a discussion paper setting out its long-term vision and goals. Both the Department of Communications and the CRTC were seeking responses to the Therrien Report. IBC provided them with a number of recommendations, including:

- A funding program for all Inuit broadcasters (IBC, Taqramiut Nipingat in northern Quebec, and the newly formed Okala-Katiget Society in Labrador);
- Recognition of Aboriginal broadcasters in the Broadcast Act;
- A special CRTC policy acknowledging and supporting Aboriginal broadcasters;
- The creation of a dedicated northern transponder (a satellite channel committed exclusively to northern programming).

These goals were viewed as wildly ambitious when IBC first released its discussion paper. It's worth noting that every one of them has been achieved, and exceeded.

IBC realized the first of its goals with the announcement on March 10, 1983 of the Northern Native Broadcast Access Program (NNBAP), which provided $33.1M over four years to thirteen northern Aboriginal organizations for the production of radio or television programming, or both. Unlike other contribution programs for Aboriginal media, which tended to fund specific projects, the NNBAP allowed broadcasters to build permanent organizations, establish governance and management infrastructures, prepare production facilities, and design program schedules.

The program was not without its limitations. Funding was based on the assumption that an hour of television costs $5,000 to produce. However, the actual cost of an hour of programming at CBC in 1983 was $36,000, more than five times as much as the NNBAP formula. Funding was also tied to levels of production: IBC was required to produce five hours of Inuktitut language programming per week. Still, for the first time, IBC and the other indigenous broadcasters had a relatively solid funding base to build on, and a guarantee of at least four years of support.

In order to produce five hours of broadcast-quality television each week, IBC set out to establish five Inuit-staffed production centres through an ambitious, two-year training program. Inukshuk broadcasts had been less structured than traditional television, with an emphasis on community involvement and participation rather than production values. But a conventional television operation requires trained technical staff (camera people, editors, switchers, sound recordists, lighting technicians), content producers (researchers, writers, directors, producers, journalists, on-air personnel), managers, administrators, and an effective governing board. In the absence of a community college providing broadcast and journalism training, and without a pool of trained broadcasters to hire from, IBC's training program sought to address all those needs. Eighteen trainees from five communities began the intensive program in 1983, and sixteen completed the course two years later. Many are still working in broadcasting today.

Their training was unlike most northern training programs in a number of ways. Participants were actually creating a TV network, producing real programming for real audiences, and working to strict deadlines. Their learning was under very public scrutiny. Friends and families would cheerfully provide detailed critiques of their work, and after each broadcast from Baker Lake producer trainees would turn on their CB radios and listen as the community discussed their programming. In the north, unlike the south, there was no gap between broadcasters and their audiences.

The trainees received their baptism of fire at the 1983 Inuit Circumpolar Conference in

Iqaluit, when the new network provided both live gavel-to-gavel coverage of the proceedings and pool video to journalists from around the world. It was broadcasting on a scale never attempted in the Eastern Arctic, but the new producers did an excellent job: the fledgling Inuit network attracted nearly as much attention from the international press as the conference itself.

Over the next three years IBC refined many elements of the look and style that defines the network to this day. Its programs were being carried on CBC, which required thirty-minute formats and a higher level of technical quality than had been the norm during Inukshuk. For the first time recurring weekly series were designed and produced. Two of IBC's longest running programs were first broadcast in those early years: *Qaggiq,* a regional current affairs program now in its nineteenth year, and *Kippingujautiit,* entertainment and storytelling, now in its fifteenth season.

One of IBC's best-known programs was launched in 1986. From its creation, IBC had targeted children as an essential audience in their overall goal of language promotion and preservation. After two years of research, focus group testing and specialized training for an Iqaluit-based crew, the network launched *Takuginai,* its award winning series for Inuit children. Although the program uses puppets, graphic stories, live action, animation and special effects, it is much more than a northern clone of Sesame Street: very funny, occasionally irreverent, and always reflective of Inuit values and traditions. For example, some animals on the program can talk – but only animals that are never hunted or eaten. Now in its thirteenth year, *Takuginai* has spun off books, posters, sunglasses, public service announcements, and even a celebrity tour for the puppets. In 2000 Leetia Ineak, the program's producer, received a National Aboriginal Achievement award for her years of puppet design on the series.

With its personnel trained, its studios established and its programming schedule designed, IBC addressed its next challenge: the issue of program distribution.

The 1983 *Northern Broadcasting Policy* stated as one of its principles that northern native people should have "fair access" to northern broadcasting distribution systems to maintain and develop their cultures and languages. The Policy didn't define fair access – it left that up to the people who owned the distribution systems. In the north, that meant the Canadian Broadcasting Corporation.

CBC generally supported IBC and its goals. But the CBC's own northern service programming took precedence, and IBC programming, as a priority, came last on the list – and in the schedule. Viewers had to wait until eleven or twelve at night to watch IBC programming, which was subject to pre-emption whenever a hockey game ran late. Rosemarie Kuptana, then president of IBC, commented to the CRTC that "God made our land the land of the midnight sun – it took the CBC to make it the land of midnight television".

Despite the late night timeslots, several independent audience surveys confirmed that IBC was attracting up to 95% of Inuit viewers. But it was clear that this couldn't be sustained. CBC Northern service planned to expand its own northern programming, and IBC programs were being pre-empted with increasing frequency.

All the northern native broadcasters across Canada were dealing with similar problems. The answer lay in the solution IBC had proposed in 1982: a dedicated northern transponder, a purely northern satellite channel to provide access for IBC and other northern broadcasters.

Six years of focused lobbying finally paid off in 1988, when Minister of Communications Flora MacDonald committed $10M to the creation of Television Northern Canada (TVNC), a pan-northern network established by northerners, for northerners. After three years of research, design and installation, the new network launched in 1992, and Aboriginal broadcasters finally had a long-awaited and much needed distribution system of their own.

TVNC provided IBC and other broadcasters with both a channel for their broadcast series and an opportunity to return to experimental programming in the spirit of the Inukshuk project. One unique example was "Connecting the North", a three-day symposium on new communications and the north that incorporated cutting edge technologies – videoconferencing, telemedicine, and web-based data transfer – into the broadcast. The program featured presentations from government spokespersons, educators and trainers, health care practitioners, Aboriginal political organizations, economic development and business people, and broadcasters from around the world. Local discussion groups in 27 communities watched the symposium on TVNC. Working with a facilitator, they'd discuss the issues raised on air and provide feedback and recommendations by phone and fax to the Symposium. In the final session the Symposium linked Inuit leaders John Amagoalik and Jose Kusugak in Iqaluit with panellists from the Tanami Network in Australia to talk about their respective land claims and territorial issues.

"Connecting the North" exemplified the real potential of northern broadcasting – community-driven, interactive, and significant. It created an innovative template for using a television network as a tool for real, two-way, community consultation – just as Inukshuk had done a decade earlier. Through this kind of imaginative programming, the new network began to attract attention from some surprising quarters.

TVNC's audience was always intended to be northern. But networks distributed by satellite can be viewed by anyone with the appropriate dish. To everyone's surprise, TVNC began receiving fan mail and requests for videotapes and information from across southern Canada, from the United States, and even from South and Central America. It seemed TVNC had appeal beyond the north.

Members of TVNC began to wonder whether a significant market for Aboriginal programming might actually exist in the south. There were clear advantages to wider distribution: since advertisers' rates are based on the audience size, a southern audience would mean higher advertising revenues. Cable companies charge their subscribers for the services they provide; if TVNC could provide a service that enough southern viewers wanted, the revenues from the cable companies would help support the broadcast organizations. Additional programming would be required; but a national Aboriginal channel built on the foundation of the TVNC network could provide a venue for the hundreds of Aboriginal writers, directors and producers working in Southern Canada without access to distribution.

In June 1997 the TVNC Board of Directors voted to seek the establishment of a national Aboriginal television network. For the next two years, the broadcasters renewed the persistent, focused lobbying that had won them their TVNC licence eight years earlier. They gathered support for the concept of a national network from the national Aboriginal organizations, cultural leaders, politicians, sponsors, educators and other broadcasters. Most important, they commissioned an Angus Reid survey that confirmed that 66% of Canadians supported the idea of a national Aboriginal TV network, even if it meant displacing an existing service. Even more surprisingly, 68% of Canadians said they would be willing to pay a 15-cent increase in their monthly cable bill to receive an Aboriginal network.

Their lobbying and research bore fruit in February 1999, when the CRTC granted a license to the Aboriginal Peoples Television Network (APTN), mandating the carriage of the network as part of the basic service of Broadcast Distribution Undertakings. The license mandated APTN to "*provide a much-needed, positive window on Aboriginal life for all Canadians, whether living in the North or in the South*".

APTN now carries the programming produced by IBC and other NNBAP-funded broadcasters to a potential viewership of more than eight million. It's a mandatory service; all cable operators over a certain size have to carry it as part of their basic package. Every subscriber pays 15 cents per month, something less than the cost of a can of coke and a package of chips per year.

Even wider distribution is in the works. APTN is planning to webcast its signal, which means their programming will be online, on the world wide web, both in real time – as it's broadcast – and in a searchable retrieval mode. The network is also exploring markets in United States, Australia and New Zealand, and reviewing the feasibility of an International Aboriginal Network. Thanks to digital and satellite technology, it seems the sky really is the limit.

