

Forty Years of *Arctic*: *The Journal of the Arctic Institute of North America*

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ABSTRACT. When the Arctic Institute of North America was established in 1945 as a membership institution, it was understood that the membership expected the Institute to publish a journal. It appeared for the first time in 1948, as *Arctic, The Journal of the Arctic Institute of North America*, and has been published continuously for 40 years since then. It is now a leading academic journal publishing research papers from a variety of disciplines on a wide range of subjects dealing with the Arctic. Over the 40 years it published 40 volumes comprising 1231 research papers and other related material. The present study reports a content analysis of the 1231 papers revealing that trends over the last 40 years of research in the North were guided by the economic and academic pressures of the day for northern research. The bulk of the papers in the 40 years involved three major areas: biological sciences, earth sciences and social sciences. The proportion of research papers in earth sciences showed a decline, accompanied by a strong growth in biological science papers and a modest growth in social science papers. Over the 40 years, subjects sited in the Canadian Arctic always dominated, with a steady growth from 23% of the total papers per volume to 42%. In particular, significant increases in the numbers of papers in the last 10 years came from resource-related work in the North, as well as from political, educational, cultural and sovereignty-related research. Research in the North leading to publication in *Arctic* was conducted largely by biologists and earth scientists. Canadian and American authors accounted for most of the papers, with the proportion being roughly equal. American authorship was nearly constant during the 40 years, while Canadian authorship increased slightly. Numbers of pages per volume and numbers of papers per volume increased over the 40 years to about 400 and 45 respectively. Papers became shorter during the 40 years, and the number of authors per paper increased steadily to 1.8 near the end of the period. Numbers of manuscripts received by *Arctic* increased steadily over the years, except for a hiatus associated with the move of the Institute from Montreal to Calgary. Acceptance rates declined slightly over the years to the present rate of 60%. Most of the authors appearing in *Arctic* wrote only a single paper; 14 wrote more than five papers in *Arctic*. *Arctic* appears to be a reasonably viable academic publication functioning as a unique multidisciplinary vehicle for a wide range of northern topics.

Key words: Arctic Institute of North America, *Arctic*, content analysis, trends, subject matter, location of study area, author's discipline, author's nationality

RÉSUMÉ. Quand l'Institut arctique de l'Amérique du Nord fut établi en 1945, en tant qu'organisme composé de membres, il était entendu que l'Institut devait publier un journal. Il parut pour la première fois en 1948 sous le nom de *Arctic, The Journal of the Arctic Institute of North America*, et il a été publié sans interruption depuis 40 ans. C'est maintenant un journal académique de premier plan, qui publie des articles de recherche dans diverses disciplines sur des sujets très variés se rapportant à l'Arctique. Au cours de ces 40 années, le journal a publié 40 volumes comprenant 1231 articles de recherche et d'autres documents connexes. La présente étude offre une analyse du contenu des 1231 articles, qui révèle qu'au cours des 40 dernières années, les sujets de recherche dans le Nord ont été influencés par les pressions économiques et académiques de l'heure. La majorité des articles publiés au cours de ces 40 ans couvrent trois domaines principaux: les sciences biologiques, les sciences de la terre et les sciences sociales. L'analyse montre une diminution de la proportion des articles de recherche sur les sciences de la terre, accompagnée d'une forte augmentation du nombre d'articles sur les sciences biologiques et d'une augmentation modeste de ceux sur les sciences sociales. Pendant ces 40 ans, les sujets situés dans l'Arctique canadien ont toujours dominé, avec une croissance soutenue de 23% à 42% des articles par volume. En particulier, l'augmentation importante du nombre d'articles dans les 10 dernières années est due aux travaux reliés aux ressources naturelles dans le Nord, ainsi qu'aux recherches sur les questions de politique, d'éducation, de culture et de souveraineté. La recherche dans le Nord qui a donné lieu à des publications dans *Arctic* a été menée en grande partie par des biologistes et des spécialistes en sciences de la terre. Les auteurs canadiens et américains ont été responsables de la majorité des articles, en proportions à peu près égales. Le nombre d'auteurs américains est resté presque constant au cours des 40 années, tandis que celui des auteurs canadiens a légèrement augmenté. Pendant la même période, le nombre de pages et le nombre d'articles par volume ont augmenté et ils atteignent maintenant respectivement environ 400 et 45. Les articles sont devenus plus courts durant ces 40 années, et le nombre d'auteurs par article s'est accru continuellement pour atteindre 1,8 vers la fin de cette période. Le nombre de manuscrits reçus par *Arctic* a augmenté de façon continue au cours des années, sauf lors d'une interruption causée par le déménagement de l'Institut de Montréal à Calgary. Le taux d'acceptation a diminué légèrement pendant cette période jusqu'au taux actuel de 60%. La plupart des auteurs ayant publié dans *Arctic* n'ont écrit qu'un seul article et 14 auteurs en ont écrit plus de 5. On peut considérer *Arctic* comme une publication viable car elle est un véhicule unique en son genre qui permet de faire circuler des informations multidisciplinaires sur un grand nombre de sujets reliés au Nord.

Mots clés: Institut arctique de l'Amérique du Nord, *Arctic*, analyse du contenu, tendances, sujet, emplacement de la zone d'étude, discipline de l'auteur, nationalité de l'auteur

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INTRODUCTION

The major publication of the Arctic Institute of North America is the journal *Arctic*; other publications include *Information North* and monographs in a technical paper series. *Arctic* is an academic journal with a regular peer review system and receives manuscripts submitted by researchers pursuing northern topics. It has been publishing for 40 years and is now running about 400 pages of text per year in four quarterly issues plus the occasional supplementary issue. Book reviews, letters to the editor, obituaries and special items, including "Arctic Profiles," make up the remainder of the text. The text of *Arctic* is presently made up largely of research papers, short papers and research notes.

Arctic was established by the Arctic Institute of North America in 1947, shortly after the Institute was founded in late 1945. As noted by Wilson (1948), Chairman of the Board of Governors of the Institute at the time, the journal was launched "as a means of communicating information about the Arctic and the activities of the Institute to all its members and to the wider public that may be interested in the ends of the earth."

The parliamentary act to found the Institute (Arctic Institute of North America Act, 1945) listed the objects of the Institute to be, in general:

- (a) to initiate, encourage, support and advance by financial grants or otherwise the objective study of arctic conditions and

problems, including such as pertain to the natural sciences, sciences generally and communication;

(b) to collect, arrange and preserve records and material relating to the arctic regions, and especially to such areas thereof as form part of or are contiguous to the Continent of North America;

(c) to make such records and material available for pure and applied scientific use by properly qualified individuals and organizations, including governmental agencies;

(d) to arrange for or to assist in the publication of reports, maps, charts and other documentary material relating to the arctic regions;

(e) establish and maintain close contact with other Arctic Institutes and organizations engaged in similar or related fields of study.

The act did not call specifically for a journal to be published, but it was surely in the minds of the founding fathers to publish a journal.

Charter membership in the Institute numbered 1204 in May 1948 (Arctic Institute of North America, 1948), and the Institute was able to report on its 20th anniversary (Reed, 1966) that *Arctic* was "published quarterly and had a circulation of about 2400 in 31 countries. . . ." The Arctic Institute set out strongly to fulfill its objectives by supporting northern work and by establishing a major northern library. Its grants in aid were used by many faculty and students for conducting northern studies, and the results of these studies in due course appeared in the pages of *Arctic*. Leadership was given to the Institute by a succession of executive directors, as listed in Table 1. During the same time the position of editor was held by an equal number, as listed in Table 2. It is important to note that both the executive directors and the editors of *Arctic* were drawn from a wide variety of disciplines. The executive directors brought a

TABLE 1. Executive directors of the Arctic Institute of North America, 1945-present

	Time span	Discipline
A.L. Washburn	1945-51	geomorphology, Quaternary geology
R.C. Wallace	1952-54	geology
T.H. Manning	1954-55	mammology, ornithology
A.T. Belcher	1957-60	RCMP, Arctic
John C. Reed	1960-67	geology
H.W. Love	1968-75	engineering
Robert C. Faylor	1975-77	engineering
John S. Tener	1977-79	biology
Peter Schledermann	1980-86	archaeology
Michael P. Robinson	1986-	law, anthropology

TABLE 2. Editors of *Arctic*

	Volume (issue)	Years	Discipline
Trevor Lloyd	1(1)-2(3)	1948-49	geography
Diana Rowley	3(1)-8(4)	1950-55	geography
Anna V. Moffat	9(1/2)	1956	(editor)
Paul F. Bruggemann	9(3)-17(4)	1956-64	engineering
A.P.B. Monson	18(1)-27(1)	1965-74	journalism, library science
M.V. Hambly	27(2)-31(1)	1974-78	science, technology, economic geography
James B. Cragg	31(2)-32(2)	1978-79	biology
Leonard V. Hills	31(2)-35(4)	1978-82	geology
Claudette Reed Upton	36(1)-38(1)	1983-85	English
Gordon W. Hodgson	38(2)-	1985-	chemistry

good deal of leadership to the Institute and some of the editors achieved recognition as scholars in their own right, as indicated, for example, by several of them being listed in *American Men and Women of Science* over the years.

