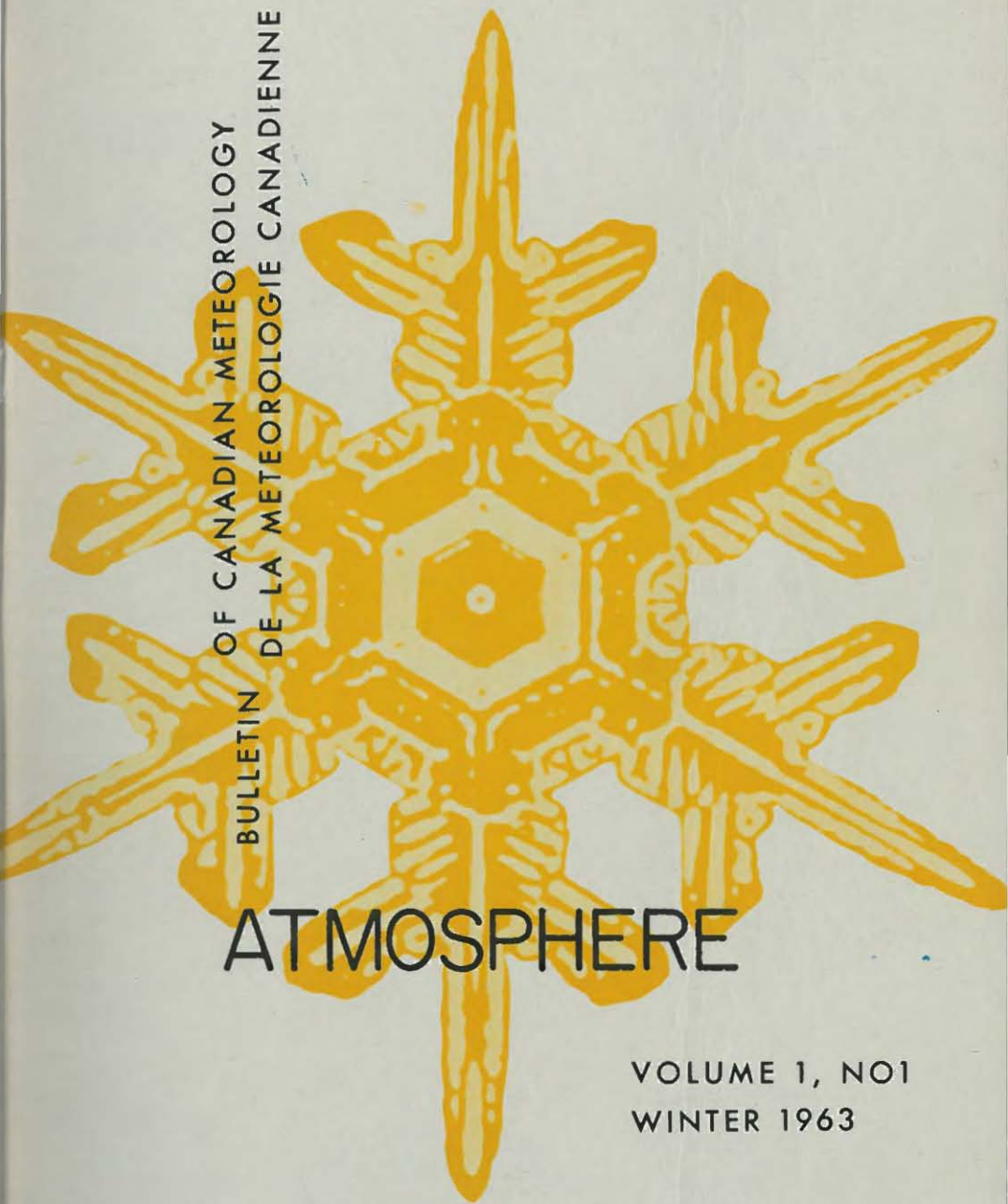
E. Truhlar

BULLETIN OF CANADIAN METEOROLOGY
DE LA METEOROLOGIE CANADIENNE



ATMOSPHERE

VOLUME 1, NO1
WINTER 1963

ATMOSPHERE

a publication of the Canadian Branch

Royal Meteorological Society

1 st Issue : March 1963

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A Message

The success of our National Meteorological Congress over the past few years has highlighted the continuing growth of Canadian Meteorology. It has also brought into relief the limitations imposed on our activities by distance and economics . The only remedy for this situation lies in effective internal communications. Your executive considers that publication on the level of original research can best be achieved through established journals such as those of the Royal and American Meteorological Societies. For other levels, it is apparent that we can render a service by initiating a bulletin of Canadian Meteorology. The editorial committee is charged with interpreting and fulfilling this objective and has, I am sure, the best wishes of all the members in this endeavour.

B. W. Boville
President, Canadian Branch
Royal Meteorological Society

An Editorial

Teaching of meteorology, and research in a wide variety of meteorological topics, are being actively pursued in Canada at the present time. The vigour of these activities may perhaps partly escape notice, as not everything finds its way into print. The only source of concise information on Canadian activities in meteorology is the relevant report and bibliography in the annual CANADIAN GEOPHYSICAL BULLETIN. The purpose of that publication is to provide, for readers inside Canada and in other countries, a picture of Canadian activities in geophysics, together with a bibliography for the year under review. Institutions or individuals who wish to be placed on the mailing list for the Canadian Geophysical Bulletin should write to the Secretary, Associate Committee on Geodesy and Geophysics, National Research Council, Ottawa, Ontario.

We recommend this publication of the N.R.C. It offers the reader a summary statement of research in Canada. The report on meteorology in the 1962 issue contains many accounts that imply richness of substance. It is our hope that ATMOSPHERE can bring, in future issues, reviews and digests of such Canadian research in meteorology. Also, we hope that our new publication will serve as a medium of communication. To accomplish this, we need the interest and help of the Canadian Branch members.