Significant change of any kind creates its own challenges. Some northern audiences have complained that the new APTN doesn't feel "northern" in the way that TVNC used to: slick and well packaged, its focus seems very southern compared to TVNC. Many Inuit viewers wonder why there's so much "Indian" programming. Conversely, Aboriginal viewers in the south wonder why there's so much Inuit programming, in Inuktitut, on a national network. Satisfying the expectations of its several different audiences will be challenge for both APTN, and for its member-contributors, including IBC.

Since the advent of APTN, IBC programming is on the national stage, reaching its largest-ever audiences, generating its largest-ever revenues, and positioned to expand into new markets and programming areas. So far IBC has retained a strong focus on community content. Since broadcasters both shape, and are shaped by, their audiences, it will be interesting to watch the evolution of an IBC that balances the needs of its original audiences for local programming, community coverage and Inuktitut language television with the needs of the large, predominantly non Inuit, urban southern audience for the national television network IBC helped to create.

But their success in the past bodes well for the future. From their roots as a satellite experiment under the wing of ITC to their prominent role in the creation of the world's first Aboriginal television network, Inuit broadcasters have been leaders in the growth of Aboriginal communications in Canada, a movement that has provided inspiration and models to Aboriginal peoples worldwide. With Inuktitut programming now available every day in eight million Canadian homes and international distribution on the horizon, IBC is, perhaps, the best example of one of the Inuit's greatest strengths – the capacity to adapt the best of new technologies from other cultures to their own needs and purposes.

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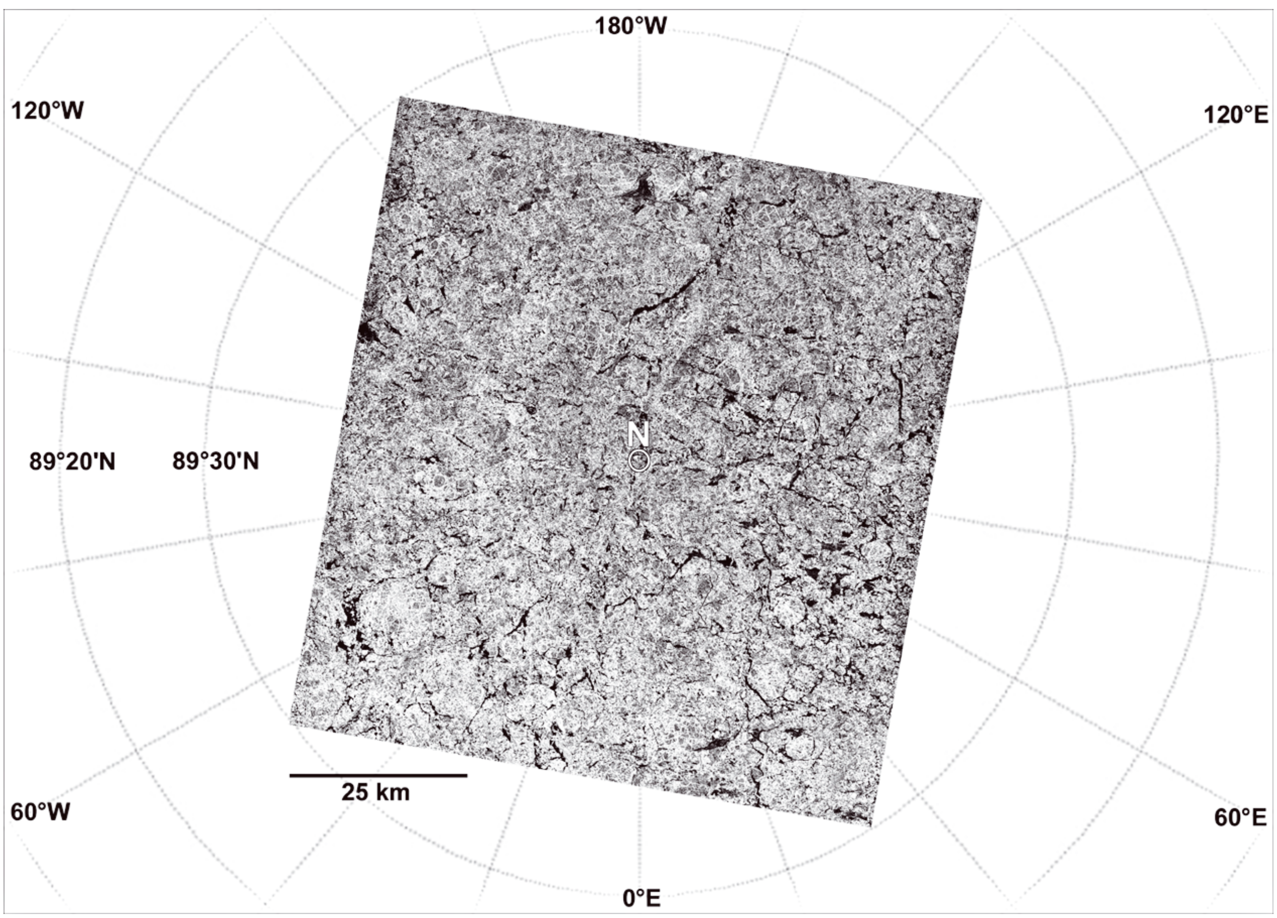
REMOTE SENSING: A POTENT INFORMATION SOURCE FOR CANADA'S ARCTIC

Paul Budkewitsch

Almost a third of a century ago, the era of commercially and publicly accessible images from the Earth, taken from space, began with NASA's Landsat-1 satellite (then called ERTS-1). The image resolution was of reasonable quality for the time (80m) and a new perspective of the planet we live on was born. Thereafter, a wealth of new information was brought forth, from all parts of the world, that enabled exciting applications to be developed. This was never truer for the Arctic, when in the 1970s an unprecedented level of exploration and development was taking place. Information from the Arctic region was so sparse that researchers and exploration companies used pictures from weather satellites with km-scale resolution to provide land detail, even before the availability of Landsat-1.

The newly formed Canada Centre for Remote Sensing (CCRS) was the first agency outside the United States that was permitted to directly receive these new US-owned Landsat-1 images. This marked a history of many technological firsts in Canada. The development of ground receiving stations by MacDonald Detwiler and Associates of Vancouver was one of them. Two receiving stations, one in Prince Albert, Saskatchewan and later one in Shoe Cove, Newfoundland, silently received satellite data for much of North America. The Shoe Cove Station was eventually discontinued and replaced in 1985 by the Gatineau Satellite Station located in Cantley, Quebec.

In the 1970s, sovereignty and surveillance in the Arctic became important issues for the government. This eventually led to



Eighteen images across the pole have been collected by RADARSAT-1 for various purposes since 1997. The latest is a RADARSAT-1 Extended High (beam 4) image, acquired 00:30 UT on January 1, 2003. This single image covers the northernmost 30° of latitude of Arctic Ocean sea-ice where parts are still in December 31, 2002 because of the International Date Line. Cloud cover and total darkness do not impede radar data collection by RADARSAT-1. Multi-year blocks of rough ice are in bright tones, whereas narrow zones and small patches in dark tones are the current year's fractures and open water leads that have refrozen.

the development of the RADARSAT-1 mission, the most advanced civilian synthetic aperture radar (SAR) satellite at the time of launch in November of 1995.[1] RADARSAT-1 has been in operation ever since and, at the time of writing, has completed over 40,000 orbits of the Earth. In a near-polar orbit (as most Earth observing satellites are), a convergence of satellite orbits occurs at high latitudes, where repeat visits for any particular spot on the ground are more frequent than at lower latitudes. In the Arctic, therefore, opportunities for acquiring cloud-free optical images are much greater than at lower latitudes. Cloud cover, however, does not obscure the ground from imaging radar, and so RADARSAT-1 is often described as an "all-weather" satellite, capable of operating day or night and throughout the dark winter months of the Arctic. Dry snow cover is also transparent to radar, thus the Canadian-built satellite is truly well suited for our northern environment.

The CCRS ground receiving stations have collected, processed and archived data from over a dozen missions for Canada, the European Space Agency, France, Japan and the United States. Current missions include NOAA AVHRR (US National Oceanic and Atmospheric Administration's Advanced Very High Resolution Radiometer), Landsat-5 and -7, RADARSAT-1, European ERS-2 (Earth Resources Satellite) and ENVISAT platforms. These international partnerships have been important for Canadians by providing data for not only the Arctic, but also for all of Canada. A 30-year archive holds an impressive, irreplaceable collection of satellite data that provides base line information to government and commercial clients. Archival data for Canada can be searched through the Canadian Earth Observation Catalogue (CEOCat[2]), an online image catalogue that allows browsing access to historical data. It was only recently recognized that the preservation of these past images is critical for climate change related studies that require time-series data sets. The future will tell what other applications will require these invaluable glimpses of the past. Many Landsat images older than 12 months are available to the public from GeoGratis[3] whereas NOAA AVHRR data are available soon after acquisition. About 6 terabytes of Landsat data are received and archived annually by direct down-link over Canada, amounting to some 20–30,000 images. A more impressive volume of approximately 22 terabytes per year of direct and recorded data collected by RADARSAT-1 worldwide is also received and archived.

