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CLIMATOLOGICAL BULLETIN

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FOREWORD

The present number of the Climatological Bulletin is the last to be published through the Department of Geography at McGill University. Starting next year (1983) the Bulletin will become a publication of the Canadian Meteorological and Oceanographic Society (CMOS).

Steps towards this changeover began two years ago when it became apparent that it would be impractical to continue the Bulletin in its present form and method of publication much longer, particularly in view of the founding editor's retirement from McGill University in August of this year (1982). Arising from the initiative and with the support of the Canadian Climate Centre discussions concerning the future of the Bulletin took place over an eighteen-month period with several climatologists and with the Council of CMOS.

These discussions showed that there was wide support for turning the Bulletin into a clearly-perceived Canadian, nationwide publication. It was also felt that its editorial policy should take care to demonstrate the place of the Bulletin among, but not in competition with, existing Canadian scientific outlets for climatological work.

Practical expression of these feelings were given last May when the Annual General Meeting of CMOS ratified a proposal from the Society's Council to assume responsibility for publishing the Climatological Bulletin from 1983 onwards. The Bulletin will now, therefore, be managed by an Editorial Board within the structure of CMOS. Editorial policy will reflect the feelings expressed above concerning the nature of the publication. Thus it is hoped to receive material of the following kind:

(a) Climatic impact and related studies,

(b) Discussion papers, reviews of activities and research, and "think tank" type articles;

(c) Good student contributions (submitted with the support of their professors) arising from thesis research or work prepared in courses;

(d) Notes and comments covering national and regional interests in climate matters.

Because the Bulletin is a Canadian publication contributions are particularly welcome which deal with Canada or with Canadian-type environments and climatic matters. This does not mean, however, that other contributions are necessarily to be excluded. In particular it is hoped to include among published articles some of general interest to everyone concerned with climate, climatic impact, and problems related thereto in the world today.

The new Editor of the Climatological Bulletin is Dr. Stewart Cohen (Department of Geography, York University, 4700 Keele Street, Downsview, Ontario M3J 1P3). Dr. Cohen has contributed an article to the present number in which he sets the tone for developing the Bulletin by taking a forward look at Climatology in Canada, and the role this publication can play as a periodical forming part of the Canadian scene. As retiring editor I want to wish Stewart Cohen and those who will be associated with him every success in furthering the Bulletin in its new and expanded role. I want also to thank those many persons who have helped me over the years in maintaining the publication. I am particularly glad to think that it will now be associated with a nationwide scientific Society like CMOS.

Montreal,
October, 1982.

B.J. Garnier
Editor

Corrigendum

Author S.J. Cohen has noted the following errors in his article, "Climatology in Canada - A Look Forward" (Climatol. Bull., 32, 1-8):

1 On p. 3, lines 10 and 11 should read "... literature (e.g., Masterton et al., 1976; Mather, 1974; McQuigg, 1975, in Slater and Levin, 1981; Allsopp et al., 1981; Murphy, 1977; Murphy et al., 1977; Oliver, 1981; Rosenberg, 1974, in Slater and Levin, 1981; Thomas, 1981) much ..."

2 On p. 7, the following reference should be included:
Daniel, H., 1980. Man and Climatic Variability: The World Climate Programme. World Meteorological Organization, No. 543, Geneva.

CLIMATOLOGY IN CANADA - A LOOK FORWARD

by

Stewart J. Cohen*

I. Introduction

Change has become a way of life for all of us. We continuously hear about changing technologies, public policies, and social norms from sources in the mass media. Perhaps it is not surprising that in this era of rapid change, we should also be hearing a great deal about changing climate. Naturally, this debate is of direct interest to us as climatologists and users of climatic information. However, it is also important because in the past, climate and climatic "change" had been considered of only marginal importance to governments and the general population.

Today, there is widespread international interest in climate as a factor in human affairs. How has this interest been expressed? What kinds of questions are being asked? What has been the response of the scientific community, especially atmospheric scientists, to these issues?