Arctic was the journal of a society that began with a substantial membership of scientists and scholars dedicated to northern research. While they came together from a wide variety of disciplines, there was a common compelling interest in the challenges of the North that unified them. The Arctic Institute was not the only society for professional researchers; in fact it was only one of many at the time. The traditional professional society of the late forties was a gathering of scholars in a particular discipline, for example, in the field or profession of chemistry. Thus the American Chemical Society was established in its day to promote the study of chemistry and the interests of chemists. In due course it established the *Journal of the American Chemical Society*. So, also, physicists came together in their society, as did virtually all other disciplinary groupings.

It was at this point that the Arctic Institute and most other professional societies parted company. Chemists, and all other professional groupings, moved to greater and greater specialization, and this was expressed in a proliferation of specialized journals. Thus, the American Chemical Society established specialty journals, for example, the *Journal of Analytical Chemistry*, the *Journal of Physical Chemistry*, the *Journal of Environmental Science and Technology* and many others over the years, each responding to another field of specialization.

The Arctic Institute, on the other hand, took a stand, either implicitly or explicitly, against specialization, and *Arctic* itself expanded to embrace broadening interests developing in the North, rather than fragmenting into a variety of different and apparently unrelated disciplines and subdisciplines. While doing so, it retained its objective of publishing primary research. Thus, it developed into a multidisciplinary research journal. Clearly, it was running against the tide, and while the Arctic Institute suffered some kind of identity crisis during the latter part of the 40 years, the journal continued and prospered during the entire period.

Arctic of course was only one of a number of northern journals, as indicated in Table 3, but it was predated only by the *Polar Record*, founded in 1931 and published by the Scott Polar Research Institute.

The objective of the present communication was to look back over the four decades of the journal in an effort to assess how the journal developed and grew over that time and how it reflected the science and scholarship of northern topics. The focus of the study was the content of the research papers in the journal. Fiscal considerations were deemed to be outside the present study, but it might be noted that the journal has been only a minor burden on the Institute, with membership dues, subscription fees, publication grants (Natural Science and Engineering Research Council and, lately, Social Science and Humanities Research Council) and page charges providing the bulk of the funds required to cover editorial and publication costs.

METHOD

It seemed reasonable to approach the analysis of the content of *Arctic* in two ways: one, a standard, objective, technical approach of subdividing the subject field and counting the components, measuring them and comparing them, generally

TABLE 3. Principal journals publishing academic papers on arctic subjects

Journal	Institution	Country	Year established	Issues per year	Pages per year	Content
<i>Arctic</i>	Arctic Institute of North America	Canada	1948	4	400	academic, general
<i>Arctic and Alpine Research</i>	University of Colorado	United States	1969	4	460	academic, general
<i>Arctic Anthropology</i>	University of Arkansas	United States	1962	2	350	academic, specializing in anthropology, archaeology
<i>Holarctic Ecology</i>	Nordic Society Oikos	Norway	1978	4	420	academic, specializing in ecology
<i>Musk-ox</i>	Institute for Northern Studies, University of Saskatchewan	Canada	1967	2	200	academic, general
<i>North</i>	Department of Indian and Northern Affairs	Canada	1953	4	250	popular, general
<i>Oikos</i>	Nordic Society Oikos	Sweden	1950	9	900	academic, general
<i>Polar Geography and Geology</i>	American Geographical Society/ National Science Foundation	United States	1977	4	360	academic, specializing in geography, geology
<i>Polar News</i>	Japan Polar Research Association	Japan	1965	2	120	academic, general
<i>Polar Record</i>	Scott Polar Research Institute	United Kingdom	1931	3	320	academic, general

attempting to synthesize a coherent understanding from the data so gathered of the role and function of the journal over the years. The other approach was to be more subjective, to place the analysis against a general chronology of events in the 40 years, and to see to what extent the material in the journal reflected the events of the day or, at least, the events of the decade. Clearly, the scientific, technical, political and social climate of the North changed substantially over the 40 years, and the content of the multidisciplinary journal *Arctic* would be expected to mirror those changes.

Content analysis is a technical specialty designed to provide a framework for objective and systematic analysis of communications, "a highly developed special purpose technique used by experts, and it is generally found largely within the disciplines of communications, political science, psychology and social anthropology" (Carney, 1979). While some observers feel that content analysis is most useful in ferreting out hidden meanings and between-the-lines understanding, it was felt to be useful in the present study, where hidden meanings were of little concern, as a way of simply organizing the content evaluation in a systematic way.

In the present study it was deemed important to look at the nature of the research papers and also at the discipline and nationality of the authors. This would give a picture of the subject material and the people who worked on it. It was important to give an account of editorial details, indicating both the way the journal grew over the years and the way material came together in terms of page counts and author counts.

Subject matter was dealt with in terms of topic and location of study area. Editorial characteristics evaluated were numbers of pages per paper, number of pages per volume (one-year span of four issues), number of papers per volume and number of pages per paper. All topics were followed for the 40 volumes of *Arctic*, which comprised 1231 research papers. An immediate objective was to follow changes in all characteristics as a function of time — a search for temporal trends.

Care was taken to meet the three main requirements of objectivity, a systematic approach and generality set out by Holsti (1969), Krippendorff (1980) and Rosengren (1981). An attempt was made, therefore, to maintain an objective perspective while considering the data through formulating and adhering to a systematic approach. First, the basic topics as outlined above were defined as the foci of attention. Second, a system of coding was established. The unit of data collection was the

individual research paper in *Arctic*, and the system of enumeration was a count of number of papers in each category per volume.

To explore each topic dealing with subject matter, location of study area and so forth, categories were established to provide comprehensive descriptions. Thus, each paper was examined and described in terms of a number of characteristics, including subject matter, location, author discipline and so on. Categories were chosen to be both exhaustive and mutually exclusive (Holsti, 1969; Krippendorff, 1980). To maintain a systematic approach, the set of categories was determined prior to analysis of the complete data set. This was accomplished through a pretest examination of a small number of *Arctic* papers and was modified during the actual analysis as the need arose. Corrections were made to the earlier coding when modifications were introduced during the analysis. The general trend of the modifications was to insure that all subjects, nationalities and so forth were represented, while at the same time minimizing the problem of an unwieldy number of categories.

While the categorization indicated in Table 4 developed naturally, a problem arose when a particular datum (i.e., research paper) spanned more than one category. For example, in relation to subject matter, some papers encompassed more than one category, such as biology, archaeology and geology (three distinct categories). The question facing the coder was which one to assign the paper to? One solution would have been to weight each paper out of a total of 1.0 and assign a fractional value to each subject, say a third each, or more precisely, weighting based on the indicated balance within the paper, for example, 20%, 30% and 50%. Such an approach, however, was too complex for the present study, and an alternative pathway was followed of assigning subject by the most prominent descriptor. Thus, if it appeared in a given paper that biology was the dominant descriptor, the paper was listed under the category biology. On other occasions, when a dominant descriptor was very difficult to assign because of multiple and approximately equally stressed subjects, a general category was assigned.

In dealing with multiple authorship, a similar difficulty was encountered in the case of author's discipline and nationality. Again, while a weighting approach based on seniority and number of authors could have been used, to do so would have been very difficult. Instead, attention was focused on the senior author (the first listed), and it was the discipline and nationality of this person that was recorded in constructing the database in

TABLE 4. Categories used in constructing the database

1. Subject matter	earth sciences: geology and geophysics; physical geography; oceanography and limnology biological sciences: botany and zoology; ecology, agriculture and horticulture resource management: non-renewable; renewable social sciences: anthropology and archaeology; sociology; human geography and demography; history and exploration; economic growth and development politics: political evolution; sovereignty assertion defence research: military activities general and other
2. Location of study area	Arctic (general) Alaska Canadian Arctic: Yukon, Northwest Territories, Canadian Arctic Islands waters, Hudson and James bays Canadian provinces Greenland Arctic Ocean northern seas: Bering Sea, Chukchi Sea, Beaufort Sea, Labrador Sea, Davis Strait, Baffin Bay, Norwegian Sea, Greenland Sea, Barents Sea, White Sea, Kara Sea, Laptev Sea, East Siberian Sea, Sea of Okhotsk, North Pacific, North Atlantic no geographic orientation and other: Scandinavia, U.S.S.R., Antarctica
3. Senior author's discipline	earth sciences: geology and geophysics; geography; oceanography and limnology biological sciences: botany and zoology; ecology, agriculture and horticulture; forestry, fish and wildlife management; environmental studies arctic studies social sciences: psychology and sociology; anthropology and archaeology; economics; history, classics and exploration political science defence research other: chemistry; physics; medicine; engineering; archival, library and information science; law; literature, art and music; journalism
4. Senior author's nationality	Canada United States Denmark United Kingdom other

the content study. Even then, difficulty was encountered in determining discipline and nationality in some cases. In such cases, "best-guess" estimates were made by the authors of the present study.

Such estimates brought to the fore a potential problem involving the objectivity of the persons coding the data (Krippendorff, 1980). Ideally, two or more coders should have independently evaluated the manuscripts in order to reduce the possibility of coder bias. In an ideal situation, each coder should be totally objective and rigidly systematic to achieve a high degree of consistency. This is particularly important when content analysis involves latent messages or implied meanings in material of complex significance, for example, in political statements. In the present study, this was not an important consideration since much of the material was reasonably objective: for example, "This paper was written by an American geologist studying glaciers in the Alaskan range," a straightforward, objective reporting of the obvious, rather than "This paper was written by

a retired military person dealing with the use of submarines for transport in arctic waters," in which case the discipline, purpose and location would have been difficult to assign. Clearly, a reliable study must be able to withstand tests of stability and reproducibility (Krippendorff, 1980). In other words, reanalyzing the data should give the same results, either from a single coder or multiple coders.