Un mot du president

Le succès qu'a connu le Congrès National de Météorologie ces dernières années est l'image du progrès continu que n'a cessé d'enregistrer la météorologie au Canada. Toutefois nous avons pu constater par la même occasion les limites que l'immensité de notre pays et les moyens financiers restreints imposent à notre activité. Pour remedier à cette situation nous devons nous en remettre à un système efficace de communication interne. Votre executif estime que la publication des travaux effectués au niveau de la recherche pure est mieux servie par des revues qui existent déjà et dont la réputation n'est plus a faire , comme par exemple celles de la "Royal Meteorological Society " ou encore celles de l' "American Meteorological Society". Il semble que, pour les recherches effectuées à d'autres échelons, nous serions d'une plus grande utilité en publiant un bulletin qui renseignerait sur la météorologie au Canada. Aussi avons nous confié au comité qui s'occupe plus particulièrement des éditoriaux la tâche de mener à bonne fin ce projet Tous nos voeux de réussite les accompagne.

B. W. Boville
President, Canadian Branch
Royal Meteorological Society

Editorial

L'enseignement de la météorologie ainsi que la recherche dans les differents secteurs de cette science se poursuivent activement au Canada à l'heure actuel. L'intensité de ces activités vous a peut-être echappé, car tout n'arrive pas a être publié. Le "Canadian Geophysical Bulletin" avec ses comptes rendus et sa bibliographie sur la météorologie , est la seule revue d'information précise sur ce qui se fait au Canada dans ce domaine. Le but de cette publication est de fournir aux lecteurs canadiens et à ceux d'autres pays , une idée des activités canadiennes en géophysique, ainsi qu'une bibliographie pour l'année en question. Les institutions et les personnes desirant recevoir le "Canadian Geophysical Bulletin" devraient écrire au Secretaire, Associate Committee on Geodesy and Geophysics, National Research Council , Ottawa, Ontario.

Nous recommendons cette publication. Elle offre aux lecteurs un resumé de ce qui se fait au niveau de la recherche au Canada. L'édition de 1962 contient de nombreux et substantiels comptes rendus sur la météorologie. Nous esperons qu' "Atmosphère" puisse faire de même et ainsi être l'occasion d'échanges fructueux entre les interessés. Afin d'y parvenir, nous sollicitons votre intéret et votre collaboration.

ARCTIC WINTER

B. W. Boville - McGill University

"The Arctic winter" may well become the hallmark of this passing season. In January bitter cold waves moved far to the southwest over Europe bringing disaster to many areas, and unprecedented snowfalls fell along the Mediterranean coast. A narrow branch of the cold outbreak spread westward casting a winter blanket over the United Kingdom and coal supplies were reduced to emergency levels.

North America also suffered from the winter aberration. Another arm reached down from the Arctic wilderness into the western United States and extended its grip eastward across the Gulf States and the Carolinas. Abnormal sub-zero temperatures were recorded at weather stations over most of the United States. Occasional icy fingers even penetrated the Rocky Mountain barrier to chill Vancouverites and nip California crops.

Eastern Canadians, meanwhile, had mixed blessings. Mild air moving up from the south kept temperatures at moderate levels but the accompanying moisture continued to run up the snowfall figures. Montreal's accumulated total passed the 80 inch mark, draining the city snow-removal budget at the rate of $ 100,000 per inch.

To the meteorologist, isolated from the woes of the private citizen, these events could be paraphrased (though not thereby explained) in the following terms : The mid-latitude westerlies - the Ganges of the general circulation- crossed Alaska over a full - latitude eastern Pacific ridge. From the Yukon the stream continued its clockwise turn moving down parallel to the east slope of the Rockies. During this southward motion the flow gradually developed cyclonic vorticity , through the Rossby-effect of the earth's rotation, and curved eastward around the strong Hudson Bay cold low. The broad stream swept across eastern North America from the Great Lakes to Florida and then turned northward through Newfoundland and Labrador. There the spin again changed to the right and the current crossed ice-bound Greenland bending through Scandinavia into the heart of western Europe. So great was this last turn that some of the clockwise trend continued westward across the United Kingdom setting up a classical blocking pattern with a high pressure centre near Iceland and a low pressure centre over the Azores-Portugal route. From the Azores, moisture laden westerlies ran eastward through the Mediterranean, over the Black Sea and into the Asiatic complex.

On Saturday, January 19th, barographs from Great Slave Lake to the Red River recorded pressure falls of up to 10 mb per 3-hour period, as a low pressure area moved through from the Beaufort Sea and deepened to 990 mb over Saskatchewan. Clairvoyant indeed would be the forecaster who could predict the details of the apparent chain reaction which followed this event, stirring the homosphere from top to bottom and in the end freeing millions of people from the abnormal deep-freeze. Prodigious also would be the atmosphere model capable of reproducing such a hydrodynamical cycle.

On Sunday, as the Saskatchewan low filled, a new low deepened over Lake Ontario, then curved cyclonically through western Quebec and Ungava and stalled over Hudson Bay. On Monday, a third low dumped snow on the Maritime provinces and then tracked northward along the Labrador coast deepening to 956 mb as it recurved towards the cold low over Hudson Bay. The main cold low then drifted south turning back into Quebec