The purpose of this brief essay is to explore important issues which are presently influencing climatological research, and will continue to do so in the near future. Since the debate has also had a significant effect on the policies and operations of several periodicals, including the Climatological Bulletin, it is therefore appropriate to discuss herein the present publishing "climate" and the future role of the Bulletin as a vehicle for disseminating information on topics of interest to Canadians.

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II. Current Issues

Events of the 1970s and early 1980s have focussed attention on the interactions between climate and society. These events include the 1968-1973 Sahelian drought, the 1972 Russian wheat crop failure and El-Nino induced reduction in the Peruvian anchovy fishery, and the 1975 cold waves in Brazil which badly damaged coffee crops. Europe was hit by a major drought in 1976, while severe cold and heavy snow storms forced many industries and schools in the northern and eastern U.S.A. to close during the winters of 1976-1977 and 1977-1978. The southern and western U.S.A. experienced major drought in 1976 and 1980, and Florida citrus groves have suffered from unusually cold weather, including the 1981-1982 winter. In Canada, farmers in Manitoba and Saskatchewan lost millions of dollars in 1980 because of drought (Fraser, in Phillips and McKay, 1981). Ontario and Quebec experienced record low snowfalls during the 1979-1980 winter (Phillips, in Phillips and McKay, 1981). Lynch et al. and Dubreuil (both in Phillips and McKay, 1981) document the resulting negative impacts on outdoor recreation and positive impacts on transportation.

Considerable research has been directed at man's impact on climate, especially the potential warming effects of increased carbon dioxide with resulting changes in agricultural activities (e.g. Bach et al., 1979; Ausubel and Biswas, 1980; Miller, 1980). However, it is important to note that the events listed above affected not only the food producing industries, but also transportation, energy, and other commercial sectors. Human feedbacks, in the form of government and private aid programs, modified the direct impact of climate within many countries. Hare (in Slater and Levin, 1981) considers these events to be examples of complex two-way climate-society interactions, rather than direct impacts, because of the considerable influence of technology and the economic tools of governments and industry. Ausubel (in Ausubel and Biswas, 1980), Timmerman (1981) and others have recently attempted to model these economic and social interactions resulting directly or indirectly from climatic events.

Although many climatically-induced calamities have affected mankind since the days of the early Egyptian civilizations, it was not really until 1972 that international concern was strong enough to create an organized worldwide response. Hare (1981) and Slater and Levin (1981) document the series of events that led to the 1977 United Nations (UN) Conference on Desertificiation and the 1979 World Climate Conference organized by the World Meteorological Organization (WMO). These were the first UN events that specifically dealt with climate as an important factor in human activities. The latter resulted in the establishment of the World Climate Programme, which has four components: data, applications, impact studies, and research (Daniel, 1980). As part of this effort, Canada has established its own Canadian Climate Program (Canada: Atmospheric Environment Service, 1981). The U.S.A. has also initiated a national program, and the Scientific Committee on Problems of the Environment (SCOPE) project on climatic impact has advanced to the point where a major publication is near completion.

This international effort has brought substantial recognition of the climate-society issue, but we do not have a consensus regarding the actual significance of climatic events, nor of the usefulness of climatic information to various decision-makers. In Ruttenberg's (in Slater and Levin, 1981) review of Garcia's study on the Sahelian drought, it was suggested that the drought was neither the starting point of the food supply crisis, nor the dominant factor in subsequent higher prices and deaths due to malnutrition.

The study recognized the drought as a significant event, but such deficiencies in rainfall were not uncommon to the region, leading to the conclusion that societal factors were the more important contributors to the crisis. Early warnings of impending drought were ignored by decision makers because of rapid economic and political changes being experienced at that time.