In the present case, the coder was reasonably familiar with multidisciplinary research. While there was some possibility that personal bias or personal lack of appreciation of the finer points of disciplinary distinction may have been present, the nature of the basic data was such that little effect would have resulted from such imperfections. Still, total objectivity is an elusive target.

Finally, care was taken that the study had a good appreciation of external validity. This is a measure of the relevance of the findings to real phenomena: does the study adequately and accurately address the original questions? For example, in the matter of location, are the categories relevant and useful in defining the designation of study location? Was it reasonable to separate northern seas from the Arctic Ocean and subdivide the seas into Bering Sea, Chukchi Sea, Beaufort Sea and so on? While reference to earlier work is important in this regard, care must be taken to avoid the introduction of biases from that work in the current study, thus reducing reliability (Krippendorff, 1980; Holsi, 1969). In the present study, the selection of locational boundaries was obviously based on earlier divisions (R. Goodwin, pers. comm. 1987) but the actual design of boundaries was made in the belief that they best suited the objectives of the present study in an attempt to balance validity and reliability.

On the other hand, there is always potential conflict between theorists and pragmatists in this kind of analysis. The theorists tend to introduce more and more control to achieve objectivity, while the pragmatists rely more and more on good judgement and professional intuition. Thus, the analyst who insists on statistical reliability can often obscure the obvious, while the person running on natural wisdom can often prove his/her preconceptions. Analysts in the present study tried to steer a course between the two extremes.

The present analysis of the content of *Arctic* over its 40-year life began with the construction of a detailed database through the examination of each research paper in the 40 volumes of the journal. Most of the papers were full-length research papers, but short papers and notes were included also if they were deemed to be reports of research activities. A total of 1231 papers was included, and each paper gave rise to a single database record with a number of fields, including title, author(s), volume number, issue number, initial page, final page, number of pages, number of authors, discipline and nationality of the senior author, location of the study area, subject matter and, finally, key words (for index of key words see Appendix 1) as chosen by the authors of each paper and printed as such in the papers. In the earlier volumes where no key words were provided, the authors of the present study formulated suitable key words. In all, this provided a database of 1231 records with data in 13 fields lodged in a personal computer (Macintosh SE).

All papers from volumes 1-40 were included, including issues 3 and 4 of volume 40 (September and December 1987), even though they were still in press. Relevant data were available for these two issues, however, and they were included (even for this paper) in the overall analysis.

RESULTS AND DISCUSSION

The results of the content analysis are best examined in two groupings: one dealing with the major study characteristics, and the other dealing with the characteristics of publication, separated by a short section dealing with a selected key word analysis to explore further the effects of recent industrial and cultural activity in the North.

Subject Matter

Figure 1 shows the distribution of subject matter as a proportion or percentage of the whole. To smooth variations occurring from year to year, the data are presented as running five-year averages, with the first set of data points referring to the first five volumes of *Arctic*. In this way, the second set of data points refers to the averages for volumes 2-6, and so on, to the end of the publication period at the end of volume 40.

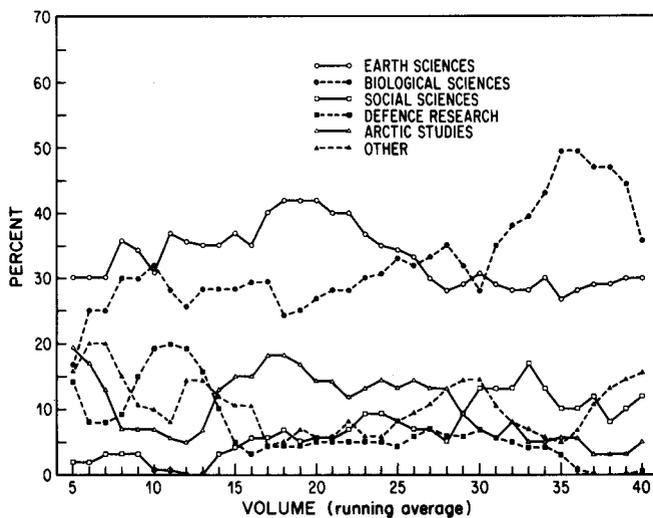


FIG. 1. Distribution of papers in *Arctic* by subject matter as percentages of the total. To smooth the year-to-year variations, data are presented in the form of 5-year running averages.

The bulk of the editorial content of *Arctic* over the 40 years was accounted for by papers in the earth sciences, biological sciences and social sciences. During part of the period they were evenly split, i.e., during the very early years (up to volume 7), during the period for running averages ending volumes 29-33, and finally at the end of the 40 years. After the second period, papers in the biological sciences dominated. Between the first two periods of approximately equal distribution, papers in the earth sciences dominated, reaching 60% of the total in the running average ending with volume 14 (1961). The earth science proportion declined from this point onwards, falling to a running average value of only 23% of the total papers published at the end of the 40-year period.

The early papers in biological sciences focused on classical wildlife studies, whereas in later years ecological matters came to the fore as a result of increased human contact with wildlife in northern regions, which served to increase the proportion of papers in the biological sciences in relation to the total. In this way, the early proportion of about 20% for biological papers rose to about 45% at the end of the 40-year period. While there may be some connection between the discipline of the editor and

the disciplinary focus of the journal, such correlation — if any — was not great.

Papers in the earth sciences showed a very different pattern, with a strong increase in proportion of the total *Arctic* papers in the first 15 years of publication. The most dramatic increase within the earth sciences lay with geology and geophysics during this period. Physical geography also contributed to the rapid growth at the same time.

During the next 20 years there was a steady decline in proportion for earth science papers but not in absolute numbers; the absolute numbers of papers per volume remained virtually constant during this period. The decline in proportion was due to a steady increase in ecological papers and, to a lesser extent, anthropology and archaeology papers.

Papers in the social sciences showed an overall increase from 22 to 29% over the 40-year period. An initial increase from 22 to 26% was followed by a decline to 13% in the running average period ending with volume 14. From that point on (1961), papers in the social sciences gained in proportion to the total, from 13 to 29% at the end of the 40-year period. The reason for the early popularity of the social sciences is not clear, but it may be related to the fact that most of those social science papers dealt with history and exploration. The general gain after the early 1960s' slump may be generally attributed to increased attention to other components of the general classification of social sciences, particularly to anthropology and archaeology, as well as to subjects resulting from new economic growth and development in the North.

Minor classifications included resource management, politics and defence research. Resource management (including both renewable and non-renewable resources) showed an increase from virtually nothing to about 6% in the second 20 years. This agrees well with increased interest in development matters in that period and aligns well with increased interest in ecological topics during that time. There was very little distinction between numbers of non-renewable and renewable resource management papers.

Papers on defence research maintained low proportions (never exceeding 1%) throughout the entire 40-year period, after an initial period in which they accounted for about 3% of the total research papers. The initial period was undoubtedly due to research flowing from wartime investigations in the North.

Papers involving political issues started at 3% and fell off to virtually nothing until volume 24 was reached, at which point a mild increase to 2% occurred for the next 10 years, after which a decline to zero occurred. This appears to be related to attention that was being paid by the federal government to northern matters leading to political devolution as a result of increasing political awareness on the part of native people in the North. It may also have been related to the passage of the *Manhattan* through the Northwest Passage in 1969, bringing to the fore the question of arctic sovereignty. Transfer from Ottawa to Yellowknife of authority for the Eastern and High Arctic took place in 1970.

A final increase in proportion to 4% for political papers in the last few years took place as a result of increased awareness of sovereignty problems precipitated by the passage of the *Polar Sea* in 1985.

"General and other" papers in Figure 1 include wide-ranging papers for the most part, e.g., the "Geological Survey in Alaska: Field season of 1949"; the "other" sub-category includes very specialized topics, e.g., linguistics.

Location of Study Area

Figure 2 breaks down the papers appearing in *Arctic* by location. Eight general areas are accounted for, covering the entire northern polar region of the earth. Of the 1231 papers included in the study, about 57 were related to non-arctic regions and dealt with alpine, Antarctic, South American and American Midwest locations.

Papers on the Canadian Arctic accounted for the largest proportion of the total throughout the 40 years. During this period the proportion increased steadily, from about 23 to 42%. The grouping of papers in the Canadian Arctic comprised two subgroups — Yukon Territory and the Northwest Territories. The latter was further subdivided into the District of Mackenzie, District of Keewatin, Hudson Bay (including James Bay), District of Franklin and the Canadian Arctic Islands waters. The District of Franklin (comprising the Arctic Islands for the most part) saw most of the research activity throughout the 40-year period, accounting for about half of the Canadian Arctic total. Conversely, the District of Keewatin had relatively little research activity. The District of Mackenzie and Yukon each constituted about 15% of the Canadian total.

An abundance of wildlife and exposed geology in the Arctic Islands undoubtedly attracted northern researchers and led to the establishment of a number of research stations in the High Arctic. As a result, over the years a good deal of research was conducted in the islands, creating an abundance of publications relating to those areas.

Over the first 30 years of the publication of *Arctic*, research papers relating to Alaska represented about 20-25% of the total (a low of 18% and a high of 30% in the running averages). In the last few years the proportion fell off noticeably, to about 13-14%. This fall was apparently due to a decline in funding for North Slope studies following a strong surge of funding in the late seventies.