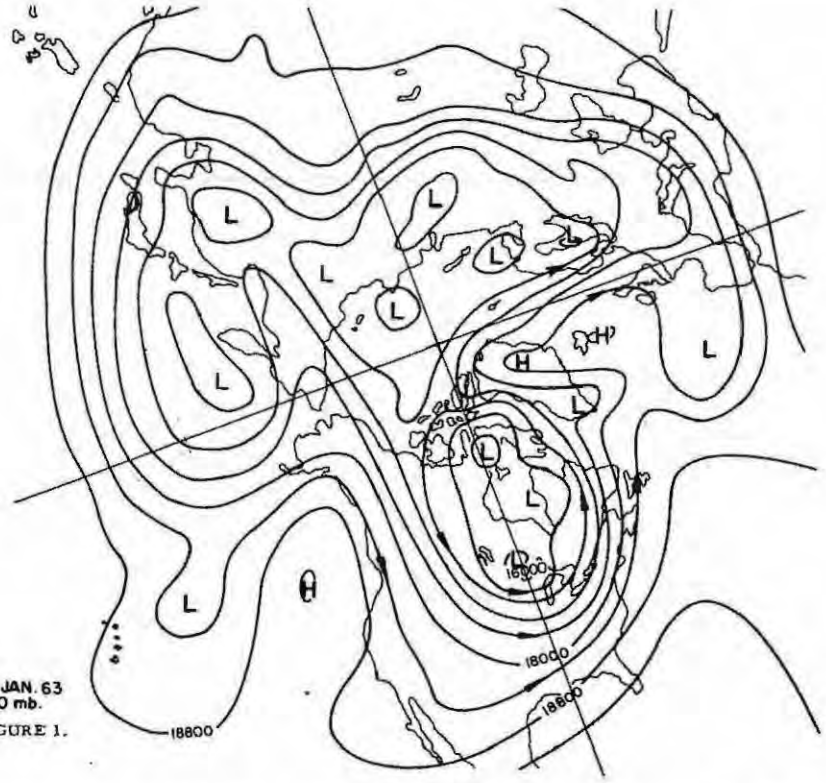
on Thursday. At that time the next developing storm was crossing New England and it combined with the previous low to reach a depth of 939 mb over Davis Strait. The pressure difference from that low to the highs over western Canada and the United States amounted to about 100 mb - a differential equivalent to 10 per cent of the total atmospheric pressure. As this massive low passed northward into Baffin Bay, the final storm of the series moved from Cape Cod to Ungava but failed to achieve the intensity of the previous lows.

During the procession of events over eastern North America the Atlantic blocking high moved eastward to the Norwegian coast then southward to the United Kingdom initially worsening the weather situation over Europe. However, the great cyclonic developments apparently represented an oscillating hemispheric energy balance, and by the end of January the Atlantic block was on its retrogressive move to Greenland. This permitted some mild Atlantic air to return to the European scene. At the same time the eastern Pacific ridge went through an hour-glass phase. The intensifying northern high pressure cell finally separated and moved northwestward toward Bering Sea. The westerlies then broke through into the western United States, setting up a new storm track across Oregon and Montana. These events brought at least temporary relief from the bitter Arctic siege.

McGill's stratospheric meteorologists surveyed these tropospheric rumblings with growing excitement. Four years of charts had led them to the synoptic conclusion that the thermal oscillations and final warmings of the polar-night stratosphere were causally linked to intense tropospheric events. However, most of the large changes had taken place over the Arctic and were difficult to document. Now one of the more intense stratospheric warmings was occurring within the North American radiosonde network.

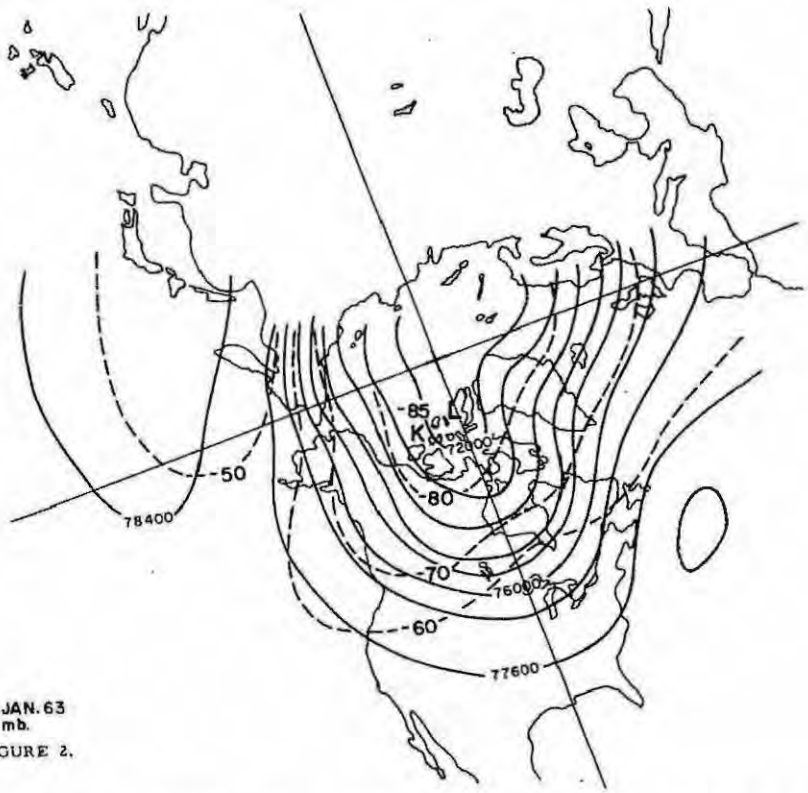
In mid-January, a strong stratospheric polar vortex with central temperatures of -85°C lay over the Arctic basin. By Monday, January 21st, an intense warming had developed over Quebec, raising 30-mb temperatures to -32°C and the -85°C cold core had shifted southwestward to the Alaska panhandle. On Saturday, the warming trend had touched nearly all of the polar region and the warm centre had reached - 18°C as it drifted northwestward to the top of Hudson Bay. By the end of January the warming covered all the northern stretches of the hemisphere and the warm centre had retrogressed further to Great Slave Lake. The cold core had diffused over the eastern Pacific and its central temperature was up some twenty degrees. Two great anticyclones were spreading across the polar basin and the stratospheric winter was effectively over. The Arctic stratosphere would undergo further radiative cooling before the return of the sun, but could not again attain the low temperatures of mid-winter.

The correspondence of the tropospheric and stratospheric events in both time and space leaves little doubt about their interaction and tends to confirm an upward propagating mechanism. The abundance of new information, including rocket and ozone soundings, will provide the material for intensive studies to formulate the details and structure of the interaction mechanism.