Even in highly developed nations such as Canada and the U.S.A., it is difficult for us as climatologists to convince governments and private industry that climatic information can be readily applied to decision making. Although proponents of applied climatology have produced a great deal of literature (e.g. Masterton et al., 1981; Murphy, 1977; Murphy et al., 1977; Oiver, 1981; Rosenberg, 1974, in Slater and Levin, 1981; Thomas, 1981), much of this information does not reach the potential user. There are various technical reasons for this, such as communications problems between scientist and layperson (Baker, 1980), and bureaucratic restrictions on budget planning (Fleagle and Wolff, 1979; Cohen, 1981), brought about by our inability to provide annual forecasts. Although long-range probability forecasts are possible (Murphy, 1977), others argue that even this kind of information would be difficult to apply to practical problems unless the decision maker is insured against possible loss (Revelle, in Slater and Levin, 1981). In certain cases, the decision maker has difficulty in interpreting the exact meaning of a forecast, and is thus unable to use it in a meaningful way. This is particularly evident when considering the value of daily precipitation forecasts (Stuart, 1982). Others who could utilize probability forecasts are not aware of the kinds of information available, such as the Atmospheric Environment Service studies on outdoor recreation (Baker, 1980).

There is also the deeper issue of public (and government) perceptions of atmospheric science as a discipline (i.e. academic) versus a profession (i.e. real world). Are we capable of providing a "product" without overselling its relevance and compromising our standards (Brooks, in Atlas, 1976)? Even large-scale climatological "facts" such as CO_2- induced climatic changes cannot become political "facts" without first being translated into economic terms, so that the politician is provided with a realistic set of alternatives (Meyer-Abich, in Ausubel and Biswas, 1980). Scientists and governments attempt to overcome this by using the "most likely scenario" approach, but decision makers are reluctant to commit resources to long-range measures in order to mitigate a situation that might never occur (Kellogg and Schware, 1981). Unless these problems are overcome, the most rational option for the politician, the industrialist, and the average citizen will continue to be "no action," or when necessary, short-term adaptation.

The events of the past decade, as well as various realities in economics, politics, and public perception, have had an impact on climatologists, and consequently, climatology. Traditional views of climate and climatology have been re-examined. This issue is discussed below.

III. Climate and Climatology -- New Perceptions

The events described above have led to an increased public sensitivity to climate. This does not imply that public perception of climate and climatic change has become more accurate than pre-1972 perceptions. For

example, results of a 1980 survey conducted in southern Ontario (Harrison, 1982) reveal that memory of past weather is short and inaccurate. Responses to questions on trends of winter and summer temperature, snowfall, and overall precipitation showed no visible correlation to the actual climatic record for that region. A large majority of the respondents believed that climate is changing in a particular direction (warmer winters, cooler summers), but there was considerable uncertainty regarding the reason for this "change".

Newspapers, magazines, and scientific journals have also exhibited increased interest in climate and climatic change. Harrison (1982) shows a marked peak in coverage of these topics during the mid-1970s. In addition, it seems that this trend was transferred from the atmospheric science journals (Journal of Applied Meteorology, Journal of Atmospheric Science) to the popular media with no apparent time lag, thereby reflecting the newsworthiness of climatic change during this period. However, the popular media's coverage was oriented towards new theories and evidence of spectacular alternations (e.g. major snowstorms -- a new ice age?) that might be more newsworthy than objective views of the range of scientific opinion. Harrison concluded that a significant proportion of the public believe that climatic change is actually occurring at present.

The public and media perceptions of our present climate do not exist in a vacuum. These views result from the lack of a clear message from atmospheric scientists on the subject of climatic change. Before the World Climate Conference took place in 1979, we had not established standard definitions of "change," and "variation." Although there has been recognition of "oscillation" and "cycle" by the American Meteorological Society (AMS) in its Glossary of Meteorology (latest printing was in 1980), the Glossary does not contain a definition of "climatic change."