In support of government issues and department programs, CCRS continues to provide reception, application development and access services on behalf of the federal government. Satellite data by itself, however, is not information and thus applications development with other government departments, universities and commercial industry has been a strong part of the CCRS mandate. These activities have been an important part of developing a strong remote sensing sector in Canada and a solid knowledge base for the public good. Another technological first in Canada was the development of rapid "Quicklook" imagery from Landsat-1 in 1972. In later experiments, Quicklook images were sent by fax directly to ships in the Arctic as navigational aids.

Today, Canadian Ice Services, part of Environment Canada, is the largest user of RADARSAT-1, ERS and ENVISAT data in Canada. They provide expert near real-time information on sea-ice conditions to ships in arctic waters, allowing better and safer routing choices. Indeed, the economic viability of the Polaris and Nanisivik zinc-lead mines was made possible in part by resulting cost savings in shipping of ore concentrate for export.

Other federal government users of satellite imagery include the Canadian Space Agency, the Department of Fisheries and Oceans, Natural Resources Canada and Parks Canada. The latter has recently completed a study on the ecological health of northern parklands using NOAA AVHRR data composites. From a 10-year data set the authors recognized a predictable relationship between the occurrence of ice-out conditions on lakes and the rapid onset of vegetation growth in early summer.[4] Impacts of annual changes and long term trends to arctic habitats affect nesting birds and grazing animals.

Resource-based industry (*e.g.,* precious and base metals, diamonds and petroleum), relies increasingly on remotely sensed data to assist with providing information at various stages of the resource development, from exploration to environmental impact reviews, mine site planning and reclamation. Other applications in the Arctic include determining sea-ice conditions, creating digital elevation models, monitoring snow cover and vegetation change, and studying the dynamics of cold-climate processes and the flow of glaciers. The rapid growth of aboriginal communities in the north can be easily and cost-effectively monitored for municipal planning and development purposes with high-resolution satellites whose images are often as good as aerial photography.

The Arctic remains a region where information is difficult and costly to obtain on the ground or from other sources. These challenges can be effectively addressed by remote sensing technology because:

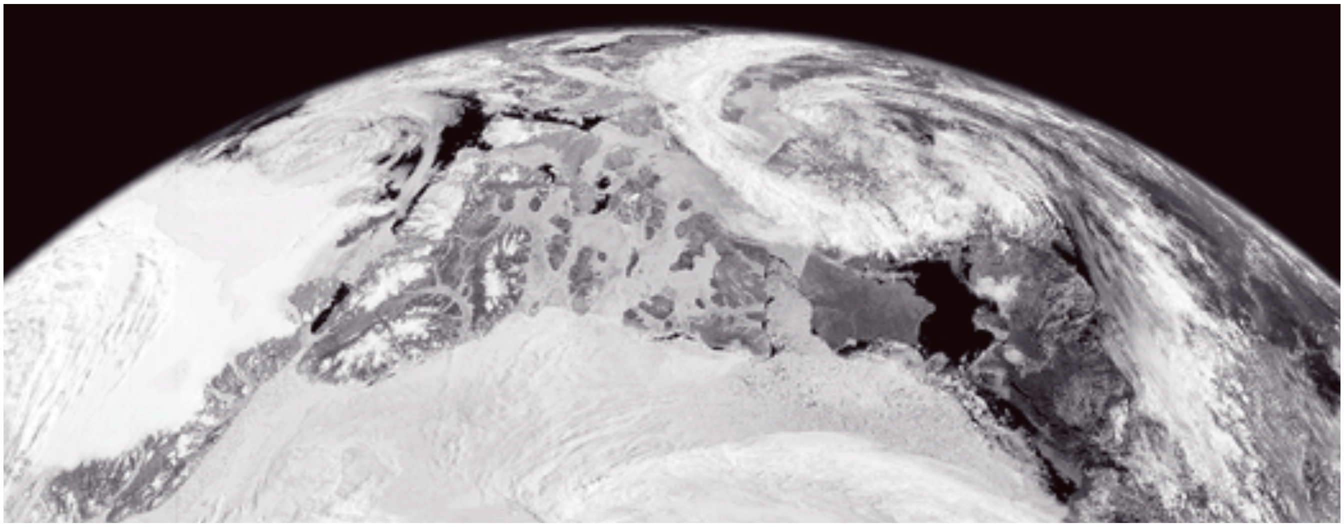
- Earth observing satellites have the capability to collect data in a systematic, synoptic and repetitive manner;

1 Further reading on the history of remote sensing in Canada can be found at ccrs.nrcan.gc.ca/ccrs/org/history/history_e.html (July 23,2003).

2 ceocat.ccrs.nrcan.gc.ca/cgi-bin/client_acc/ceocate/holdings.phtml (July 23, 2003).

3 geogratis.cgdi.gc.ca (July 23, 2003).

4 Satellite Monitoring of Northern Ecosystems, 2002 (B. Sparling, J. Wilmshurst, J. Tuckwell et T. Naughten).



Looking southeast on July 9th, 1999, across the most of the polar region with SeaWiFS (Sea-viewing Wide Field Scanner) from an orbiting altitude of 705km (curvature of the Earth is exaggerated in this perspective). Most of the western Arctic archipelago is cloud-free and this image includes the area from Cape Morris Jesup (Greenland) near the lower left, to the Mackenzie Delta, NWT, on the right.

- The data are acquired in spatial reference frame and contain geophysical and thematic terrain information not available from topographic maps;
- The information is up-to-date, quantitative and impartial.

Canada was among the first nations in space, with a small satellite launched in 1962. Alouette-1 studied the ionosphere to further understanding of radio communications in the far north. Only the Soviet Union and the United States, driven by cold war policies, had developed space technologies at that time. Today the list of countries with Earth-observing satellites also includes Brazil, China, the European Union, India, Israel, and Japan. Canada's past investments and leadership have paid dividends for our aerospace industry and the resulting technological advancements and information have brought benefits for all Canadians. Resource exploration and development are experiencing resurgence in the North and new concerns are being raised because of the obvious impact of human activities and environmental change on the polar region. As never before, satellite sensors are poised to provide much needed strategic information for the development and monitoring of the North.

Receiving stations located at high latitudes are in an advantageous position because direct communication with a satellite is possible during each orbit. Norway, recognizing this, has taken advantage of its high latitude and proximity to the pole in Svalbard. SvalSat currently operates a farm of receiving antennae at Longyearbyen (N78) for clients worldwide, including the United States. In Canada, a receiving station at Resolute Bay, Nunavut (N75), for example, would be 22 degrees further north than our northernmost one in Prince Albert, and have all the same relative geographic advantages that exist at Svalbard. Foreign interests have already made related inquiries, but waning support for our existing ground receiving infrastructure currently makes it next to impossible to respond with a Canadian commitment. An investment of this kind could provide sustainable, long-term economic benefits to the north through the high technology sector.

When changes in government programs occur, there is a risk of losing sight of the advantages of maintaining strong competency in core disciplines. In many areas, it can be shown that routine or operational systems of today developed out of earlier support given to high-risk experiments and investigations that did not promise immediate benefits. After coming so far since the beginning of this technological era, let us not lose the solid foundation gained in the field of remote sensing now that more technically advanced sensors are being deployed almost annually and providing new and unique data. With our large polar landmass, Canada can continue to play an influential role in global Earth observation policies and practices. We should not let this capability diminish, since it is critical for addressing current and future circumpolar issues.

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DELIMITING THE JURIDICAL CONTINENTAL SHELF IN THE ARCTIC OCEAN: A CONFLUENCE OF LAW, SCIENCE, AND POLITICS

Ron Macnab

Within the next decade or so, the jurisdictional map of the Arctic Ocean will likely undergo significant revision as the five surrounding states develop the outer limits of their juridical continental shelves beyond 200 nautical miles. The Russian Federation was the first to attempt this process, and the outcome of that attempt did not meet expectations. This note begins by providing a brief description of the procedures for developing outer limits. It then outlines the Russian approach and the responses of its Arctic neighbours. Finally, it concludes with a short discussion of the lessons learned from the Russian submission, and of its implications for other Arctic states.

INTRODUCTION: THE JURIDICAL CONTINENTAL SHELF

The Arctic Ocean is a semi-enclosed sea surrounded by the land masses of Canada, Greenland, Norway, Russia, and the USA (Figure 1). In regions adjacent to the continental margins of all five coastal states, the seabed has characteristics that may, in accordance with the provisions of Article 76 of the United Nations Convention on the Law of the Sea (UNCLOS), provide validation for the exercise of certain sovereign rights beyond the usual 200 nautical mile (nm) limit. The area in which these sovereign rights apply is known as the *juridical* continental shelf, which is not to be confused with the *physiographic* continental shelf.

Article 76 defines the bathymetric and geological criteria that a coastal state must satisfy in order to project elements of its national jurisdiction beyond 200 nm, and to define the outer limit of that projected jurisdiction. In general, this entails the collection and analysis of observations that describe the depth and shape of the seabed, as well as the thickness of underlying sediment. The outer limit that is so determined, along with supporting information, must then be documented in a *submission* that is presented to the Commission on the Limits of the Continental Shelf (CLCS), an elected body of 21 experts in the field of geology, geophysics, or hydrography; this must occur within ten years of the entry into force of UNCLOS for that particular state. The primary function of the CLCS is to review the contents of the submission, and to issue recommendations concerning the admissibility of the proposed outer limit.