Greenland was the focus of more than 15% of the papers of *Arctic* in the first 5 years and fell to about 5% and remained at that level throughout the subsequent volumes. Research interest in the early years related to post-war publication of military-

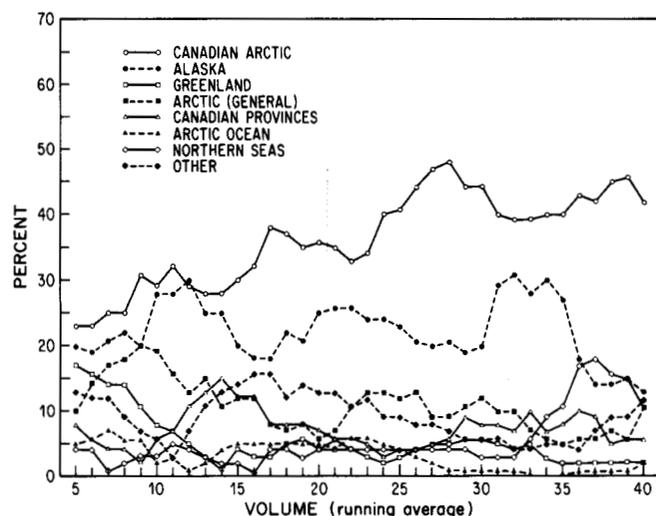


FIG. 2. Distribution of papers in *Arctic* by location of study area as percentages of the total. To smooth year-to-year variations, data are presented in the form of 5-year running averages.

initiated studies conducted during and immediately after World War II, when Greenland became open to international contact. Home rule was instituted in 1979, but this was not reflected in increased Greenland research publications in *Arctic*, perhaps instead by a decrease.

Research sited in Canadian provinces, i.e., in the northern boreal forest for the most part, generally accounted for about 5-10% of the papers in *Arctic* during the 40-year period. A diffuse peak in the period 1957-64 might be attributed to increased interest in those areas occasioned by the establishment of the DEW Line and associated radar lines, as well as to major funding for a program for pinpointing mineral wealth in the Canadian Shield.

The Arctic Ocean was featured in about 5% of the *Arctic* papers until volume 26, after which it declined to about 1% to the present. The basis for the research interest before 1976 included a general attraction to studies dealing with the ocean floor surface. Work on the Arctic Ocean surely continued at a level higher than indicated by the publication density in *Arctic*, leading to the conclusion that either the results of the work were not published or they were published in some other, probably more specialized, vehicle.

Northern seas (coastal seas surrounding the Arctic Ocean, including, for example, the Beaufort Sea) varied between 1 and 5% throughout the first 32 years, after which a substantial increase to 18% of the total took place, followed by a decline to an 11% running average at the end of the 40-year period. This substantial increase in papers relating to the northern seas during the late seventies was associated with an increase in oil and gas exploration in the Beaufort Sea. So, also, the drop-off in the mid-eighties was due to the energy industry recession at that time.

Papers classed as "arctic general" (including those dealing with areas encompassing a wide geographic range within the Arctic, for example, the North American Arctic in general) experienced an overall net decrease from about 15 to 5% of the total papers in *Arctic*. This reflects a tendency toward more specialized study localities as opposed to wide-ranging topics over that period.

Finally, the "other" category includes studies with no geographic orientation and studies in areas outside of the Arctic (for example, Antarctica, South America, the American Midwest and alpine regions). The "other" category accounted for a significant number of papers (about 5-15%), particularly in the early years.

The results of the key word analysis are helpful in extending the understanding of more specific topics and subtopics. The choice of topics searched was based upon a conception of more popular subjects during the 40-year period. Table 5 shows three classes of these popular subjects grouped by their change in publication frequency over time. Two calculations were made: publication frequency of papers per volume over the entire 40-year period, and publication frequency over the final decade. Class A includes those popular subjects with little or no frequency change; Class B includes those subjects showing a significant increase in publication frequency in the last ten years; and Class C gives those subjects showing a significant decrease in frequency. In order to qualify for a significant increase or decrease in the final decade, publication frequency had to have changed from the 40-year average by a factor of at least two or one-half respectively.

Class A study area locations include Greenland, District of

TABLE 5. Key word search for papers published in *Arctic* ordered by frequency of occurrence and grouped in three classes of change with time, presented in terms of average numbers of papers per volume

Key word	Papers per volume	
	40-year average	1977-87 average
Class A: Key words of manuscripts with little or no frequency change with time		
glaci (e.g., glacier, glaciology, glaciation)	1.47	1.00
Greenland	1.25	1.00
Eskimo	0.98	1.00
development	0.95	1.60
Mackenzie	0.88	1.40
birds	0.85	1.30
U.S.S.R.	0.68	0.90
sea ice	0.55	0.50
mammal	0.42	0.70
Hudson Bay	0.42	0.70
region	0.40	0.30
native	0.38	0.40
James Bay	0.28	0.30
ice shelf	0.28	0.40
resources	0.25	0.40
Class B: Significant increase in publication frequency in last ten years		
Beaufort	0.75	2.50
caribou	0.75	2.10
oil	0.75	2.00
whale	0.68	2.20
Yukon	0.65	1.30
bear	0.60	1.30
ecology	0.58	2.00
culture	0.48	1.00
environment	0.40	0.90
muskoxen	0.40	0.80
community	0.33	0.90
social	0.30	0.80
economic	0.30	0.60
fish	0.28	0.60
Mackenzie River	0.22	0.60
politics	0.20	0.50
petroleum	0.18	0.70
Inuit	0.18	0.70
pipeline	0.15	0.30
ecology and petroleum	0.12	0.50
transportation	0.12	0.30
sovereignty	0.10	0.30
education	0.10	0.20
pack ice	0.08	0.30
military	0.05	0.10
Class C: Significant decrease in publication frequency in last ten years		
exploration	0.50	0.10
ice island	0.35	0.05
District of Mackenzie	0.10	0
lemmings	0.10	0
defence policy	0.05	0

Mackenzie, U.S.S.R., Hudson Bay and James Bay, indicating a stable and continuing interest in these areas over 40 years. In the same class were a number of subtopics dealing with ice, native and development issues, mammals and birds. These key words clearly relate to subjects and locations little affected by resource activities in the seventies and eighties.

Class B, indicating an increase in publication frequency, includes a number of subtopics reflecting resource development and socio-political changes in the North in the last decade or so. Thus, activities that began in the early seventies in the Canadian Arctic (as revealed in the chronology of current events in Appendix 2) were reflected by substantial increases in publication frequency in *Arctic* in the late seventies and eighties. Table

5 presents the analysis for only a limited number of key words, but it is obvious that a variety of other key words would show the same effect of burgeoning arctic interest in the last 15 years.

It is interesting to note that the term Inuit increased significantly in publication frequency in the last 10 years, presumably because it is now the preferred term for natives indigenous to the Eastern Arctic. However, the older term, Eskimo, failed to show a significant decrease in publication frequency, as might have been expected, and remained in the no-change Class A grouping above. This may be due to a significant number of "native" papers from Alaska in the last few years or to a general insensitivity about nomenclature.

Class C subtopics — those decreasing in publication frequency in the last 10 years — were few. The term exploration refers to historical exploration, as in Franklin exploration. "Ice island" refers specifically to the ice island-based research of the fifties. Similarly, a fascination with lemmings in the fifties and early sixties caused a higher publication frequency of this subject at that time.

Discipline of Senior Author

Figure 3 shows the discipline of senior authors through the 40 volumes of *Arctic*. Papers whose senior author was in the earth sciences (for example, as identified with a department of geology within a particular institution) accounted for about 30% of the total papers at the beginning of the 40-year period, rose to about 42% at about volume 20 and then declined to 30% in the final years. This indicates a strong base in earth science research throughout the 40-year period.

Papers from researchers in the biological sciences increased significantly, from 15-20% in the early years to 45-50% at the end of the four decades. The increase in the last decade was clearly due to the increase in environmental awareness and ecological concerns associated with northern resource development.

Authors in arctic studies (those associated with specific arctic institutes but not with a particular department or discipline, for example, with the Scott Polar Research Institute) accounted for about 10-12% of the papers, decreasing generally in later years.

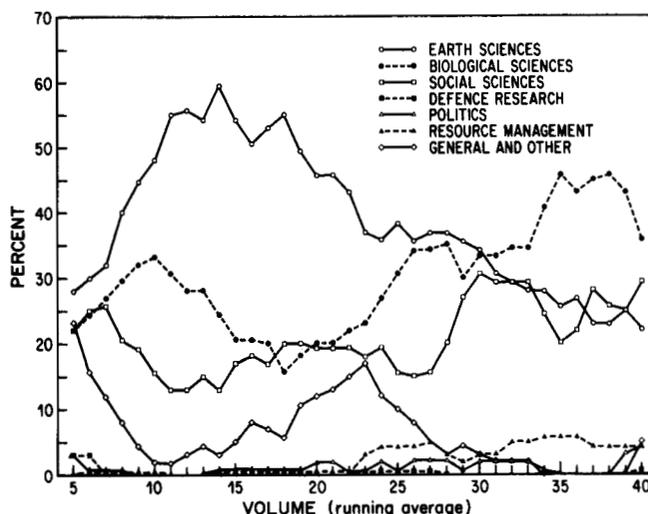


FIG. 3. Distribution of papers in *Arctic* by discipline of senior author as percentages of the total. To smooth year-to-year variations, data are presented in the form of 5-year running averages.