What is the most appropriate reference period for determing climatic change? Lamb (1982) notes that the standard 30-year period is probably as uninformative on this issue as longer periods such as 100 years. Besides the lack of hard evidence indicating change, Lamb points out that there is no consensus on climatic variability either. There are those who believe that although the climate is essentially unchanged, the recent wave of unusual weather events indicates increased variability. Others disagree, claiming that these meteorological extremes are merely part of the normal climate. Many now consider climate to be a "climate system" which recognizes the influence of feedback from biota, soil, ice masses, and oceans. The system is said to be "almost intransitive" in that various climatic modes are possible within a "constant" climate, and that extremes are something to be expected. Furthermore, it is argued that our perception of these events has changed because modern society is more susceptible than previous generations to these events. We incur larger monetary losses, due primarily to our larger population and capital infrastructure, not because of increased climatic variability. In addition, we are informed about local, national, and foreign natural disasters in highly populated areas often within hours of occurrence, thereby adding to our increased sensitivity to these extremes.

How has this public debate affected the discipline of climatology, and the views of climatologists regarding the future? One outcome has been a paper by Mather et al. (1980) in which a return to Thornthwaite's "topoclimatology" is advocated. Climatologists should be examining heat and moisture exchanges at the earth's boundary layer, rather than becoming statisticians describing climatic variability by quasi-stationary time series, an extension of our traditional role as "keepers of the records." Geographical

climatologists should become more active in climatic modelling, particularly in linking energy budget models to general circulation models developed by meteorologists. Climate-effects studies would provide useful input into the overall modelling process.

Climatology's scope within the realms of meteorology and geography has been difficult to define. In a reply to Mather et al. (1980), Chakravarti (1981) notes that there have been many attempts to establish this field as a discipline with a clear distinctive identity within geography. Description, explanation, modelling, and prediction are activities common to many disciplines, and much work remains in all four of them. Mather et al. (1980) emphasize modelling, and this might help to identify climatology as a visible discipline in its own right, but with a distinctly geographical component.

Climatologists receive varying degrees of training in meteorology, depending on their academic background. However, climatologists are also geographers, and most of us enter the profession with degrees in geography. This dual allegiance has been a source of confusion for many people, both within and outside the discipline. This is reflected in the range of journals that contain articles on climatology. These include broadly based publications such as Science, but also specialized journals in geography and meteorology. What is the present publication "climate," how is it changing, and how does the Climatological Bulletin fit in?

IV. The Future Role of the Climatological Bulletin

Since the 1950s, the main recipients of contributions from Canadian climatologists have been AMS journals, European meteorological and geophysical journals (e.g. Tellus, Quarterly Journal of the Royal Meteorological Society), Agricultural Meteorology, Atmosphere-Ocean, Boundary Layer Meteorology, and the Canadian Geographer. Regarding the latter, 78 articles on climatology and related topics have appeared between 1950 and July 1982. From 1961 to 1975, 52 articles (approximately 3.5 per year) were published, most of this on Arctic and subarctic research, and energy and water balance studies. However, between 1976 and July 1982, at a time of increased international interest in climate, only 13 articles (less than 2 per year) were published.

Articles have also appeared in WMO and Association of American Geographers (AAG) publications, and in periodicals from agricultural, biological, physical, and social sciences (particularly history). A few Canadian institutions have published and distributed climatological research results in monograph form (e.g. McGill University, AES Canadian Climate Center). Several American institutions (e.g. Thornthwaite and Mather's Laboratory of Climatology, Illinois State Water Survey) also produce monographs. However, before 1980, there was only one North American periodical which was exclusively devoted to climatology — the Climatological Bulletin.

Since 1980, several events of interest to Canadian climatologists have taken place. First came the new Journal of Climatology from the Royal Meteorological Society. Then came the announcement from AMS that under new editorship, the Journal of Applied Meteorology would broaden its scope to include topics in climatology, applied climatology, and impact assessment.