Upon approval of the outer limit of its juridical continental shelf beyond 200 nm, a coastal state may begin to exercise significant sovereign rights within the extended region: jurisdiction over living and non-living resources of the seabed and subsoil; control over the emplacement and use of submarine cables and pipelines, artificial islands, installations, and structures; regulation of drilling; control and prevention of marine pollution; and regulation of marine scientific research. Article 76 is therefore a piece of international maritime law that has significant relevance for coastal states that qualify.

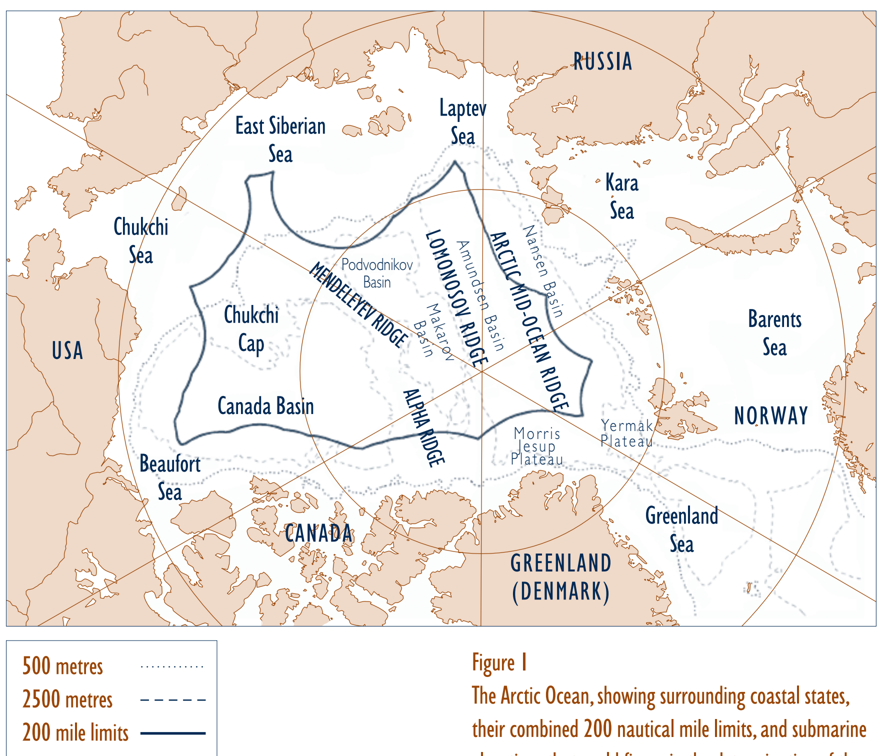


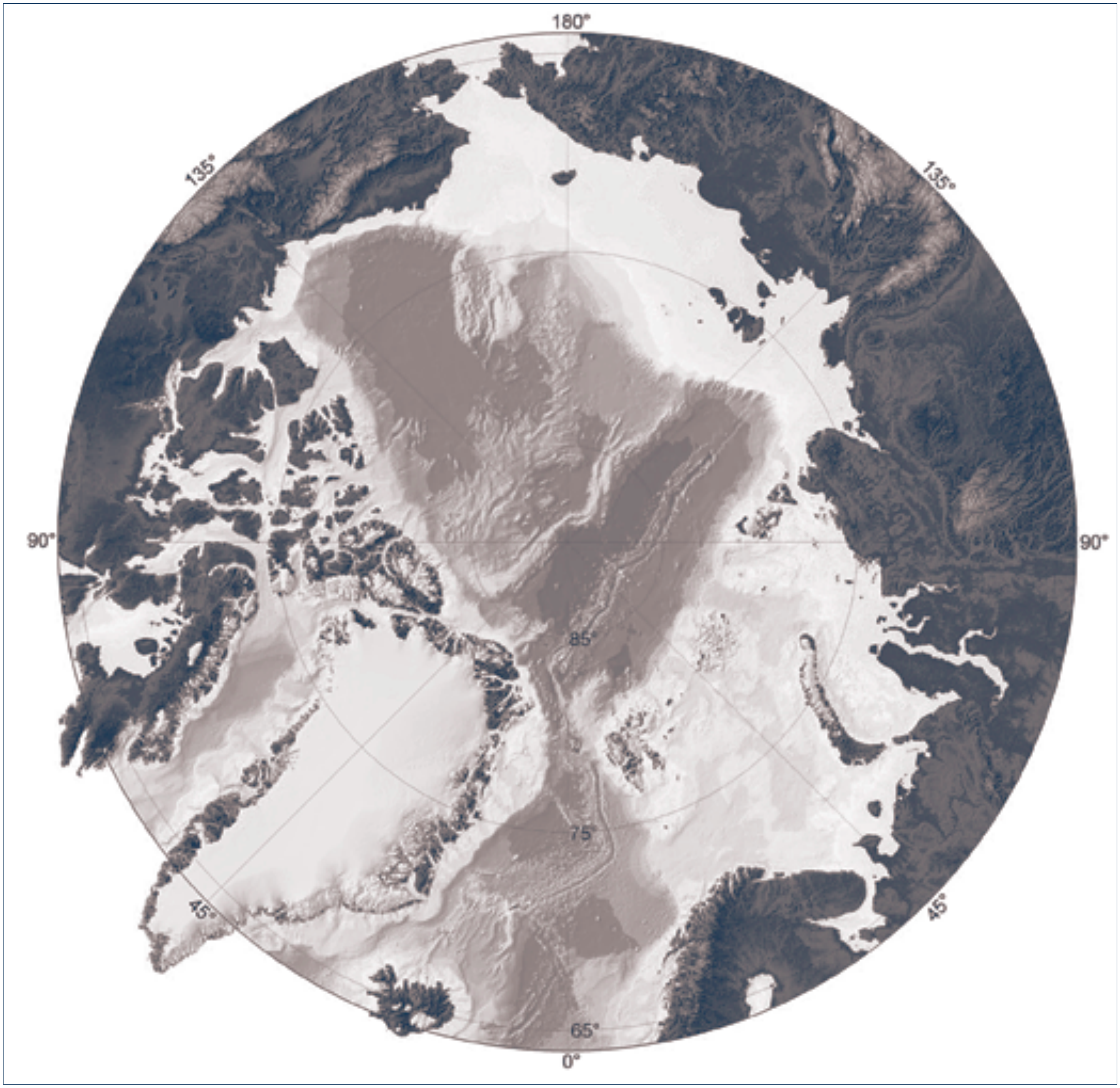
Figure 1
The Arctic Ocean, showing surrounding coastal states, their combined 200 nautical mile limits, and submarine elevations that could figure in the determination of the outer limit of the juridical continental shelf, according to the provisions of UNCLOS Article 76: Chukchi Cap, Alpha Mendeleev Complex, Lomonosov Ridge, Morris Jesup Plateau, and Yermak Plateau.

IMPLEMENTING ARTICLE 76 IN THE ARCTIC OCEAN

As in other parts of the world where multiple coastal states front onto a common ocean area, outer limit determinations in the Arctic Ocean are complicated by several factors: prospects for converging and overlapping continental shelf claims; unsynchronised national timetables for the ratification of UNCLOS and the implementation of Article 76; inadequate or incompatible data sets; variations between states in their interpretive styles and criteria; and limited knowledge of the seabed's resource potential.

While Article 76 may rest on a scientific and technical foundation, the decision to proceed with its implementation is largely political, and different states will be motivated by different factors – some internal, others external (for instance, the departing head of at least one small coastal state has reportedly seized upon Article 76 as an opportunity to enhance his legacy by increasing substantially the size of his country's maritime territory). This may introduce difficulties in coordinating delimitation activi-

Figure 2
The International Bathymetric Chart of the Arctic Ocean (IBCAO), first constructed in 2000 from all bathymetric observations that were available in the public domain, and since updated with new information. For more detail, see www.ngdc.noaa.gov/mgg/bathymetry/arctic/arctic.html.



ties among neighbouring states: while timing and conditions may be right for some, they may be wrong for others.

In the case of the Arctic Ocean, only two out of five states – Norway and Russia – have actually ratified UNCLOS, and the deadline for their submissions will be in 2009. Denmark is reported to have enabled legislation that will permit ratification by the end of this year, which will place its deadline in 2013. Canada and the USA have yet to ratify, although in the latter country, it would appear that support is growing for early ratification. Thus the Arctic nations are likely to occupy different positions in the implementation cycle.

Data issues are especially problematic in the Arctic, on account of the difficulties encountered in mapping an ocean that is permanently ice-covered. In recent years, this has prompted polar investigators to embark on informal initiatives to consolidate available data sets that describe the seafloor and the underlying sediment. The intent has been to develop a common perception of seabed conditions that would affect the determination of outer limits, and in so doing to reduce contention between states that might otherwise seek to project their respective jurisdictions over the same piece of ocean floor. These initiatives have met with mixed success: a new and much improved international map of Arctic bathymetry has been developed from public data sources (Figure 2), but classified data sets are known to exist that would no doubt enhance the quality of this product. Similarly, an international data base of seismic observations is under construction, however a comprehensive map of sediment thickness remains a distant prospect: a large body of observations is known to exist, however most of it is classified because it was created for defence purposes, and it is unlikely to be made available in the near future.