Authors involved in defence research (identified by their association with a defence establishment) wrote about 6% of the papers in *Arctic* over the 40-year period, with the exception of the Cold War period of the fifties, during which the defence research proportion reached 20% of the total. Further, in the last few years authors associated with defence establishments have declined to virtually nothing in *Arctic*. This decline may be attributed to a tendency for such people to publish in more specialized journals, for example, those dealing with strategic studies.

Contributions of social scientists increased from about 2% at the start of the 40-year period to 15% in the last decade. The heightened interest in the last decade was caused by a greater awareness of cultural and social affairs during the search for natural resources at that time. It is interesting that papers in the social sciences increased to nearly 30% of the total papers in *Arctic* at the end of the 40-year period, but the senior authors recognized as social scientists rose only to about 12% of the total authors. This seems to indicate that some of the social papers were written by author groupings where the senior author was not a social scientist.

Authors of "other" disciplines include chemistry, physics, medicine, engineering, information sciences, law, literature, art, music, journalism and religion. Papers by such writers maintained a fairly constant proportion, varying between 5 and 20% throughout the four decades. This was a non-negligible proportion of the papers in *Arctic* and therefore represents the wide array of disciplines included.

Nationality of Senior Authors

Figure 4 shows the nationality of authors (as inferred from location of employment) through the 40 volumes of *Arctic*. Two nationalities dominate the scene, American and Canadian, with roughly equal numbers of papers in a mirror-image pattern. In

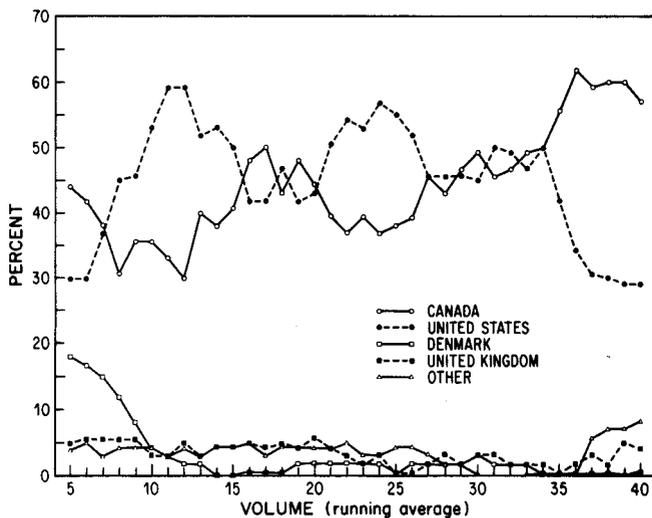


FIG. 4. Distribution of papers in *Arctic* by nationality of senior author as percentages of the total. To smooth year-to-year variations, data are presented in the form of 5-year running averages.

general they each account for about 45% of the papers. Canadian authors tend to show a slight increase during the 40 years, while Americans remain nearly constant.

Danish authors declined from an initial high of 18% to approximately 2% by volume 12, after which time this level was maintained. This initial high level of Danish authors was due to Danish research in Greenland precipitated by new interest in Greenlandic affairs in the post-war period.

British researchers maintained a constant portion of about 5% throughout the entire 40-year period.

Finally, "other" includes Norwegian, Swedish, Finnish, Icelandic, Soviet, French, German and still others, including one Venezuelan. These writers constituted a constant 5% proportion through the first three decades. During the first half of the fourth decade there were virtually no authors in the "other" category. However, in the final four volumes the numbers of papers by "other" authors increased sharply, to 7% in the running average, largely because of a substantial number of papers in volume 37 devoted entirely to "Unveiling the Arctic" written by an unusually wide variety of scholars.

Editorial Details

Figure 5 shows a number of characteristics describing the editorial details of the papers in *Arctic* over the 40 years. The foci of interest were number of authors per paper, number of pages per paper, number of papers per volume and number of pages per volume. It is important to note that the format of *Arctic* was changed in 1981 (volume 34) from a small to large size, i.e., from about 600 words per page to 900.

A steady increase marked the number of authors per paper. At the beginning of the 40-year period, authorship figures showed 1.15 authors per paper, increasing to 1.80 authors per paper by the end of the 40 years. This reflects a universal trend toward increased cooperative research over time in all fields. This appears to be a common trend in scientific publications, as noted, for example, by Satyanarayana (1987) for a journal of medical research where the increase in authors per paper over a 40-year period was from 1.87 to 3.65.

The number of pages per paper showed an overall decrease, from 11 in the earlier volumes to 8 in the final volumes. Such a decrease seems to be general, as noted again by Satyanarayana (1987), who reports a change from 13.21 to 5.67 for the medical journal. An early increase in pages per paper in *Arctic* was due to a special issue in volume 7 entitled "Arctic Research." Similarly, volume 33 contained the special issue "Eskimo Archaeology," causing an increase in the running average for pages per paper late in the 40-year period. The change in page size in volume 34 appears to have little effect on the number of pages per paper.

The number of pages per volume increased from about 200 at the beginning to approximately 400 in the final volumes. This increase was not regular. An initial slow increase throughout the first three decades was followed by a sharp increase of 200 pages per volume between volumes 31 and 34. This is not what would be expected, because with the change to larger format in volume 34, the number of pages per volume should have decreased. However, it increased. The reason for the increase may lie in the fact that a special issue on archaeology occurred in volume 33, with 800 pages, and was followed by volume 34, with 400 pages.

Papers per volume increased from about 15 to 45 over the 40-year period. The increase was reasonably steady except for a depression early in the second decade and another early in the fourth decade. The reason for the first depression is not clear, but the second may be related to the Arctic Institute's move from

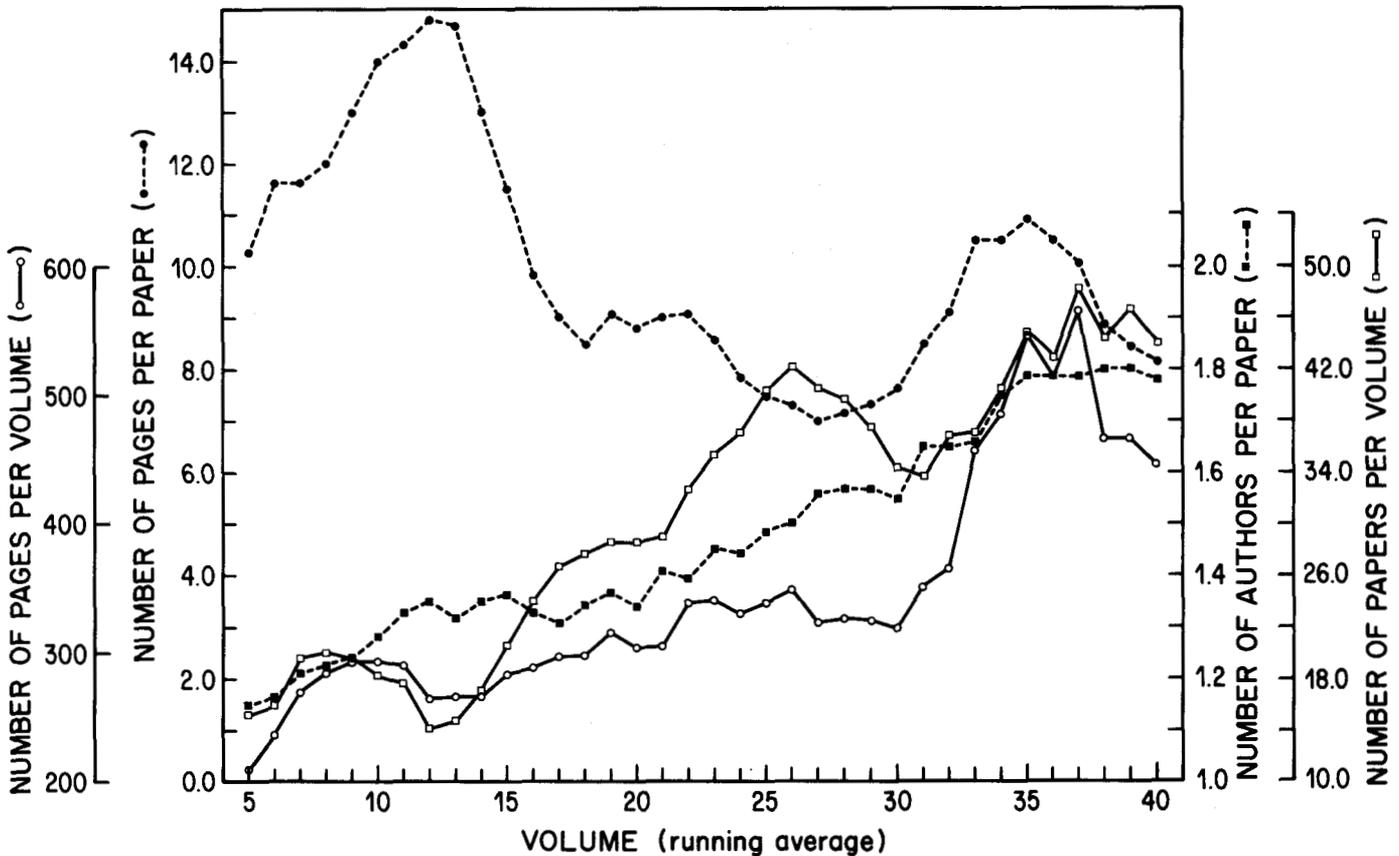


FIG. 5. Editorial details of *Arctic* during its 40 years of publication. To smooth year-to-year variations, data are presented in the form of 5-year running averages.