In January 1983, the name of the journal will be changed to the Journal of Climate and Applied Meteorology (Silverman and Hecht, 1982). The Canadian Association of Geographers is launching a new journal called Operational Geographer/Géographie Appliqué, whose role appears to parallel those of the Professional Geographer and the Bulletin of the American Meteorological Society. Most recently, the Canadian Meteorological and Oceanographic Society (CMOS) announced a change in the editorial policy of Atmosphere-Ocean, in which papers related to hydrology, including hydrometeorology and human impact, would be considered for publication.

In the midst of these events, the Climatological Bulletin is also undergoing significant changes. Under CMOS sponsorship, the scope of the Bulletin is being broadened to include applied climatology and climate impact assessment, two main areas of interest of the World Climate Programme. As a Canadian publication, the immediate goal is to establish the Bulletin as a national journal, complementary to Atmosphere-Ocean and other CMOS publications (Chinook and the newsletter). There is a continuing need for a Canadian periodical devoted to climatology, especially since climatologists appear less willing to publish in the Canadian Geographer now than in previous years, opting instead for publications with a greater audience of atmospheric scientists. It is hoped that the expansion of the Bulletin will encourage a wide range of contributions on climatological topics relevant to the Canadian scene, not only from climatologists, but from researchers in other disciplines as well.

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CANADIAN CLIMATE PUBLICATIONS

by

Morley K. Thomas*

One result of the major expansion in climate activities over the past generation or so is that Canadian climate literature is much more plentiful today than ever before. Immediately after World War II, there were less than twenty people working in climate throughout Canada, while today there must be several hundred. In the Climatology Division of the Meteorological Branch (currently the Canadian Climate Centre of the Atmospheric Environment Service) staff strength soared from 14 in 1945 to about 165 twenty years later. In 1982 about 230 AES staff memebers are employed in climate and climate related activities. Climatologists have been recruited by other federal departments and by provincial governments. Meteorology departments or divisions have been established at several universities and the Canadian Meteorological and Oceanographic Society has markedly expanded its activities and size. A not unexpected result of all this increased activity has been a virtual flood of publications on and about the climates of Canada. The particulars of these publications have been noted in a series of bibliographies on Canadian climate published by AES in 1961, 1973 and 1979 with a fourth edition scheduled for publication in 1982 (Thomas 1961, 1973, Thomas & Phillips, 1979; Phillips, in prep.).

Publications about the Canadian climate before 1850 were largely limited to journal articles or reports in books by explorers in the north and by soldiers and surveyors in the south. The establishment of a Magnetic and Meteorological Observatory in Toronto in 1839-40 provided an initial focal point for meteorology and climatology in the country. The first scientific

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Table One

NUMBER OF BIBLIOGRAPHIC ITEMS AT FIVE YEAR INTERVALS 1897-1977

Year	Number	Year	Number	Year	Number
1897	2	1927	3	1957	77
1902	3	1932	8	1962	115
1907	9	1937	17	1967	109
1912	0	1942	15	1972	145
1917	4	1947	38	1977	227
1922	8	1952	67		

Table Two

MODE OF PUBLICATION (%)

	1957	1977
Journals (Serials)	39	31
AES (Occasional)	20	15
Other government (Occasional)	16	8
Workshop or Conference Proceedings	9	36
Foreign Governments	8	3
University (Serials or Occasional)	4	6
Books	4	1
	100	100

Table Three

IDENTITY OF SENIOR AUTHOR (%)

	1957	1977
AES	50	36
Other Canadian Governments	27	20
Foreign	16	10
Canadian Universities	4	30
Canadian Private Sector	3	4
	100	100

article to be published from the "official" data was one on the variation of temperature in Toronto which appeared in the 1853 Philosophical Transactions of London. This article was written by a Colonel (later General) E. Sabine, an officer in the British Army, who had supervisory responsibilities for the Toronto and other observatories around the world. In subsequent years most published reports in Canada were of "meteorological results" at the Toronto and other observing stations. In 1894, Frederic Stupart became the first Canadian born Director of the Meteorological Service and he subsequently wrote and published nearly one article a year until his retirement in 1929. Earlier, in 1909, Stupart hired A.J. Connor to write the climate of Canada and over the ensuing four decades, Mr. Connor, who had the title of Dominion Climatologist, contributed greatly to our climate knowledge. One of his subsequent major contrubutions was a section on the climate of Canada for the Köppen-Geiger Handbuch der Climatologie published in Germany in 1936.