About three years ago, a team of Canadian investigators used existing public information to construct a series of hypothetical outer limits in the Arctic Ocean. This analysis concluded that the combined continental shelves of the five coastal states would occupy most of the Arctic Ocean with the exception of two "donut holes" (Figure 3). This has led to some interesting and admittedly academic conjectures on how the combined area could be partitioned between the five states. For the time being, the partitioning issue remains moot, however it will need to be addressed at some future date.

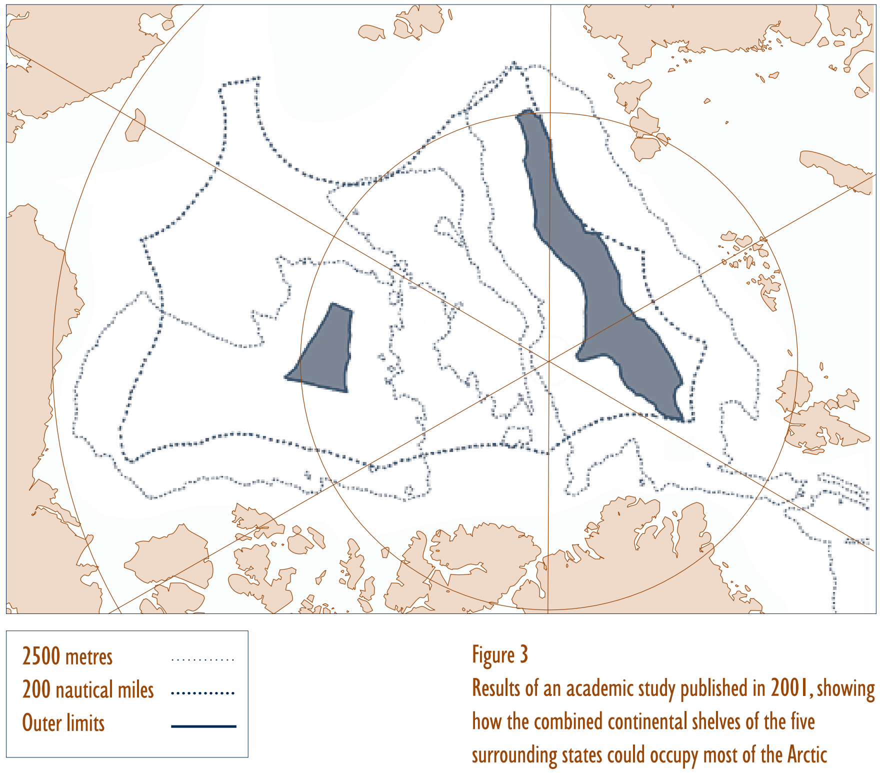


Figure 3
Results of an academic study published in 2001, showing how the combined continental shelves of the five surrounding states could occupy most of the Arctic Ocean, except for two "donut holes". The smaller opening is a composite of the outer limits of Canada, Russia, and the USA. The larger opening is a composite of the outer limits of Denmark, Norway and Russia.

Figure 4
Lighter coloured areas indicate the locations and sizes of the two continental shelf extensions sought by Russia in the high seas region circumscribed by the combined 200 mile limits of the Arctic coastal states (heavy line).

RUSSIA'S SUBMISSION

In December 2001 – well in advance of its 2009 deadline – the Russian Federation became the first and so far the only coastal state to present a continental shelf submission for consideration by the CLCS. This submission had a wide geographic scope, seeking extended jurisdiction over four distinct areas in the North Pacific and Arctic Oceans, however the only area that will be discussed here is the central Arctic Ocean (Figure 4). By and large, this claim encompassed a roughly triangular zone with its apex at the North Pole; the eastern border consisted of a straight line that was defined approximately by the 169th meridian, while the irregular western border, which was constructed in accordance with the provisions of Article 76, skirted the northern flank of the Arctic Mid-Ocean Ridge (also known as the Gakkel Ridge).

A comparison of the Russian outer limit with that obtained in 2001 by the Canadian team reveals noticeable divergences in some places (Figure 5). There are two possible explanations for these discrepancies: (1) different data sets – one public, the other classified – were used for describing depth and sediment thickness; (2) different techniques and criteria were used to analyze and interpret this information – which is hardly surprising, given the many ambiguities that characterize Article 76.

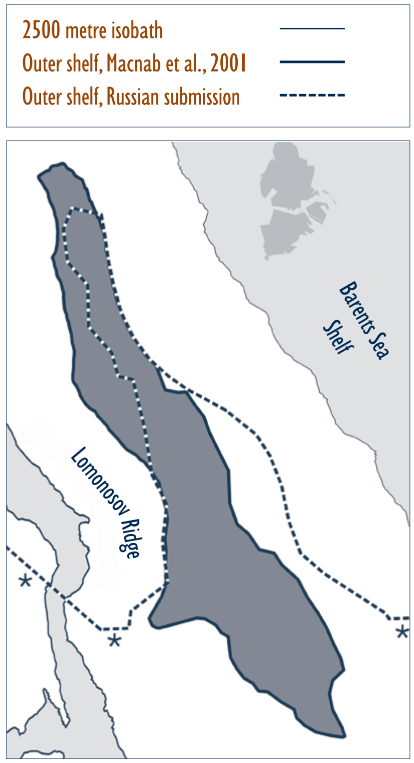


Figure 5
An enlarged view of Eurasia Basin, comparing portions of the outer limits portrayed in Figures 3 and 4. The limits don't match in all places because they were determined independently by two groups using separate databases and applying different criteria in their interpretations. The line constructed in 2001 represents a combined outer limit for Denmark, Norway, and Russia. The outer limit submitted by Russia, on the other hand, was developed uniquely for that country, and it incorporates provisional bilateral boundaries (indicated with asterisks) whose final positions are subject to negotiation with neighbouring states.

The Russian submission triggered formal objections from five neighbouring states, although only three – Canada, Denmark, and the USA – made specific mention of the central Arctic component. Canada and Denmark both indicated a need for additional supporting data in order to assess properly the submission, and advised that the recommendations of the CLCS would be without prejudice to the prospective delimitation of the continental shelf between themselves and the Russian Federation. The USA took a much harder line, declaring notably in its *note verbale* to the UN Under-Secretary-General that the submission had "major flaws" and questioning whether its geological criteria and interpretations were "accepted as valid by the weight of informed scientific opinion". It then went on with a critical review of the technical and scientific underpinnings of the Russian submission.

Informal concerns were also raised in some quarters of the international scientific community, expressing apprehension over the prospect of Russia extending its jurisdiction to encompass a substantial segment of the Arctic high seas where it would gain the authority to regulate marine scientific research, particularly ocean drilling.

In considering the Russian submission, the CLCS took note of Canadian and Danish concerns and confirmed that its recommendations would not prejudice the determination of prospective boundaries between these two states and the Russian Federation. As for US concerns, it has been reported that the CLCS did not consider the scientific points raised by that country, disregarding them as third-party interventions that are not allowed by UNCLOS. Nevertheless, it appears that the CLCS adopted a somewhat rigourous scientific approach in its assessment of the Russian submission: while the full text of its ensuing recommendations have not been made public, it has been reported that the CLCS had concerns with the adequacy of the data sets that were presented to support the inclusion of segments of the Lomonosov and Mendeleyev Ridges within the proposed outer limit. In rendering its decision in the second part of 2002, the CLCS accordingly recommended a revision of the central Arctic component of the submission, with additional supporting data.

In the absence of any provision for appealing or for questioning the decisions of the CLCS, the Russian Federation called an international scientific meeting in June of this year, in order to review contentious issues relating to the implementation of Article 76 in the Arctic Ocean. At this meeting, a series of Russian speakers described the scientific rationale that figured in the preparation of their national submission, and speakers from other countries were invited to present complementary or opposing viewpoints. Not surprisingly, US participants tended to stand by their country's position, as previously articulated to the UN Under-Secretary-General. By the end of the meeting and with views firmly entrenched on both sides, a senior ministry official from Moscow expressed a clear intention to continue building the case for the Russian Federation's submission.

LESSONS AND IMPLICATIONS FOR OTHER STATES

In the Arctic context where an extended continental shelf stands to be partitioned between several neighbour states, it is perhaps inevitable that conflicting scenarios will be developed by different states as they seek to realize their most advantageous outer limits. This will be especially true if each state realizes its own implementation of Article 76 by applying unique analytical procedures to data bases that differ from those held by its neighbours. If this leads to a situation where one state's implementation is perceived to jeopardize another state's interests, the CLCS will not intervene to deal with the problem, but will leave it to the disputing parties to seek a mutually satisfactory resolution.

Probably the best way to avoid this sort of contention is for neighbour states to agree to work together by combining and rationalizing all available data sets for their region of interest, and by harmonizing their analytical procedures. Through the use of common data bases and shared interpretations, such a cooperation should make it easier for states to develop a common perspective of their continental shelf prospects, and to achieve an understanding that will facilitate the resolution of potential disagreements. Ideally, this would also enable the development of coordinated – perhaps even joint – submissions to the CLCS.