Montreal to Calgary in 1975 and *Arctic's* move in 1978. The decline in the number of papers per volume occurred prior to and during these moves. Subsequent to the moves, the number of papers per volume increased.

This observation is reflected in the total number of manuscripts received. Figure 6 shows a steady increase until 1974; from then until 1978, coincident with *Arctic* moving from Montreal to Calgary, a decrease from 50 to 43 manuscripts received per year occurred. This decrease was apparently due to uncertainty on the part of potential contributors as to the future of the Arctic Institute. However, after 1978, the total number of manuscripts received per year once again increased, indicating renewed contributor confidence in the Institute and its journal.

Figure 6 also shows variation in the rate of acceptance of manuscripts received. The acceptance rate here is defined and calculated as those manuscripts accepted expressed as a proportion of total manuscripts received (including manuscripts accepted, rejected, withdrawn and still in limbo).

There has been a general decrease in acceptance rate in the last 20 years, indicating either higher standards or poorer papers. Currently, the journal's acceptance rates are showing running averages of about 55-60%.

The general decrease was unsteady, however, with a more clear-cut decrease in the period ending in 1977, coinciding with the move from Montreal to Calgary. This decrease in the acceptance rate during the same period that fewer manuscripts were received would be expected to lead to a reduced number of papers per volume. However, this was not the case. Instead, an increased number of papers per volume was published. This

could only be explained if the editor had a substantial backlog of manuscripts to work with during this period.

Repeat Authorship

It was possible to search the database to determine the pattern of repeat authorship in *Arctic*. The central questions were, "How many authors in *Arctic* wrote more than one paper in *Arctic*, and how many wrote two, three, four and so forth?" The results are shown in Figure 7. About 210 out of a total of 1200 authors in *Arctic* (including both senior and junior authors) wrote more than a single paper. There was a geometric decrease in number of authors with increasing repeat authorship, falling from 161 authors involved in two papers to one instance in which there were 14 papers from a single repeat author. Repeat authors with the greatest number of papers in *Arctic* are William Barr, Max Dunbar, Erik Hohn, L.K. Coachman, Lawrence Bliss, D.M. Atlas, Peter Schlederemann, John Reed, J.R. Mackay and G. Hattersley-Smith.

A striking aspect of Figure 7 is that the bulk of the authors (920) contributed only a single paper to *Arctic* over the 40-year period. The significance of this figure becomes clearer when one considers the proportion of papers dealing with arctic matters published in *Arctic* versus those published in other journals. A possible reason for many potential arctic papers appearing in disciplinary journals is that many authors prefer to contribute to a publication specializing in their particular discipline instead of their study area (i.e., the Arctic).

It is interesting to compare this situation with that revealed by two other major generalized publications, *American Scientist*

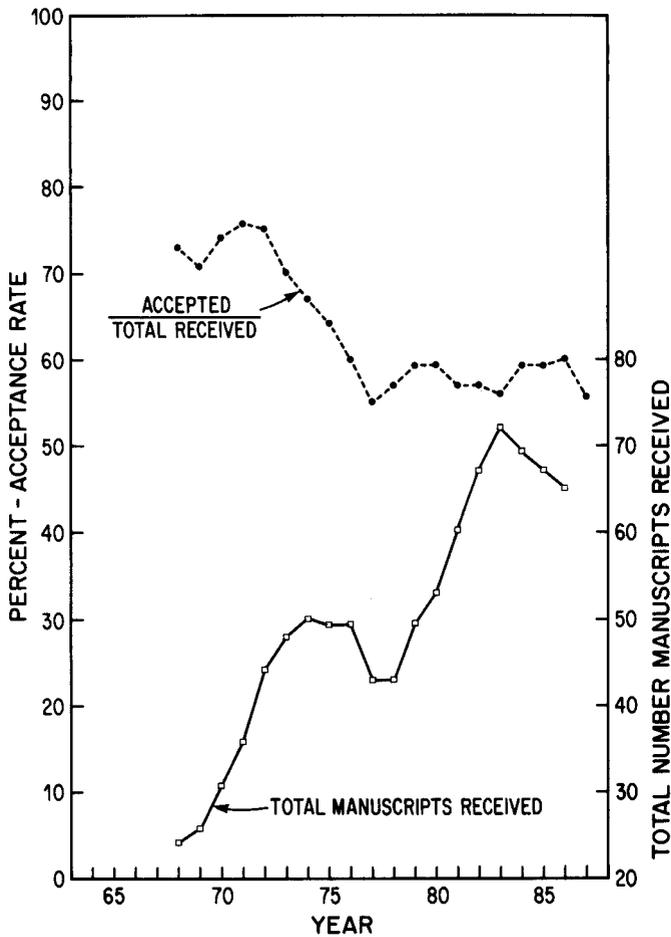


FIG. 6. Acceptance rates for manuscripts received by *Arctic* during the last 20 years. To smooth year-to-year variations, data are presented in the form of 5-year running averages.

and *Scientific American*. Both of these major journals publish in a multidisciplinary way. Each issue contains a similar variety of material as *Arctic*. Repeat authorship is very small in both. One is the publication of a professional society — Sigma Xi — that came together more than 100 years ago to promote a common purpose, interest in science. The other is a straight commercial operation that has existed for more than 100 years. Neither publishes primary research. In that sense, *Arctic* is unique in that it publishes exclusively primary research.

How Topical Is Subject Matter?

The content of *Arctic* over the years obviously reflects the interests and concerns of scientists and scholars located primarily in the South. In order to compare the interests of such people with those of ordinary southerners, we extracted northern items from two general chronologies of Canadian events over the same 40 years. Thus, Appendix 2 gives a northern chronology drawn from general news items as perceived and compiled by southern Canadian news observers (Pepper and Martland, 1985, 1986, 1987; Myers, 1986). Although 75 000 people live in northern Canada, the most significant northern event noted by southern Canadian observers in 1947 was that the lowest temperature recorded in North America was -64°C at Snag, Yukon. In 1949, 1952, 1956, 1962 and 1966 nothing was perceived by southern Canadian news observers to have happened in the North. Clearly, this was an expression of the benign

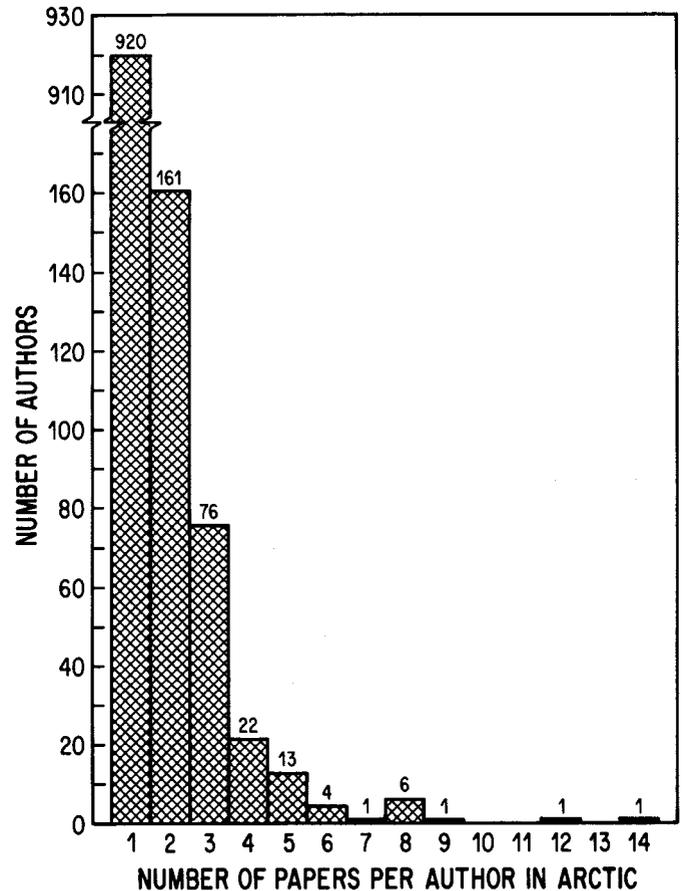


FIG. 7. Repeat authorship in *Arctic* over the 40-year period. All authors, including senior and junior authors, were included in the analysis of repeat authorship.

neglect afforded the North by the South; it was not just simple inattention on the part of the media. Throughout the years the number and density of entries dealing with northern topics increased steadily, but it was always the extension of southern interests that caught the attention of the reporters: the search for non-renewable resources, militarism and sovereignty. Only nine items in the last ten years related directly to indigenous northern cultural, political or social topics. It is quite likely that a similar summary of events could be compiled for Alaska and other northern regions as perceived by relevant southern regions.

It is equally clear that virtually all the research work conducted in the North was done by southerners (Lange, 1987). The number of northern native authors in *Arctic* seems to have been only one, Elmer Ghostkeeper, in 1987.

It is obvious that the publication of research results lags far behind the times. By the time a subject becomes topical, in the North or anywhere else, the urgency has been obvious for a number of years. Funding for the work typically lags a few years behind the recognition of the "urgency," and the actual time required by the researchers — faculty and students, or professionals — is often several years to complete the first stages of the work. This is commonly followed by a write-up time of another year or so, and then by another year before it appears in *Arctic*. The net result is that by the time of publication, 5-10 years elapsed since the first serious recognition of the research topic. This is obvious in comparisons of the content of *Arctic* with the chronology of the area. For example, the surge in biological papers in the last five volumes relates directly to the

threat of environmental damage from exploration for oil and gas beginning in the early seventies. So, also, the rise of papers in "politics" in the last few volumes relates to devolution processes taking place since the early seventies. Rising militarism in the North (cruise missiles, Star Wars, nuclear submarines and the North Warning System) in the past few years has yet to appear in *Arctic*. Sovereignty concerns are appearing in key word searches in the last ten years but not in more general groupings.