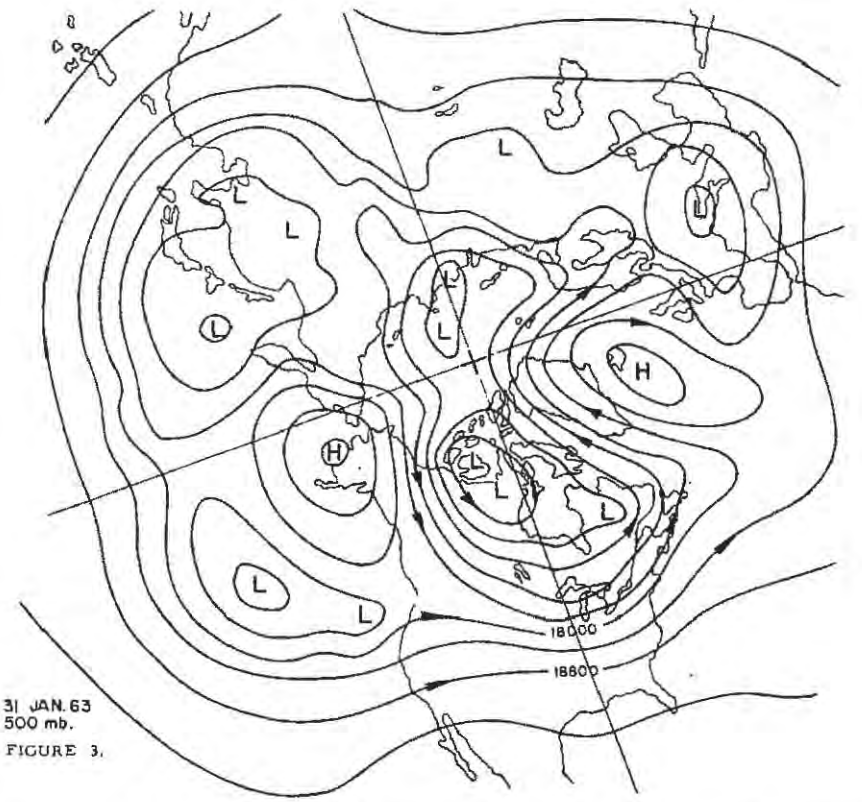
14 JAN. 63
500 mb.
FIGURE 1.

THE 500 MB LONG WAVE PATTERN CENTRED OVER NORTH AMERICA HAS A VERY LARGE AMPLITUDE. HEIGHTS ARE ABOUT 1000 FT. ABOVE NORMAL IN THE GULF OF ALASKA RIDGE AND THE BLOCKING HIGH OVER ICELAND , AND CORRESPONDINGLY BELOW NORMAL IN THE HUDSON BAY LOW. NOTE THE ENTRY REGIONS FOR COLD ARCTIC AIR OVER WESTERN NORTH AMERICA AND NEAR SCANDINAVIA.



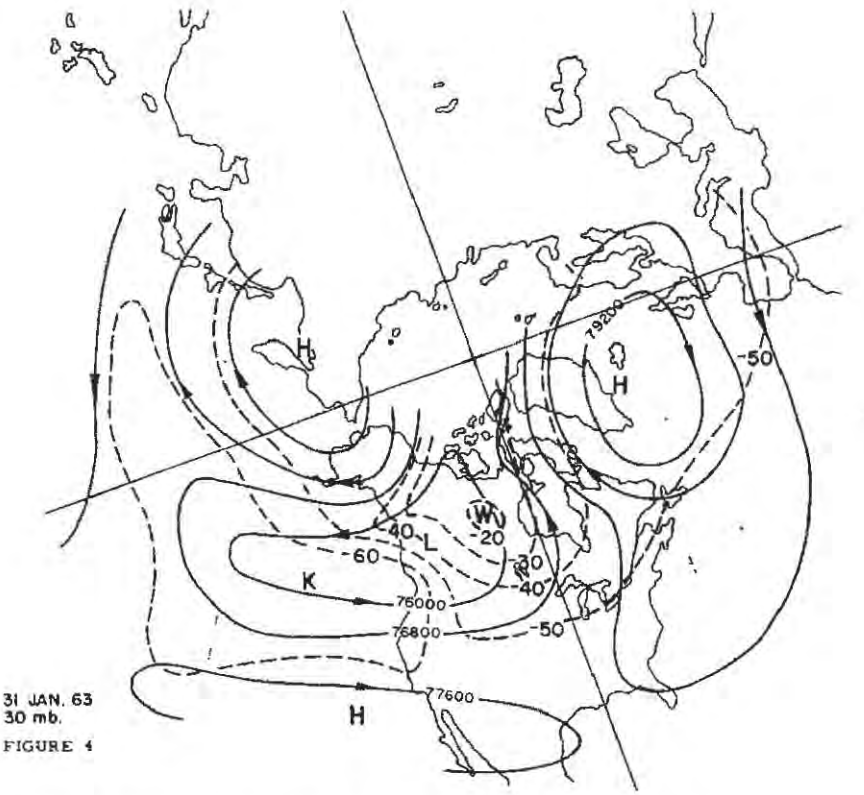
14 JAN. 63
30 mb.
FIGURE 2.

THIS 30 MB CHART IS FAIRLY TYPICAL OF THE MID-WINTER STRATOSPHERE. THE WARM HIGH NEAR JAPAN AND THE COLD TROUGH OVER NORTH AMERICA ARE SOME 20 TO 30 DEGREES WEST OF THEIR AVERAGE POSITIONS. SOME THERMAL ASYMMETRY IS ALREADY APPARENT OVER CANADA.



31 JAN. 63
500 mb.
FIGURE 3.

THE 500 MB FIELD HAS BECOME CONSIDERABLY DISTORTED SINCE MID-JANUARY. A HIGH CELL HAS MOVED NORTHWEST TO THE BERING SEA AND MILD WESTERLIES CROSS THE ROCKY MOUNTAIN STATES. THE COLD INFLUX FROM THE NORTH WEST TERRITORIES IS DIRECTED TOWARDS THE GREAT LAKES RATHER THAN THE MID-WEST. THE NORTH ATLANTIC HIGH HAS RETROGRESSED TOWARDS GREENLAND WHERE HEIGHTS ARE 2000 FT. ABOVE NORMAL.



31 JAN. 63
30 mb.
FIGURE 4

THE STRATOSPHERE HAS CHANGED REMARKABLY. TEMPERATURES HAVE RISEN SOME 60 DEGREES OVER THE POLAR BASIN AND A WARM CENTRE OF - 19°C LIES OVER THE CANADIAN SUB-ARCTIC. A LARGE ANTICYCLONE HAS GROWN OVER THE NORTH ATLANTIC SECTOR AND THE COLD VORTEX HAS SPLIT INTO WEAK MID-LATITUDE CELLS.