Even if countries agree to work together in a coordinated or joint implementation of Article 76, they must still face the challenges of reconciling the legal and scientific requirements of the Article, and of drafting submissions that will withstand the scrutiny of the CLCS. It is generally agreed that Article 76, with its simplifying assumptions and its ambiguous terminology, constitutes an uncomfortable mix of law and science that makes it difficult under some circumstances to achieve clear and unequivocal conclusions. The CLCS has attempted to improve the situation by developing a set of Guidelines that purport to clarify the provisions of the Article; it is telling that in their English version, these Guidelines require 120 pages to explain the meaning of the Article's 639 words. In situations where the Article lacks clarity, it therefore remains to be seen to what extent the Guidelines will be binding on submitting states that have legitimate difficulties in accepting the recommendations of the CLCS.

Non-submitting states may have sound and justifiable reasons for seeking details about other states' submissions and about the treatment of those submissions by the CLCS. In the Arctic context, for instance, the content of one coastal state's submission and the issues that it raises with the CLCS could impact the strategies of other states in developing their own submissions. However, under the current rules that dictate CLCS procedure, there is no provision for the routine disclosure of such information. Therefore when tailoring its approach to Article 76, it may be difficult for one state to take into account the experience of another state.

CONCLUSIONS

Legally, scientifically, and politically, the delimitation of the juridical continental shelf in the Arctic Ocean is a potentially complex undertaking that has already exposed significant disagreements between two major stakeholders on how to proceed with the task. If all five coastal states could agree that it was in their best interest to refrain from exacerbating the situation, they might be well advised to promote greater collaboration among themselves in order (a) to develop a common position concerning the application of Article 76, and (b) to present a united front to the Commission on the Limits of the Continental Shelf.

Acknowledgements
The information in this note has been extracted from various papers and oral presentations prepared by the author and various colleagues, from the website of the Division of Ocean Affairs (DOALOS) of the United Nations, and from reports received from informed sources.

Ron Macnab is a geophysicist (Geological Survey of Canada, retired) based in Dartmouth, NS.

CLIMATE CHANGE, CASES, AND A NEW GENERATION OF ARCTIC SCIENTISTS

Lucette Barber, David Barber and Martin Fortier

It was a dark and stormy night as Chicken Little made his way out onto the porch. He looked skyward and exclaimed, "The climate is changing! The climate is changing!" This analogy may well be appropriate, for a random selection of recent quotes pertaining to global warming would look something like this:

> *"Climate change will destroy the planet! ... Global warming is nothing to worry about – remember that the dinosaurs were cold blooded and lived in a time when the Earth was much warmer!*
> *"Pah – global warming, bring it on – I live in Winnipeg and we could do with some of that warming!*
> *"Global warming may be real but it is just a natural part of the climate system – nothing to worry about for us technologically literate humans. We'll just adapt!"*

Although at first glance these quotes may seem to have more to do with Chicken Little than climate science, they probably capture the wide range of perceptions from the readership of this periodical – and for that matter, of the general public. Why is it that an issue as potentially significant as global warming and climate change engenders such diverse public opinion? One reason is that opinions differ depending whether they come from the carbon-based resource sector, agriculture, mining, subsistence harvesting, scientists, or the public.

Each is impacted differently, and each has a different interpretation of the complex picture that is presented through the media, the science community, and public information outlets.

It's not surprising then that, given the uncertainty in the scientific understanding of climate change, we can expect this large range of opinion to persist.

Since policy makers take public opinion into account, creating sound policies around such complex issues as climate change, issues fraught with uncertainty and diverse public opinion, becomes very challenging. In these circumstances, governments and policy makers often adopt a precautionary approach: rather than waiting for complete understanding, they decide to act in order to avoid possible irreversible environmental damage. This approach requires continued examination of climate change science in concert with aspects of mitigation and adaptation. For example, many policy makers believe evidence from the Intergovernmental Panel on Climate Change (IPCC) sufficiently compelling to warrant action; and that taking no action is not an option given the time required to mitigate the impacts of increased green house gases, adopt alternate energy strategies, etc.

Around the globe, governments are investing significant resources into all aspects of climate science. This has improved our understanding of large-scale phenomena such as the El Nino Southern Oscillation (ENSO), the North Atlantic Oscillation (NAO) and the Arctic Oscillation (AO). These hemispheric-scale atmospheric patterns provide a framework to understand portions of the variability observed in physical and biological systems operating on the planet. This work also provides direct evidence for and against predictions of climate variability and change. As this work evolves we become better at modeling the climate system using local, regional, hemispheric and global climate models (GCMs).

One of the interesting aspects of global climate model analyses is the consistent agreement across many different GCMs that we can expect the earliest and strongest signs of global climate change at high latitudes — the Arctic and Antarctic. The reasons include a variety of feedback mechanisms operating across the ocean/sea ice/atmosphere system in high latitudes. The Canadian Centre for Climate Modeling and Analysis (CCCMA) in Victoria currently predicts a seasonally ice free summer as early as 2050. Although debates continue regarding the precision and accuracy of such projections, these model results are currently in line with observed reductions in the areal extent of sea ice and observations by the Inuvialuit living in regions most affected by higher average annual temperatures.

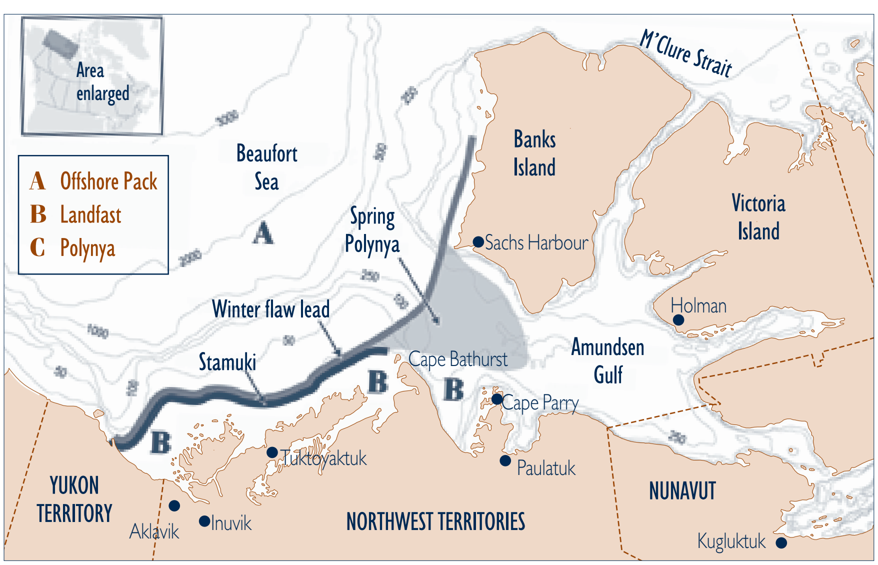
As science continues to refine and prioritize which aspects of the climate system should receive the most immediate and sustained scientific examination, policy makers and managers continue to develop approaches as to how to prepare for and how to adapt to climate variability and change. Throughout this process the matter of public opinion remains something that is more influenced by the "Chicken Little" scenario than informed decision making. This is due to complexities in the communication of scientific evidence of climate change and all the other vagaries of human decision-making.

WHY IS ARCTIC CLIMATE CHANGE SO IMPORTANT TO US?

The feedbacks we referred to above make the polar regions very sensitive to small changes in average annual air temperature. Although several have been identified, the sea ice-albedo feedback mechanism appears especially significant. As sea ice extent diminishes (particularly in spring and fall) more energy is transferred from the atmosphere to the ocean (and vice versa). This positive feedback enhances the regional atmospheric temperature, further reducing ice concentration (percent cover per unit area).

Recent evidence suggests that this response has in fact already begun. Between 1978 and 1998 the aerial extent of sea ice over the entire northern hemisphere was reduced by an annual average of 34,600 km^2 (Parkinson *et al.,* 1999). This reduction is spatially heterogeneous, and includes larger decreases in some locations (*e.g.,*

Mackenzie Shelf—Cape Bathurst Polynya



Chukchi and Laptav Seas) and slight increases in others (*e.g.,* Baffin Bay).

In the Canadian Arctic the observations of sea ice areal concentrations are regionally complex, with significant reductions in the western Arctic (*e.g.,* Barber *et al.,* 2003, Serreze *et al.,* 2003), an increase in sea ice in Baffin Bay, especially associated with the Northwater Polynya (Barber *et al.,* 2001), no systematic change in the Canadian Archipelago, and systematic reductions in Hudson Bay (Alt *et al.,* 2002 and Stirling *et al.,* 1999). The overall picture shows increasing concentrations in the Eastern Arctic, possibly from an increase in through-flow of ice from the central arctic into the arctic islands and Baffin Bay, with significant reductions in the Southern Beaufort Sea and Hudson Bay. This observed reduction in sea ice is linked directly to climate variability and change and provides compelling arguments that in fact the GCM community is correct in indicating that the first and strongest indicators of global warming will be felt in the polar regions.