Although meteorology and climatology were considered an important part of natural philosophy, then a popular subject, few climate papers or articles were published by university personnel in the early days. G.T. Kingston and succeeding Toronto observatory and Meteorological Service directors were associated with the University of Toronto but their contributions were limited to a few articles in the Canadian Journal. Dr. C.H. McLeod published some observational data in the Canadian Record of Science. Subsequently McLeod and H.T. Barnes published notes on the temperature contrast between the McGill grounds and Mount Royal. In 1931 an American post graduate student, C.E. Koeppe, wrote and published a book on the Canadian climate. In the mid 1930s, a Masters degree course in meteorology was established at the University of Toronto, and a few years later staff and students began to publish papers on different aspects of Canada's meteorology and climate.

In the world of Canadian climatology, the three decades after the end of World War II were marked by an enormous expansion -- an expansion of resources, of people, and of publications. When, in 1950, the writer of this article began to assemble a bibliography of Canadian climate, he could collect only a hundred references. There were more of course, but even when the first edition of the Bibliography of Canadian Climate was published no more than about 1400 items could be found for the entire period up to 1957. From about a dozen items a year in the 1930s, production of articles and reports grew to about 80 a year during the fifties, to well over 100 a year during the 1960s and to an average of about two hundred a year in recent years (Table One).

This dramatic increase was one result of an increasing number of climatologists and meteorologists in Government departments, both federal and provincial. In addition to more universities, for many years most of those obtaining post graduate degrees were recruited into the professorial ranks where they trained more graduates in climatology and related fields. Membership in the professional societies — Canadian, American, and British - grew markedly. The number of periodicals devoted to climate and climate related activities increased tremendously. It even became financially viable for publishing houses, especially in Europe, to establish periodicals in climatology and the natural sciences which provided an even broader band of publishing possibilities for budding authors. In those expanding years, the government services, besides having more people, also had more money to publish more atlases, reports, and articles than had ever previously been the case.

In an attempt to see if the marked expansion in climate publishing was accompanied by any trends, entries in the issues and manuscripts for the Bibliography of Canadian Climate, covering the period from 1763 to 1981, were examined. The number of bibliographic items at five year intervals are shown in Table One over the priod of 1897 through 1977. The marked increase in the number of items after World War II is very evident. To compare conditions in years over a span of two decades, a pair of years, 1957 and 1977, was chosen. Simple statistics were calculated and Table Two shows the mode of publication in each of those two years and Table Three the identity of the author or senior author in case of multiple authorship. In Tables Two and Three percentages have been used to contrast activities in 1957 and 1977 since the number of items under consideration increased three fold during that twenty year period.

Twenty-five years ago, in 1957, 39% of the articles and reports on the climate of Canada were carried in journals and other serial publications of learned or professional societies. Occasional government publications carried another third of the total, 20% coming from the Meteorological Branch, the name then of today's Atmospheric Environment Service. Some 9% of the articles appeared in proceedings or records of workshops or conferences and 4% appeared in Canadian university serials or occasional publications. By 1977 the number of items on the climate of Canada appearing in proceedings of workshops or conferences increased to 36% while the number of articles and reports in journals dropped to 31%. There was also a decrease in the percentage of articles appearing in occasional publications issued by the Meteorological Branch and other federal and provincial departments. The percentage of articles in university publications remained about the same over the twenty year period. With the marked increase in total number, it is interesting to note the significant shift in mode of publication over the twenty-year period from referreed serial publications to proceedings of workshops, usually unreferreed. (For another analysis of paper and publication trends see Phillips & Veinot, 1977.)