Finally, this relates to the stress between "objective" and "subjective" approaches. Granted that there is no such thing in reality as a truly objective approach — even quantum physicists are recognizing this now (Gribbon, 1986) — the search for objectivity can often obscure important trends. This is obvious in many fields of study, such as epidemiology, where groupings can be designed in such a way that minor aberrations become invisible, whether it is an environmental effect or the significance of alcoholism. Objectivity can give broad picture views, but in so doing it can miss vital instances of sickness, which although small in number are of vital concern to the individual persons involved.

CONCLUSIONS

Arctic has been publishing papers arising from northern research over the last 40 years. The journal is multidisciplinary, with an ever increasing number of disciplines. It is peer reviewed, with an acceptance rate of about 60%. The supply of manuscripts has risen steadily over the years (except for the 1975-78 period) but seems to have reached a plateau at the present time.

A reflection of the research structure of the day shows a steady increase in the number of authors per paper, nearly doubling over the 40-year period.

Probably the most striking feature of authorship is the great dominance of single-paper authors. The reason for this seems to be that most arctic authors publish regularly elsewhere, presumably in single-discipline journals, i.e., in specialty journals. Again, this is a reflection of the pressures of the day, where a major measure of professional success lies in the publish-or-perish concept, which focuses primarily on the discipline or

subdiscipline of the researcher. It seems reasonable to conclude that most northern researchers choose therefore to treat *Arctic* as a non-regular publication vehicle, perhaps as a vehicle that permits a refreshing departure from the regular.

Finally, the trends revealed in this study are not unexpected: the general increase in biological papers, a decrease in the proportion of earth science papers and a steady increase in social science papers. Geographic preferences are increasingly for Canadian venues.

ACKNOWLEDGEMENTS

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Note: Appendices 1 and 2 follow.

APPENDIX 1. KEY WORD INDEX

This cumulative index for *Arctic*, volumes 1-40 inclusive, is based on key words as listed by authors (or assigned in the present study for early articles before the general use of key words in *Arctic*). Key words are listed by volume and initial page; thus, 39:82 refers to key words of a paper appearing in volume 39 beginning on page 82. Papers in supplementary issues of *Arctic* are listed, for example, as 40s:34 for page 34 in a supplementary issue in volume 40.

- aboriginal traditions 39:20
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APPENDIX 2. NORTHERN CHRONOLOGY, 1947-87

This chronology of northern events was selected and edited by the present study from *Canadian Facts and Dates* for 1947-84 (Myers, 1986) and from *Canadian News Facts* (Pepper and Martland, 1985, 1986, 1987) for items for 1985, 1986 and 1987. This basic listing reflects the judgement of Myers and of Pepper and Martland as representative observers of Canadian events in the 40 years. Other compilers might have shown a different weighting of current events. Note that in the following listing "government" refers to the Government of Canada.

- 1947 February 3:** The lowest temperature in North America was recorded at Snag, Yukon, at -64°C .
- 1948** The Mackenzie highway was opened from Hay River, N.W.T., to Grimshaw, Alberta.
- 1950 April 29:** The RCMP ship *St. Roch* reached Halifax after passing through the Panama Canal from Vancouver. It was the first ship to circumnavigate North America. *Item:* Alert, a joint Canada-U.S. weather station, was established at the northern tip of Ellesmere Island. It was the northern-most permanent habitation in the world.
- 1951 January 15:** Michael P. Robinson, future executive director of the Arctic Institute of North America, born. **June 15:** The Northwest Territories Act was amended to provide for a partially elective council. The first election for the N.W.T. Council was held September 17.
- 1952**
- 1953 December 16:** A bill to establish the Department of Northern Affairs and Natural Resources was given royal assent.
- 1954 February 5:** The most northerly group of Canada's arctic islands were named the Queen Elizabeth Islands. **November 21:** The HMCS *Labrador* arrived in Halifax, after completing a 29 000 km voyage through the Northwest Passage and around North America via the Panama Canal. *Item:* The Pinetree Line of early-warning radar station went into operation.
- 1955 June 3:** CP Airlines inaugurated the first service between Vancouver and Amsterdam over the North Pole. **September 30:** Operation Franklin, a geological survey of Canada's Arctic Islands, was completed. *Item:* Aylmer, Quebec, passed a law regulating "peace, order and good morals" that banned, among other things, swearing, fortune telling and roller skating.
- 1956**
- 1957 July 31:** The Distant Early Warning (DEW) Line of radar stations was put into operation as a joint U.S.-Canada defence project. **September 12:** The North American Air Defence Command (NORAD) was formed by the U.S. and Canada to coordinate air defence for North America.
- 1958** The U.S. nuclear submarine *Nautilus* was the first vessel to travel under the North Pole.
- 1959 August 17:** The first discovery of oil in the Yukon was announced.
- 1960 July 1:** Canadian Treaty Indians were given the right to vote. **October 12:** It was announced that the unnamed sound between Axel Heiberg Island and Amund Ringnes Island in the Arctic would be named Massey Sound after the former governor-general. *Item:* The most famous Inuit print, *The Enchanted Owl*, was drawn by Kenojuak (born 1927) at Cape Dorset, N.W.T.
- 1961 February 20:** The government announced a federal-provincial program of aeromagnetic surveys over the following 12 years to pinpoint mineral wealth in the Canadian Shield. **July 21:** Prime Minister Diefenbaker opened the government-built arctic town of Inuvik, N.W.T. **July 22:** The largest single microwave project in Canada, the Northwest Telecommunications System, was inaugurated at Whitehorse, Yukon.
- 1962**
- 1963 May 3:** Hay River and Fort Simpson, N.W.T., were struck by severe floods, forcing more than 1600 residents to be airlifted to safety. **May 29:** A new permanent exhibit at the National Museum of Canada, the Hall of Canadian Eskimos, was opened. **December 10:** Canada's first permanent research laboratory north of the Arctic Circle was completed in Inuvik, N.W.T.
- 1964 October:** The most detailed mapping of Canada ever made, on a scale of four miles to the inch, was completed after 19 years of work by the Department of Mines and Technical Surveys and the army survey establishment. **November 18:** The first shipment of lead-zinc ore left Pine Point, N.W.T., for smelters in Trail and Kimberley, B.C., over the recently completed Great Slave Lake Railway. **November 20:** One of the highest unnamed mountains in Canada, on the Alaska-Yukon border, was named Mt. Kennedy in memory of the late U.S. president.
- 1965 June 1:** The CCGS *John Cabot*, the world's first icebreaker cable-repair ship, was commissioned in Montreal for the Canadian Coast Guard. **October 18:** Abraham Allen Okpik of Yellowknife became the first Inuit to be appointed to the N.W.T. Council.
- 1966**
- 1967 January 18:** Yellowknife became the capital of the N.W.T. Administrative functions were transferred from Ottawa on September 15. **June:** CKYK-TV in Yellowknife, N.W.T., became the first television station to subscribe to the CBC's "frontier package" service. It consisted of a four-hour videotape delivered daily by air. **December 12:** It was announced that the government would join a consortium of Canadian oil and mining companies for oil exploration in the Arctic.
- 1968 March 7:** It was announced that Canada would participate with the U.S. in developing an airborne radar system to replace all or part of the DEW Line radar stations in northern Canada. **March 30:** Canada and the U.S. agreed to renew the NORAD agreement for five years. **April 20:** A Canadian-U.S. expedition reached the North Pole after 42 days on four snowmobiles. It was the first indisputable arrival at the Pole over sea ice.
- 1969 March 4:** The RCMP announced that its remaining dog teams would be replaced by snowmobiles. **August 24:** The U.S. oil tanker *Manhattan* left Chester, Pennsylvania, on a trial voyage through the Northwest Passage to prove the feasibility of the route for transporting arctic oil. With the assistance of the Canadian icebreaker CCGS *John A. Macdonald* and the U.S. USCG *Westwind*, the *Manhattan* reached Sachs Harbour, N.W.T., on September 15. The *Manhattan* stopped at Halifax on November 8 on its return voyage. **September 22:** The highest mountain in the Canadian Arctic, on Ellesmere Island, was named after the late Marius Barbeau, Canadian anthropologist. **October:** Canada's largest icebreaker, the 11 800 tonne CCGS *Louis St. Laurent*, was completed by Canadian Vickers Ltd. in Montreal. **November 10:** The government announced a plan to restore historic properties in the Yukon Territory. **November 19:** The Canadian scientific vessel *Hudson* left Halifax for an 11-month voyage of the Atlantic, Pacific and Arctic oceans to examine ocean currents and resource potential. **December 2:** Canada, the U.S., Denmark and the U.S.S.R. agreed to participate in a permanent secretariat dealing with problems of the Inuit.
- 1970 March 9:** Prime Minister Trudeau opened Canada's first Arctic Winter Games in Yellowknife, N.W.T. **April 1:** Responsibility for governing the eastern and upper Arctic was transferred to the N.W.T. Government, from the Department of Indian Affairs and Northern Development. **April 10:** Plans were announced for the creation of two new national parks, one at Artillery Lake northeast of Yellowknife, N.W.T. **June:** Parliament passed the Arctic Waters Pollution Prevention Bill in an effort to protect the Arctic from pollution by foreign supertankers.
- 1971 January 20:** Radio Tuktoyaktuk (N.W.T.) began broadcasting, in English and Inuktitut. **January 24:** Panarctic Oils Ltd. capped a natural gas well at King Christian Island, N.W.T., which had been burning out of control for three months. *Item:* An exhibition of Inuit art assembled by the Vancouver Art Gallery began a tour of Vancouver