Assessing the effects of present variability in sea ice cover on Arctic marine ecosystems and regional climate requires a substantial improvement in our understanding of the links between freshwater and sea ice, sea ice and climate, and sea ice and biogeochemical fluxes. Data is especially needed for the shallow coastal shelf regions (30% of the Arctic basin) where the extent, thickness and duration of sea ice is most variable and where Arctic marine food webs are most vulnerable to change.

The environmental, socio-economic and geopolitical consequences of an eventual sustained reduction of Arctic sea ice are bound to be tremendous: marine arctic ecosystems will be displaced, a new ocean will open to exploitation, climate warming may accelerate, global ocean circulation may be modified, and traditional use will change. Given our arctic responsibilities, and as one of the first countries to be affected, Canada should lead the growing international effort to study the Arctic Ocean. Toward that goal, the CASES Research Network was funded in March 2001 by the Natural Sciences and Engineering Research Council of Canada (NSERC) to conduct the Canadian Arctic Shelf Exchange Study (CASES), an international effort under Canadian leadership to understand the biogeochemical and ecological consequences of sea ice variability and change on the Mackenzie Shelf (cases.quebec-ocean.ulaval.ca).

A central aim of the CASES field program is to study the fall and winter pre-conditioning of the Mackenzie Shelf-Cape Bathurst Polynya ecosystem by the minimum fall and winter discharge of the Mackenzie River, and its spring and summer development in response to the intense freshet and the variable ice break-up. Because the area cannot be reached from southern ports until August when the ice retreats, the only practical way to achieve this is by overwintering the new Canadian research icebreaker (see *Meridian, Fall/Winter 2002*). A one-year overwintering will start in September 2003. A preparatory expedition to the study area in September–October 2002 moored current meters, CT profiles and sediment traps, deployed drifting buoys, and carried out ship-based biogeochemical sampling.

The ship and landfast ice camps will support the year-round sampling of the ocean-sea ice-atmosphere interface and associated shelf ecosystem. Ship-based sampling will be conducted along a series of across-shelf sampling transects adjusted seasonally with the expansion-reduction of the open water (navigable) area. Satellite remote sensing of the area will be extensive with real-time data received on the ship to assist field operations.

This field experiment is one in a series of Canadian and international initiatives to help scientists understand the complex interrelationships between climate change, sea ice and marine ecosystems using polynyas (areas of open water surrounded by sea ice where sea ice should exist). Although the goals of these projects are scientifically driven we have evolved an academic outreach program aimed at inspiring the next generation of arctic scientists and informing the Canadian public of the evidence for arctic climate change. The "Schools on Board" program will bring together northerners, public school students and scientists in an interactive examination of the evidence for, and adaptation to, arctic climate change.

SCHOOLS ON BOARD

Schools on Board is a national initiative designed to engage schools and communities in arctic marine science. This pilot program encourages high schools to include arctic science in their curricula, and offers them the opportunity to apply to send a student, a teacher, or both, to participate in an arctic field study. The program includes three components.

Schools on Board Network

Interested schools who implement an arctic science component to their curriculum will join the Schools on Board Network. This network is a communication tool that provides them with access to resources, contacts with scientists in the field, assistance in facilitating school presentations by Canadian Arctic researchers, and information about upcoming opportunities to participate in Arctic field programs led by recognized academic and government researchers.

Field Program

A team of secondary school and CEGEP students will be selected from across Canada to participate in one of the ongoing research programs on board the Canadian research icebreaker. Onboard programming will include fieldwork with graduate students, lectures from nationally and internationally recognized university and government scientists, group projects, and presentations. A northern community visit will introduce students to northern culture and knowledge – what has become known as *Inuit Qaujimajatuqangit* (see *Meridian, Spring/Summer 2003*). The educational program will introduce students to "two ways of knowing": the aboriginal and the scientific approaches to understanding the complexities of the Arctic marine environment. The cultural exchange between students from all parts of Canada will provide multiple perspectives to the program.

Schools on Board Student Forum

This forum will be either an actual or an online meeting, depending on budgets. Ideally, students will attend the science forum (a followup meeting of the research program), where they will share their experiences and thoughts on arctic environmental issues with scientists, stakeholders, and policy makers.

The objectives of Schools on Board are:

- to expand arctic sciences in high school curriculums across the country;
- to increase awareness of arctic climate change issues;
- to increase awareness of Canadian-led research projects;
- to introduce students to research design and implementation;
- to integrate students from coast-to-coast-to-coast in a unique educational life experience;
- to foster an appreciation for both scientific and aboriginal understanding of complex environmental issues;
- to foster the development of partnerships between high schools and research institutions (both academic and government); and
- to inspire the next generation of scientists.

2003–2004 Field Program

In 2003–2004, Schools on Board will launch its first field program as part of the CASES icebreaker over-wintering. CASES has provided 12 berths on the vessel, for two one-week sessions at the end of February and mid March, 2004. Students will be exposed to the science objectives and methods of scientific studies ranging from microbiology to climatology. Schools on Board is targeting schools that wish to expand their science program, and high school students interested in research who would like to experience arctic marine science in the field.

By linking science teachers to university and government researchers and their programs, Schools on Board hopes to generate an interest in the internationally recognized research activities of the Canadian scientists in the North, and offer students the opportunity to experience science at work in the field. The contacts and liaisons made through Schools on Board also have the potential to develop into long-lasting partnerships between public schools and Canadian university and government research groups. To paraphrase one member of School Division 59 in northern British Columbia: "The success of this program will be measured long after students return from the field. It will be measured in the increased awareness of the environmental issues impacting the Arctic, and the lasting relationships that evolve with research agencies, universities, sponsors and the media."

Collaboration between research teams, government agencies, and the public school network creates a winning situation for everyone involved by highlighting this country's premier research activities and offering unique experiences to the next generation of scientists and policymakers.

> *"The Arctic Ocean and the Arctic are changing rapidly because of climate warming. And yet, scientifically these regions still represent the least studied biotas on Earth. The demand for Arctic specialists will increase tremendously in the coming decades, and a central objective of research networks such as the Canadian Arctic Shelf Exchange Study (CASES) is to train the next generation of Canadian Arctic scientists. The Schools on Board program is an excellent way to make high school students aware of the possibility to develop an enriching career in a fascinating research field."*
>
> – Louis Fortier, CASES chief scientist

For more information contact Lucette Barber at lbarber@mts.net or visit our web site (cases.quebec-ocean.ulaval.ca/school.asp).

Lucette Barber is Project Manager for Schools on Board; David Barber is Canada Research Chair in Arctic System Science at the University of Manitoba. Martin Fortier is the scientific coordinator of CASES at Université Laval.

SERENDIPITY AND WHERE IT MIGHT LEAD: OPPORTUNITIES FOR STUDYING THE ARCTIC AND ANTARCTIC

Kathy Conlan

While going through our careers, I think we all become aware of how important contacts are in formulating the next step. Sometimes it is serendipity. Other times, one acts on advice. My life was changed this way.

HOW IT ALL BEGAN

When I graduated with a Masters degree in Marine Biology, I could get no more than low paying, short-term contracts. I gave up and went travelling with my husband, Glenn for a year. Then I was lucky to pick up work with Dr. Ed Bousfield at the Canadian Museum of Nature, a Crown Corporation in the Government of Canada. After five years of contracting, I secured a less tenuous "term" status. I had a foot in the door. Soon after, the director of the museum suggested that I upgrade my qualifications with a Ph.D at Carleton University in Ottawa, Canada. I was loath to do this as I had two small children. However, I figured that I had no choice but to agree, and it turned out to be easier than I expected. My husband's help was essential and by then, I had research experience under my belt. That training led to permanent job status and a fortuitous meeting with Dr. John Oliver.

During my doctoral studies, my adviser, Dr. Henry Howden, suggested that I spend time on the coasts of North America getting to know the behaviour of my study animals. While visiting Moss Landing Marine Laboratories in Monterey Bay, California, I met my colleague Peter Slattery, who invited me to participate in an Alaskan research trip the following year. On the cruise, I had the good fortune to meet the head of Moss Landing's benthic lab, John Oliver, who transformed my life. Having only known me for a week, John invited me to Antarctica, suggested an Arctic research program, and told me to "think big". As I soon discovered, Oliver inspires those around him with his vivacity, talent, and enthusiasm for science, and has likely changed the direction of more students than myself.

Oliver was not one to simply toss out suggestions. The following year, the Canadian Museum of Nature provided Oliver with funding for research in the Canadian High Arctic. With help from his students Rikk Kvitek and Hunter Lenihan, we established a collaborative research program that has run for nine years. The talents of Rikk Kvitek, Hunter Lenihan, and Stacy Kim of Moss Landing, and Steve Blasco of the Geological Survey of Canada were key to making our research a success. The following year, Oliver made good on his invitation to bring me down to Antarctica, and that resulted in eight more returns, with a new, three-year grant now in the offing.

Kathy Conlan. Photo: Gregg Leibert.