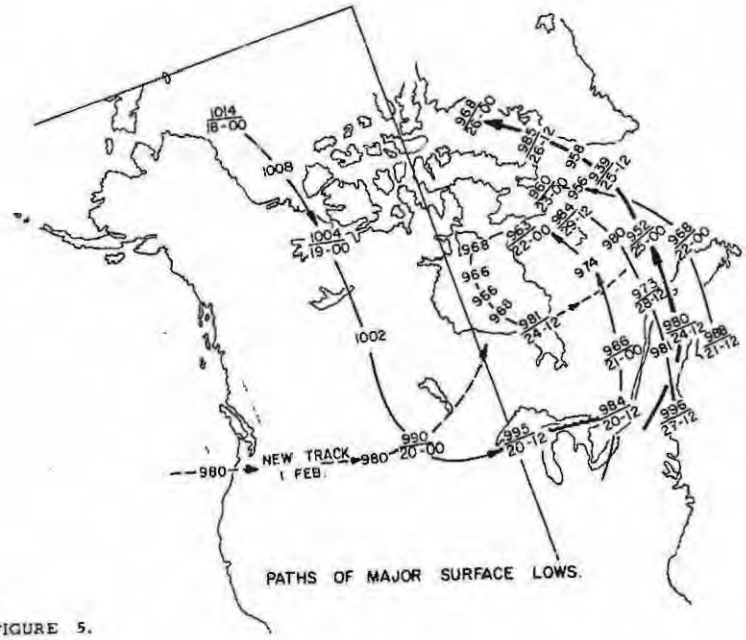


FIGURE 5.

THE TRACKS OF THE MAJOR SURFACE LOWS OVER NORTH AMERICA IN LATE JANUARY. NOTE THE UNUSUAL DEEPENING OF THE LOW MOVING DOWN ACROSS WESTERN CANADA ON THE 19TH. THE MAJOR DEVELOPMENTS THEN OCCURRED AS LOWS MOVED UP EASTERN NORTH AMERICAN FRONTAL ZONES AND RECURVED INTO THE CENTRAL COLD CORE. A NEW 980 MB LOW CAME IN FROM THE PACIFIC ON FEBRUARY 1 ST.

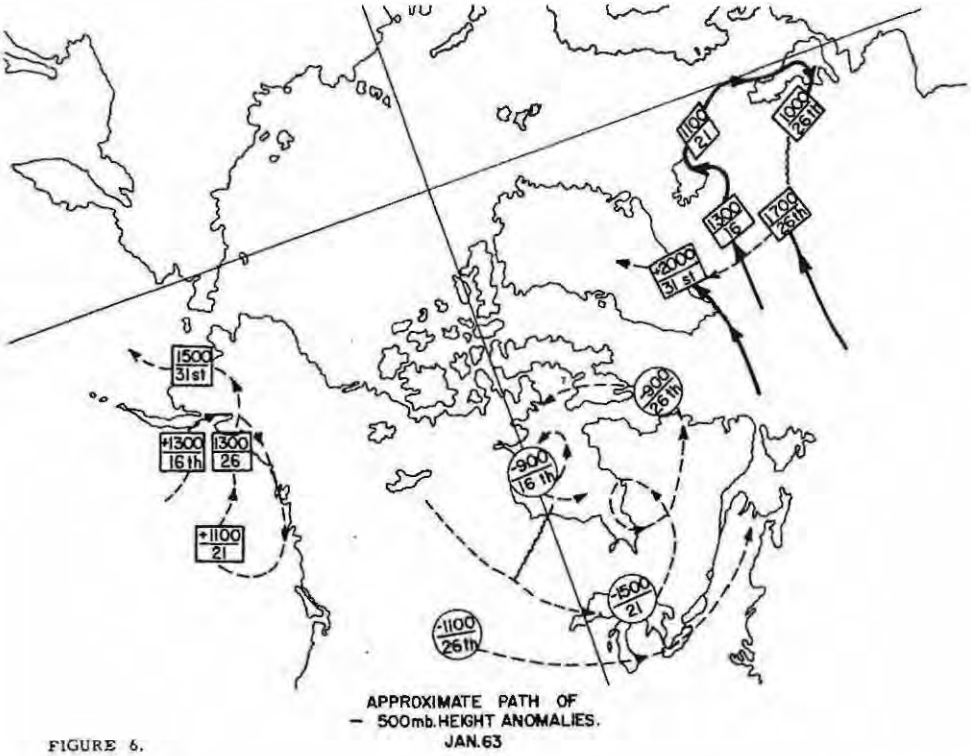


FIGURE 6.

THE TRACKS OF THE 500MB HEIGHT ANOMALIES (DEPARTURES FROM NORMAL IN FEET) ARE RATHER SIMILAR TO THE SURFACE SYSTEMS OVER NORTH AMERICA. THE TRACKS OF THE ATLANTIC CENTRES SHOW THAT THE RETROGRESSION TOOK PLACE AS A SERIES OF WARM RIDGES INTENSIFIED OVER THE WESTERN NORTH ATLANTIC RATHER THAN BY A DIRECT MOTION OF THE ORIGINAL HIGH.

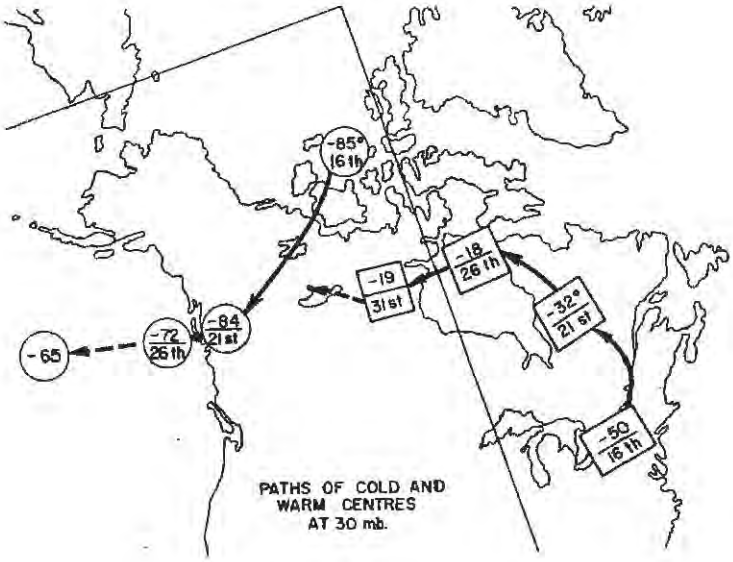


FIGURE 7.