Looking at the identity of authors, twenty-five years ago about one half of the people writing on the climate of Canada were employed by the Meteorological Branch. A quarter of the total number of authors were employed by other government agencies, but in 1957 only 4% of the authors of articles and reports published on the climate of Canada were university people. By 1977 there was a marked shift as the percentage of university people increased to 30%, a percentage exceeded only by those employed by the Atmospheric Environment Service. The fact that foreign authorship dropped from 16% to 10% may be more indicative of the bibliographers tendency to include fewer foreign publications in the Bibliography in recent years than formerly as the numbers of Canadian written and published articles increased.

It is difficult (and dangerous!) to attempt to identify those individuals who contributed the most to Canadian climate publishing over the past thirty-five years. It is better perhaps to identify only those individuals who have been the most prolific in publishing as recorded in the issues of the Bibliography of Canadian Climate. From the universities, the names of Hare, Longley, Orvig, Vowinckel and Sanderson appear most frequently. From government the names of Baier, Boyd, Bruce, Ferguson, Findlay, Goll, McKay, Munn, Potter, Richards, Robertson, and Thomas are found most frequently in the bibliographies.

Although the occasional publications of the Canadian Branch of the Royal Meteorological Society did not constitute a serial publication, dozens of climate articles were published there from 1950 until the beginning of Atmosphere (the forerunner of today's Atmosphere-Ocean) in 1963. The Climatological Bulletin, instituted in 1967, is still the only serial in Canada devoted entirely to the publishing of climate articles. The Feuillet Météorologique, published in French by the Québec Meteorological Service, has also carried many articles on climate, especially pertaining to that province. Over the years, Canadians have contributed to the Quarterly Journal of the Royal Meteorological Society, the Journals of Atmospheric Science and Applied Meteorology of the American Meteorological Society, to Weather and Weatherwise and to other meteorological and climate publications. For several years the Arctic Meteorology Research Group at McGill University published occasional papers while the Atmospheric Environment Service has had series called Canadian Meteorological Memoirs and Climatological Studies, along with an extensive technical circular series. Most of the names in this paragraph and more are mentioned in Marie Sanderson's "Impressions Over Three Decades" (Sanderson, 1982).

In recent years, with inflation and resulting government fiscal restraint, there has of course been a levelling off, and even a decrease, in the amount of resources available to government departments and universities to pay climatologists salaries and to support publishing programs. Commercial publishers face the "threat" that computerized libraries will replace periodicals and books in an "instant awareness" world. However, regardless of these concerns, the climatic publishing field is, and might be expected to remain, an order or two of magnitude above what it was a generation ago. The users of climate information now realize its value and consequently will support research and publication activities much more than was ever done before. Although printing and other costs associated with publishing have risen markedly, climate publications are probably cheaper relative to other commodities and services than they ever have been in the past.

In a previous essay (Thomas, 1978) the writer suggested that a respectable body of Canadian climatological literature existed in 1957 as a result of the enthusiasm and endeavour of university and government scientists in the decade after World War II. The study of climate and its applications is now firmly established in both universities and government and the resulting publications will continue to be of great assistance to planners and managers who cope with the climate problems of today and in the future. The role of the Climatological Bulletin can be a most significant one in the years to come. As the only periodical devoted singularly to climate, and with its new affiliation with the Canadian Meteorological and Oceanographic Society, the Climatological Bulletin can play an increasingly important role in the diffusion of climate information in the future.

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ARTICLES PUBLISHED IN THE CLIMATOLOGICAL BULLETIN FROM 1967 TO 1982

Note: These notes and listing have been compiled by B.J. Garnier, retiring editor of the Climatological Bulletin.

The Climatological Bulletin was inaugurated in January 1967 and two numbers a year have been published from the Department of Geography at McGill University ever since. Because the present number is the last to be published in this way, it has been though appropriate to prepare a listing of the major articles which have appeared, up to and including number 31, April 1982.