THE RIGHT DECISION

Research in the Arctic and Antarctic has been tremendously stimulating. It is physically demanding, because we do our work by scuba diving in ice-filled, sub-zero water. Yet, it has an exotic nature that the public finds captivating. The Office of Polar Programs in the National Science Foundation (NSF) supports US research in both the Arctic and Antarctic, and has generously supported my collaborations with my Moss Landing colleagues. Our Antarctic research has contributed to convincing the National Science Foundation to apply sewage treatment at McMurdo Station, Antarctica's largest base. Our Arctic research has shown that ice scour disturbance can have a positive influence on benthic diversity, and it has lead to an invitation from German colleagues to study the recolonization of ice scours in Antarctica.

Unlike other countries, Canada does not have a central polar research program. The Natural Sciences and Engineering Research Council of Canada, which funds Canadian university based science, reviews polar research proposals on equal basis with those aimed at warmer climates. However, costs for working in the Arctic have escalated considerably, with little added federal support. Canada also has no research base in Antarctica, but it encourages bipolar collaboration through the Canadian Arctic-Antarctic Exchange Program. Countries such as the United States, Germany, New Zealand, Australia, Britain, and Japan have dedicated huge resources to studying the Antarctic environment, and have interests in the Arctic as well. They invite foreign participation in their research programs, and this enables Canadians to conduct Antarctic or bipolar research. The study of climate warming is one of the draws, and there is now strong evidence that both the Antarctic Peninsula and the western Canadian Arctic are warming.

The Canadian Museum of Nature has been very supportive of my research and promotional activities, enabling me to study benthic communities in many systems, teach marine biology on the Atlantic and Pacific Coasts, and popularize my findings through the media and museum exhibits. The latter function, popularizing science, is essential for all scientists. More than once I have heard that if you cannot explain your research to the lay-person, you do not have it straight in your own mind.

POLAR AMBASSADOR

A consequence of my Antarctic work is that I have become an ambassador for the polar world. I am a member of the Canadian Committee for Antarctic Research, and I have become Canada's representative to the Biology Working Group on SCAR, the Scientific Committee on Antarctic Research. These committees offer a means to network, influence policy, and develop new science initiatives for the Antarctic. As a result of this involvement, Geoff Green and Angela Holmes, founders of Students on Ice, an organization that runs polar learning expeditions for teenagers, invited me to become a member of the education team. Students on Ice has introduced me to a new way of interpreting the polar world through the eyes of the young, and I have participated in some amazing trips both north and south.

CARPE DIEM

There is a certain draw to the Arctic and Antarctic that causes people to return again and again. It may be the immense feeling of wilderness and wide-open space. It may be the chance to be part of a different culture. It may be the unique research opportunities that the polar regions provide. It is a life-changing experience that you should seize if the opportunity arises. You have to work hard and take the initiative yourself, but sometimes you need a helping hand. I hope I've shown some ways to make that a reality for you. Look for, and listen to the John Olivers of the world, set a goal, and "think big".

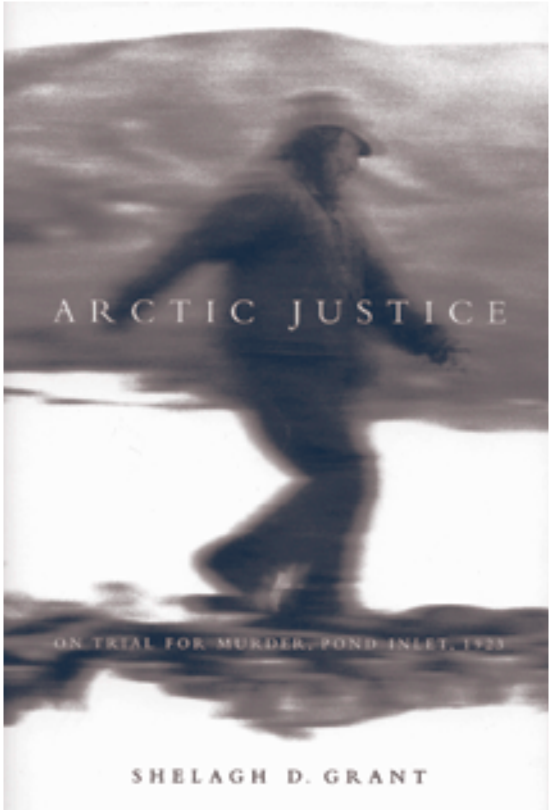
Kathy Conlan is a marine biologist with the Canadian Museum of Nature.

POLAR RESOURCES

With renewed interest in Arctic oil and gas development and recognition that the polar regions are early warning systems for climate warming, both foreign and Canadian researchers once again are focusing on the Arctic. Canadian universities that support research in the North have a network called the Association of Canadian Universities for Northern Studies (ACUNS) (uottawa.ca/associations/aucen-acuns). The Canadian Polar Commission is a useful source of polar information (polarcom.gc.ca). A new virtual circumpolar training facility, the University of the Arctic, is also being established (urova.fi/home/uarctic). Northern research grants are awarded by the Northern Research Institute (yukoncollege.yk.ca/programs/nri), the Churchill Northern Studies Centre (churchillmb.net/~cnsc), the Arctic Institute of North America (ucalgary.ca/aina), the Aurora Research Institute (aurresint.nt.ca), and the Nunavut Research Institute (pooka.nunanet.com/research). The federal logistical support facility for Arctic research is the Polar Continental Shelf Project (polar.nrcan.gc.ca), which is the best way for students to find out who's doing what in the eastern Canadian High Arctic.

BOOK REVIEW

Gordon Robertson



Arctic Justice: On Trial for Murder, Pond Inlet, 1923, by Sheilagh D. Grant. McGill-Queens University Press. xx 342 pages. ISBN 0-7735-2337-5.

Arctic Justice is a fascinating book for anyone interested in the Canadian North and especially in the problems that may arise in the relationship of Aboriginal people in Canada to the dominant society that has established the rules and customs under which they, as part of the total society, must live.

Professor Grant has told from the Inuit perspective the story of the death of a white trader, Robert Janes, in circumstances that appeared to be "murder" under Canadian law and values. In that perspective the "execution" of Janes by a group of Inuit could be seen as a reasonable action to protect the tiny social group at Pond Inlet that made life possible in the harsh environment in which they lived. Much of the Common Law, underlying the law of Canada, has its origins in English custom but our law had no place for aboriginal custom, however reasonable it might seem to the Inuit involved.

Canadian law and the administration of Canadian justice did not have room for the "execution" to be treated as something less than "murder", with the normal penalty of death. Counsel were provided at the trial for both the prosecution and the defence and both counsel were sympathetic to the three accused, Nuqallaq, Aatitaaq and Ululyarnaat. The defence counsel urged that Nuqallaq be acquitted. The prosecution recommended a conviction for manslaughter, the penalty for which was less than murder, and also informed the jury "that they could recommend the accuseds to the clemency of the court". The jury found Nuqallaq "guilty of manslaughter" but made no recommendation for clemency. Nuqallaq was then sentenced to ten years in Stony Mountain Penitentiary. Uluyarnaat was sentenced to two years of hard labour in "close confinement" at Pond Inlet. The charges against Aatitaaq were dropped.

Professor Grant attaches great importance, in the "unprecedented decision" to put the three Inuit on trial for murder, to "Canada's international political concerns for establishing sovereignty over the Arctic" – what she calls "the politics of Arctic sovereignty." This is not convincingly demonstrated. Her book is a sharp attack on the absence of any "effective occupation" of the Arctic Islands – or of much of the rest of the Canadian Arctic – by the Canada of that day. However, there was no direct challenge by any country to our claim to sovereignty over the Arctic Islands. Only Norway had a potential claim – to the Sverdrup Islands – on the basis of discovery once the United Kingdom passed to Canada in 1870 its title. Norway made no claim of sovereignty at any time and its potential claim was settled for a cash payment by Canada in 1930. Obviously, Norway was not actively seeking to establish sovereignty over any islands in the Canadian North.

Professor Grant's criticism of the inadequacy of Canadian administration in the Northwest Territories at the time of the Pond Inlet episode – and for many years after – is harsh but not unfair. She refers to it as the "triumvirate rule" by the Hudson's Bay Company, the RCMP and the churches, the "first phase in colonial occupation of Baffin Island". Canada had really no Arctic policy until the Second World War and the postwar period made our "state of absence of mind" clear to the St-Laurent government in 1948. Then, but only then, did Canada develop a policy that treated the North as part of Canada.

Self-government in the Northwest Territories and Nunavut has now put control of law and administration in the hands of the people – Aboriginal and other – but many of the aspects of adjustment to the new range of problems remain to be tackled effectively. Professor Grant's book, and its focus on differing social perspectives and the problems they can create, is important today and will be for many years to come, and not only in the North.

Gordon Robertson served as deputy minister of Northern Affairs and National Resources (1953–63) and as clerk of the Privy Council and Cabinet secretary (1963–75).

HORIZON

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International Polar Year 2007–2008

A number of Arctic and Antarctic science coordinating agencies and nations are planning an International Polar Year (IPY) for 2007–08, the 50th anniversary of the International Geophysical Year and the 125th anniversary of the first IPY. Through the Canadian Polar Commission, Canada has started discussion on national involvement in the IPY, although all questions of implementation and funding strategies remain to be addressed, The Commission is committed to consulting a wide range of stakeholders from all levels of government, university scholarship, aboriginal organizations, and non-governmental organizations. We encourage you to participate in the on-line forum at polarcom.gc.ca, or contact:

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