THE APPROXIMATE CENTRES OF THE COLD CORE AND THE INTENSIFYING WARM ZONE AT 30 MB ARE SHOWN AT 5 -DAY INTERVALS. THE SOUTHWESTWARD PLUNGE OF THE COLD CORE TO THE ALASKAN PANHANDLE OCCURRED JUST AFTER THE SURFACE LOW (FIG. 5) MOVED DOWN ACROSS WESTERN CANADA. THEREAFTER THE COLD CORE DRIFTED SLOWLY WESTWARD TO BECOME LOST IN THE MEAGRE PACIFIC RADIOSONDE NETWORK. THE WARM ZONE DEVELOPED AND INTENSIFIED OVER THE STRONG AND PERSISTENT REGION OF CYCLOGENESIS AT SEA-LEVEL AND RETROGRESSED NORTH-WESTWARD IN ABOUT THE SAME MANNER AS THE 500 MB ANOMALIES.

A REVIEW

" Extremes of Wind Shear", by A. F. Crossley. Meteorological Office, Scientific Paper No. 17. H. M. S. O. , London, 1962, 23 pp. 3 s.

This paper is the result of a compilation from 48 listed references of extreme wind shears, undertaken with an eye on the development of supersonic flight. An aircraft flying with sufficient speed through a zone of sufficient shear will experience a gust. Similarly, rockets and missiles will be subject to turning moments, so the question is very topical. Unfortunately Mr. Crossley does not give values.

The dimension of shear is 1/T. The distance through which shear is sustained is of importance. Vertical shears are conveniently given in knots/1, 000 ft. Whereas a shear of 3, 500 kt over a distance of 20 feet is 'typical' for the distance , shears of 79 kt/1,000 ft. over 980 feet and 18 kt/1, 000 ft. over 9, 200 feet are similarly extreme. Horizontal shears are smaller by a factor of between 5 and 10 and are usually stated in knots/nautical mile. Examples of extreme values are 40 kt in 10 n. m. and 80 kt in 29 n. m.

From the available observations, made in various places, Mr. Crossley has heen able to construct smooth curves relating extreme shear to layer thickness. On the assumption that shear is proportional to wind speed, supported by data from the Crawley automatic radar theodolite to 10, 000 feet, he infers that it is possible to deduce from wind speed data, the frequency with which a particular shear value may be exceeded anywhere.

The greatest shears are nomally associated with the jet stream of the Ferrel westerlies. More than 100 miles to the side of the core, vertical shears are negligible and noticeable only in the vicinity of the tropopause. The largest horizontal shears occur at the level of the core and within about 300 miles of it. Theoretically, there is no limit to the magnitude of the shear on the cold side of the jet, but on the warm side shears cannot exceed the Coriolis parameter without instability. Mr. Crossley examines cases where the anticyclonic shear was reported to exceed the Coriolis parameter and concludes that the observational evidence is not sufficiently rigorous. Further, the critical value of cyclonic shear for turbulence is so often exceeded without clear air turbulence being experienced by aircraft in flight (hence not all shears are 'abhorred') that he suggests that the criterion may have no relevance to the initiation of turbulence. In this connection the report by Turner (1959: Met. Mag. 88, pp. 33) comes to mind. He found that reports of CAT by British European Airways pilots overflying France might be interpreted as indicating its origin in orographic standing waves.

Shears in Japan do not fit into Mr. Crossley's picture, as they are too small. This difficulty is lessened by attributing them to the 'subtropical jet stream'. He remarks that "at the polar front jet stream the strongest shears are often the negative ones above the core: it still remains to be seen whether this is true also for the subtropical jet stream over Japan". Krishnamurti (1961: J. Met. 18, p. 178) finds that it is, but the point is inconclusive as the Ferrel westerlies get well down into Japan during the winter and a question of air mass identification is involved.

Essentially the paper does not deal with the westerly and easterly subtropical jets nor the polar night jet. Mr. Crossley does however say that "observations of vertical shear ..... do not suggest that the shear at very high levels is any greater than that found in the proximity of jet streams". The shears are treated independently of sign, direction, or baroclinic development. Nevertheless, the assembly of material is of interest, especially for the aviation meteorologist, who will be able to handle with it apparently anomalous wind sonde data or pilots' claims.

J.L.G.

ANNOUNCEMENTS

Seminar on the Stratosphere and Mesosphere, and Polar Meteorology.

The Arctic Meteorology Research Group, McGill University, with the collaboration of the Committee on Polar Meteorology, American Geophysical Union, announce Seminars at Stanstead College, Stanstead, P.Q. in the period 7th July to 19th July, 1963. These seminars are the fifth in a biennial series begun in 1955. In 1963 stress will be laid on the physical, chemical and dynamical problems of the stratosphere and mesosphere, together with inter-layer coupling. With the collaboration of the Committee on Polar Meteorology, American Geophysical Union, sessions will also be devoted to recent developments in polar meteorology. The seminars are intended for professional meteorologists, aeronomers and other geophysicists, but are open to all interested persons who wish to register. Space is limited, and the University reserves the right to restrict enrolment if the demand is too great.

Staff

F. Kenneth Hare, Director, Arctic Meteorology Research Group, and Dean, Faculty of Arts and Science, McGill University.

B.W. Boville, Associate Professor of Meteorology, McGill University.

Svenn Orvig, Associate Professor of Meteorology, McGill University.

Morton J. Rubin, Chief, Office of Special Programs, U.S. Weather Bureau and Chairman, Committee on Polar Metecrology, American Geophysical Union.