- ver, Copenhagen, Moscow, Leningrad, London, Philadelphia and Ottawa.
- 1972 February 24:** Panarctic Oils Ltd. announced the first oil discovery in the Arctic, on Ellesmere Island. **March 7:** The Yukon Territory gave five square miles to the N.W.T. as compensation for a surveying error. The land was used to create a game preserve. **April 28:** The government announced the construction of a highway extending 1690 km from the Alberta border to Tuktoyaktuk, N.W.T. **May 5:** The Quebec Indian Association announced that it had filed a legal action to stop Quebec's James Bay Power Project. **August 2:** The proclamation of the Arctic Waters Pollution Act made ship and cargo owners completely liable for pollution in the Arctic. **November 9:** Anik-1, Canada's (and the world's) first geostationary domestic communications satellite, was launched to improve telephone and radio service and provide television to communities in the Far North. **November 24:** The Quebec National Assembly introduced legislation to create 13 electoral districts in northern Quebec, providing the vote to 1500 Inuit, 3500 Indians and several hundred whites.
- 1973 January 14:** Prime Minister Trudeau agreed on the formation of a committee to negotiate Indian land claims in the Yukon. **September 7:** The N.W.T. Supreme Court permitted the Indian Brotherhood of the N.W.T. to file a claim for approximately one-third of the land in the Territories.
- 1974 February 13:** The Quebec Court of Appeals refused to allow an Indian-Inuit coalition to proceed in its request for a permanent injunction against the James Bay hydro-electric development while awaiting the outcome of an earlier appeal. **March 13:** Offshore drilling in the Beaufort Sea was banned until the summer of 1976 in order to conduct environmental studies. **November 15:** An agreement was signed in Montreal giving native people of the James Bay region about \$150 million as compensation for land lost to the James Bay hydro-electric project.
- 1975 October 23:** Paul Lucier (born 1923), mayor of Whitehorse, was named the first senator from the Yukon.
- 1976 March 15:** The government gave final approval to Dome Petroleum Ltd., of Calgary, to drill the first offshore wells in the Beaufort Sea. **May 8:** The Berger Inquiry into the social and environmental effects of the Mackenzie Valley Pipeline ended its hearings.
- 1977 April 5:** Willy Adams (born 1931), of Rankin Inlet, N.W.T., was appointed senator for the N.W.T. and became the first Inuit to sit in Parliament. **May 9:** The Berger Commission recommended a 10-year moratorium on a Mackenzie Valley pipeline, to allow time to settle native land claims and solve technical and environmental problems. It also suggested a permanent ban on any pipeline from Alaska across the northern Yukon. **August 8:** The government gave tentative approval to the Foothills Pipe Lines (Yukon) Ltd. proposal for an Alaska Highway pipeline through the southern Yukon, pending the outcome of negotiations with the U.S. **September 20:** Canada and the U.S. signed an agreement in Ottawa for the construction of a natural gas pipeline across the Yukon for the shipment of Alaska gas to the U.S. **October 31:** The James Bay Land Claims Agreement, the first modern treaty with Canadian native people, became law.
- 1978 January 28:** Cosmos 954, a nuclear-powered Soviet satellite, re-entered the atmosphere and crashed in the N.W.T. **July 6:** The government prohibited all new development in a 38 850 km² region of northern Yukon Territory, so that a national wilderness area might be established. The government announced the creation of a task force to establish a management program for a 110 000-140 000 animal caribou herd that migrates through the northern Yukon. **July 15:** In negotiations with the Committee for the Original Peoples' Entitlement, the government offered \$45 million to 2500 Inuit in the western Arctic from 1981 to 1994. **July 19:** The U.S. announced a 10-year program to pave and rebuild the Alaska and Haines highways in the Yukon.
- 1979 June 10:** Project Lorex, or the Lomonsov Ridge Experiment — a temporary scientific station built on an ice floe that had drifted 240 km across the North Pole from mid-March to June 10 — was dismantled. **August 18:** The Dempster Highway was opened, from Dawson, Yukon, to Inuvik, N.W.T. **November 12:** The Metis Association of the N.W.T. offered \$160 million for the government's one-third interest in Imperial Oil's Norman Wells operation.
- 1980 November:** The world's first heavy icebreaking cargo vessel, the *Arctic*, arrived in Churchill, Manitoba, to take on wheat for Italy. **December 1:** A new television network was begun in the N.W.T., broadcasting Inuktitut to the Eastern Arctic.
- 1981 March 10:** Panarctic Oils Ltd. announced that an offshore exploratory natural gas well in the Eastern Arctic had produced oil, only the second time a well in the Arctic Islands had done so. **May 12:** The North American Air Defence Command (NORAD) became the North American Aerospace Defence Command after the five-year renewal of the NORAD agreement. **May 26:** Lawren Harris's *South Shore, Baffin Island* set a new record price for a Canadian painting at \$240 000. **October 1:** The first shipments of Canadian natural gas to Los Angeles through the "pre-built" western section of the Alaska gas pipeline began. **November 3:** Dome Petroleum Ltd. announced the discovery of huge new oil deposits in the Beaufort Sea, about 109 km north of the Mackenzie River Delta. **December:** The government announced its intention of setting aside more than \$4 billion and large tracts of land in the Yukon and N.W.T. to settle native land claims by 1985.
- 1982 March 5:** The Canada Oil and Gas Act became law, intended to speed oil and gas development off the north, east and west coasts of Canada. **May 10:** A \$600 million oil and gas exploration program in the Beaufort Sea was announced by the Department of Energy and Mineral Resources and the Department of Indian and Northern Affairs.
- 1983 February 10:** It was announced that Canada and the U.S. had signed an agreement allowing U.S. testing of military equipment in Canada, including the cruise missile. **November 3:** The Senate approved a constitutional accord on aboriginal rights, making the first amendment to the Canadian constitution possible.
- 1984 March 8:** The cruise missile was first tested over western Canada. **April 25:** Canada and the Soviet Union signed an agreement for cooperation in scientific research in the Arctic, including the areas of resource development and environment.
- 1985 July 25:** The U.S. Coast Guard said the American icebreaker *Polar Sea* was to enter northern Canadian waters in August for a two-week voyage through the Northwest Passage. **August 11:** The *Polar Sea* left Canadian-claimed waters 10 days after starting its controversial voyage through the Northwest Passage. **September 10:** The first-ever shipload of Canadian crude dispatched by Panarctic Oils Ltd. arrived in Montreal — 100 000 barrels of crude from Brent Horn oil field on Cameron Island. **September 11:** Canada will make \$450 000 available during the next three years for the Inuit Cultural Institute to help draft arctic policy. **September 23:** The luxury *World Discoverer* arrived at Halifax on its way for visits to remote Inuit villages, glaciers and the habitat of polar bears, whales and puffin. **October 30:** The government announced new incentives for frontier and offshore oil exploration, saying they were far less generous than the scheme they would replace. **November 8:** The government issued a call for proposals for exploration rights in the Fort Good Hope area of the Mackenzie Valley, N.W.T. **December 20:** The government introduced legislation to replace grants given to oil companies exploring for oil and gas in the offshore and the North with a new tax credit. The new plan would cost Ottawa \$150-250 million per year, compared to the \$1.7 billion the treasury spent in 1984 to encourage exploration.
- 1986 March 26:** Legislation was passed ending the multibillion-dollar petroleum incentive program that helped underwrite oil and gas exploration in the frontier and offshore areas. **April 28:** The government tabled a bill in the Commons to assert Canadian sovereignty over the Arctic Archipelago. **September:** The External Affairs Minister, Joe Clark, announced that the government anticipated sovereignty legislation two months after the U.S. icebreaker entered the

Northwest Passage without seeking Canada's permission. *October 2:* The government said it would permit the resumption of cruise missile flights by the U.S. Air Force in the Arctic during the coming winter. *December 8:* Canada protested U.S. hearings on an expanded oil exploration program in the North in territory where Ottawa and Washington disagreed on the international boundary.

1987 *January 15:* Native groups in the N.W.T. finally reached an agreement on division of the territory, subject to a referendum. *January 22:* Gulf Canada said it would resume drilling in the Beaufort Sea. Work would centre on the Amauligak discovery and expenditures were expected to be \$150-200 million. *April 13:*

Statistics Canada reported the N.W.T. population as 52 328, up from 45 741 (in 1981); Yukon, 23 504, up from 23 153. *April 22:* The Canadian government said it was keeping an eye on the Soviet Union to ensure it did not follow the U.S. lead and challenge Canadian sovereignty in the Arctic. *April 16:* The N.W.T. banned smoking in all government buildings effective June 1. *April 28:* Canada was considering buying a fleet of nuclear-powered submarines to help enforce its claim of sovereignty in the Arctic. *April 18:* Amoco Corporation of Chicago agreed to buy Dome Petroleum for \$5.1 billion.