This listing shows that a total of 102 articles have been published. An analyses of these articles shows some interesting facts concerning the Bulletin and the function it has performed up to the present time.

To begin with the Bulletin started very much as an "in house" publication. Within a few years, however, it had gained sufficient recognition to attract outside contributions. The latter contributions account for 47 of the 102 articles published compared with 55 which are essentially of McGill origin. While this shows a good balance between McGill and non-McGill authorship it is noticeable that half the articles from McGill were developed essentially from student initiative or with students as the major writers. There have been 29 such articles in the period analysed, of which 27 are of McGill origin. Looked at another way, professional scientists contributing from outside McGill have outnumbered McGill staff by nearly two to one: 45 (non-McGill) to 28 (McGill).

As regards type of article, the following data are interesting:

General reports and reviews of activities	- 29
Articles which are essentially "think tank," ideas and/or methodologies	- 13
Articles dealing essentially with student (mainly graduate) research	- 28
General scientific articles	- 32

Given the original aims of the Bulletin as a publication medium for both professional and student activity of different kinds, together with research ideas and research projects "in the making", the foregoing suggests that the original objectives have been achieved quite well.

In the listing which follows an article has been recorded only once, under the name of the author first-named in the article as submitted. The following notation has been used to indicate contributions when the authors were students:

** Doctoral candidates
* Masters canadidates
+ Undergraduates

Following the title of the article are given: the number of the Bulletin, the month and year, and page numbers, e.g. 14, Oct. '73, 1-23.

Ayoade, J.O.: A Statistical Analysis of Rainfall in Samaru, Nigeria, (1928-1971), 17, Apr. '75, 15-28.

Bach, W.: A Chart for Calculating Long-Wave Radiation, 2, Jul. '67, 45-50.

Baird, P.D.: Mont St. Hilaire Climatological Records, 1, Jan. '67, 9-14.

Baird, P.D.: The Climate of Mont St. Hilaire - A personal impression, 8, Jul. '70, 26-39.

Basnayake, B.K.**: Two Maps of Direct Short-Wave Radiation in Barbados, 4, Jul. '68, 21-30.

Basnayake, B.K.**: Some Problems in large scale mapping of the Topographic Variation of Solar Radiation, 8, Jan. '70, 1-16.

Basnayake, B.K.**: Comparison of the Field Performance of three types of Solar Radiation Measuring Instruments, 8, Jan. '70, 17-25.

Brown, R.D.* & John E. Lewis: Calibration of Multi-Spectral Scanner Data for Urban Albedo measurements using Target Reflectance Panels - some user experiences, 28, Oct. '80, 19-24.

Daoust, Mario*, J.C. Préfontaine+, & R. van Wyngarden+: Note on a Relationship between Daily Hours of Bright Sunshine and Mean Daily Atmospheric Transmissivity, 30, Oct. '81, 15-20.

Davies, John A.: Surface Albedo and Emissivity for Lake Ontario, 12, Oct. '72, 12-22.

Davies, John A., Wayne R. Rouse & T.R. Oke: Microclimatological Investigations at Simcoe, Southern Ontario, 6, Jul. '69, 1-43.

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Drummond, R. Norman: The Origins and Purpose of the McGill Sub-Arctic Research Laboratory, 2, Jul. '67, 1-7.

Dunne, Thomas & Anthony G. Price**: Estimating Daily Net Radiation over a Snowpack, 18, Oct. '75, 40-48.

East, Conrad, O.J. Diduch, & C.E. Klaponski: Two Studies in the Urban Climatology of Montreal, 5, Jan. '69, 21-34.

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Fitzgibbon, John** & T. Dunne: Photographic Measurement of Vegetation Canopies for use in the computation of the Radiation Balance, 13, Apr. '73, 1-8.

Fogarasi, S. & M. Boakes: Cloudiness and Global Radiation at the Head of Inugsuin Fiord, N.W.T. in the summer of 1968, 14, Oct. '73, 1-23.

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