The topics include stratospheric energy and momentum studies, atmospheric wave structure, atmospheric ozone, automatic processing and analysis of data, stratospheric-tropospheric interaction, Arctic and Antarctic climatology and micrometeorology, techniques of stratospheric analysis, oscillations in geophysical phenomena, atmospheric tides, gravity waves and turbulence in the upper atmosphere, stratospheric radiation problems, stratospheric studies by radioactive tracer experiments, chemical reactions in the upper atmosphere, synoptic features and changes of stratospheric circulation.

The lecturers include : A. Barnes, Air Force Cambridge Research Laboratories; B.W. Boville, McGill University; A.W. Brewer, University of Toronto; George P. Cressman, National Meteorological Center, U.S.W.B.; Paul Dalrymple, Polar and Mountain Section, H.Q., Quartermaster Research and Engineering Command; R.T. Duquet, Pennsylvania State University; W.L. Godson, Meteorological Branch, Department of Transport, Toronto; Bernard Haurwitz, University of Colorado; Wayne S. Hering, Meteorological

Research Laboratory, Air Force Cambridge Research Laboratories; Colin O. Hines, University of Chicago; Walter Hitschfeld, McGill University; Julius London, University of Colorado ; E.A. Martell, National Center for Atmospheric Research, Boulder, Colorado; F. Bernard Muller, Meteorological Branch, Department of Transport, Toronto ; Lt -Col. Francis W. Murray, 3rd Weather Wing, U.S.A.F. ; Svenn Orvig, McGill University ; Morton J. Rubin, Office of Special Programs, U.S. Weather Bureau ; H. Schiff, McGill University ; M. Shimizu, Japan Meteorological Agency ; Eberhart Vowinckel, McGill University ; W.S. Weyant, Polar Meteorology Research Project, U.S.W.B. ; A. Wiin-Nielsen , National Center for Atmospheric Research, Boulder, Colorado ; G. Warnecke, Institut fur Meteorologie und Geophysik der Freien Universitat Berlin.

The fees for participation amount to $ 100. Board and residence can be provided at the College. Board can be provided separately (including families) if notice is given. The district has many motels, lakeside cottages and camp sites.

Registration will be held on Sunday , 7th July, and the opening session will be that evening. The last session will be in the afternoon of 19th July.

All enquiries to : Dean F.K. Hare,
Faculty of Arts and Science
McGill University, Montreal, P.Q.

International Union of Geodesy and Geophysics

XIII General Assembly , Berkeley, California, August 19-31, 1963.

The International Union of Geodesy and Geophysics (IUGG) is one of the General Unions constituting the International Council of Scientific Unions (ICSU). The principal objective of the IUGG is to promote the study of the problems relating to the figure and the physics of the earth, including the oceans and the atmosphere, through initiating, facilitating and coordinating research relating to those problems which require international cooperation.

The IUGG was established in 1919 in Brussels by the combining as a federation of six autonomous international associations (Geodesy, Seismology, Meteorology, Terrestrial Magnetism and Electricity, Physical Oceanography, and Volcanology) several of which had antecedents going back to the previous century. In 1922, the International Association of Hydrology joined the Union to bring the number to seven, the present-day Union "population".

Expansions and additions to the fields of interest of a number of the associations have from time to time resulted in changes in their names, so that, today, the seven constituent associations are designated as follows :

International Association of Geodesy (IAG)
International Association of Seismology and Physics of the Earth's Interior (IASPEI)
International Association of Meteorology and Atmospheric Physics (IAMAP)
International Association of Geomagnetism and Aeronomy (IAGA)
International Association of Physical Oceanography (IAPO)
International Association of Volcanology (IAV)
International Association of Scientific Hydrology (IASH)

Officers of the International Association of Meteorology and Atmospheric Physics are, for 1960 - 1963 :

President	Dr. Horace R. Byers (USA)
Vice Presidents	Dr. A.M. Oboukhoff (USSR)
	Dr. R.C. Sutcliffe (Great Britain)
Secretary	Dr. W.L. Godson , Meteorological Branch, Dept. of Transport, 315 Bloor Street West, Toronto 5, Ontario.

The following program of meetings of the Association of Meteorology and Atmospheric Physics is provisional :

Tuesday, August 20, 1963

P.M. : Plenary Session, including Presidential Address, Report of Secretary and further business.

Wednesday, August 21 - Thursday, August 22, 1963

Upper Atmosphere meteorology symposium

Ocean-Atmosphere interaction symposium with IAPO

Friday, August 23, 1963

Upper Atmosphere meteorology symposium

Radio meteorology symposium

Saturday, August 24, 1963

Upper Atmosphere meteorology and aeronomy symposium with IAGA

Radio meteorology symposium

Monday , August 26, 1963

Symposium on evaporation

General scientific sessions on atmospheric structure

Tuesday, August 27, 1963

A.M. Symposium on evaporation

General scientific session on atmospheric structure

Symposium on ice crystals and ice nucleation

P.M. Session on precipitation

Symposium on cloud physics

General scientific session on climatology

Wednesday, August 28, 1963

A.M. Session on precipitation

Palaeomagnetism and palaeoclimatology symposium (with IAGA)

Symposium on results from meteorological satellites.

P.M. Final administrative plenary meeting of IAMAP

Palaeomagnetism and palaeoclimatology symposium (with IAGA)

Thursday, August 29, 1963

A.M. and P.M. General scientific sessions on atmospheric physics

A.M. IAMAP Executive committee

Friday , August 30, 1963

A.M. and P.M. Symposium on meso-scale dynamics (note :if additional miscellaneous sessions are required , they will be scheduled on Thursday and Friday, August 29 and 30, 1963).

Event Subsequent to and Independent of XIII General Assembly

Monday-Saturday , September 2 - 7, 1963

Symposium on dynamic meteorology (large-scale atmospheric processes), Boulder, Colorado.

National Meteorological Congress, Quebec City, June 5-6, 1963.

For those who were unable to attend, and for those who perhaps missed J.L. Galloway's accounts in "Weather" of the 1962 Congress at McMaster University, we venture to review the highlights of this most memorable occasion, before offering a reminder of the forthcoming Congress a few months hence.

The Congress began auspiciously with the first session under the joint sponsorship of the Royal Society of Canada and the Canadian Branch, R.M.S. Three distinguished speakers - Dr. C. Hines, Dean F. Hare, and Dr. R.W. Stewart - presented a rather complete coverage of the atmosphere, beginning at ionospheric levels and working downward to the air-ocean interface, stressing the linkages between adjacent layers. The joint session with the Canadian Association of Physicists brought together eight papers with the common theme " Upper Atmosphere Physics", in the course of which it became quite apparent that the spectroscope is a meteorological instrument of importance. In the remaining two sessions, comprising fifteen papers, the subject matter ranged through the entire gamut of topics meteorological, indicating clearly the wide range of specific interests pursued by the Fellowship of the Canadian Branch.

The luncheon provided a pleasant opportunity for the presentation of awards. The Napier Shaw Memorial Prize was presented by Dean Hare to Dr. C. Hines for his paper (recently published in the Quarterly Journal) entitled " The Upper Atmosphere in Motion". The Hugh Robert Mill Medal and Prize was awarded to Prof. J.S. Marshall, and the Darton Prize (Canada) to Prof. Walter Hitschfeld. Prof. Boville and Dean Hare received the President's Prize. The occasion was also marked by the presentation of the Patterson Medal to Prof. Marshall and to Mr. A.J. Childs.

This year the Congress will assemble on June 5 and 6, at Laval University in Quebec City. There will be morning and afternoon sessions on each day. The morning session on June 5 will be held jointly with the Royal Society of Canada, and the afternoon session on June 6 with the Canadian Association of Physicists. Addressing the first of these two joint meetings will be two distinguished guests : Dr. A.W. Brewer, formerly of Oxford University and presently at the University of Toronto, and Dr. N.P. Fofonoff, oceanographer at Woods Hole Oceanographic Institute. Dr. Brewer will present " Ozone as a tracer element in the Stratosphere", and Dr. Fofonoff, " Dynamics of Ocean Currents".

At the time of writing , the details of the other sessions have yet to be arranged, but one will take as its theme Numerical Weather Prediction, in recognition of the arrival of the "machine age" at the Central Analysis Office.

A luncheon on June 5 will provide the occasion of the Annual Meeting of the Canadian Branch, including the presentation of prizes.

Fellows of the R.M.S. will appreciate the courteous invitation, extended by the Royal Society of Canada and the Canadian Association of Physicists, to attend a special Symposium on Space Physics on the evening of June 5. Two papers are to be read, entitled " Solar Terrestrial Relationships", and " The Canadian Satellite".

The complete program, including extended abstracts or short summaries, will appear in the next issue of this publication, planned to be in the hands of the Fellows in ample time before the Congress.

Fellows who expect to attend the Congress are asked (in fact are urged) to notify R.H. Douglas (Dept. of Meteorology, McGill University) of their intention at the earliest possible moment; they will be sent conference pre-registration forms as soon as these forms become available from Laval. Needless to say, this admonition does not apply to those who have already implied attendance by offering papers and who will be sent the forms as a matter of course.

MEETINGS OF CENTRES

Toronto Centre : 27 February, 1963

The February meeting of the Toronto Centre was held at the Bedford Road classrooms of the Meteorological Service of Canada, with Dr. J. Clodman in the chair.

Mr John Knox , Chief Forecaster, Malton Forecast Office, introduced the guest speaker, Mr. B.J. Wiggin of the United States Weather Bureau office at Buffalo, N. Y., outlining his lengthy career with the USWB which culminated in his appointment as Officer-in-Charge of the Buffalo Office in 1945.

Mr. Wiggin began his remarks by briefly outlining the history of weather services at Buffalo up to the present time when the acquisition of a WBR-57 radar opened new possibilities for the provision of these services.

With a series of spectacular colour slides and time lapse film of radar patterns, Mr. Wiggin illustrated the special problems of convective precipitation and cloud in the Buffalo area. Mr. Wiggin summarized his evaluation of radar by stating that it was a weather instrument which offered much today and even more for tomorrow.

Mr. Jack Wingfield of the Hamilton City Weather Office thanked the speaker on behalf of the large audience present , and a lively discussion ensued during the serving of refreshments.

Keith McGlening

Montreal Centre : 28 February, 1963

The fourth meeting of the Montreal Centre was held at Montreal Airport under the chairmanship of Mr. R.A. Parry. The business of the evening was a visit to and a demonstration of the Bendix G-20 electronic computer recently installed in the Central Analysis Office of the Meteorological Service of Canada.

Mr. Michael Kwizak , head of the Operational Development and Numerical Weather Prediction Units of the C.A.O., led off the proceedings with a 15-minute description of the equipment. The main element of the system was the Central Processo which contained the arithmetic units and 8,192 words of core storage. Addition time was given as 12 microseconds, equivalent to about 80,000 additions per second . Six magnetic tapes were available as auxiliary equipment, along with a Control Buffer, a Line Printer, a Control Console, a Paper Tape Reader, a Card Reader and a Card Punch.

Mr. Michael Kwizak also described planned changes that would be introduced within the next two years, mentioning another 8,192 words of core storage and a Data Communicator. Replying to Dr. McTaggart-Cowan , Director of the Meteorological Service, he said that the latter would afford simultaneity of operational performance, as against sequence, with consequent economy in time of completion.

Mr. Robert Strachan then took up automatic data processing, pointing out that the computer processed one complete radiosonde report per second. Mr. H. Kruger followed with a description of objective analysis, giving two minutes as the time required for each chart. The last speaker was Mr. J. Simla on the barotropic model. Six minutes were taken to complete a 48-hour forecast.

The oral presentations were followed by a visit to the computer room, where the various elements of the system were demonstrated in operation. The meteorological

programs described earlier were run on a limited scale. The completed analysis was printed in a contoured form in 35 seconds (1,000 lines per minute) and this, along with the speed at which paper tape was read into the computer (500 characters per second) represented the most impressive phase of the operation.

The attendance exceeded the usual high average, and included members from Toronto and Ottawa.

André Robert