ATMOSPHERE

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CONTENTS

ATMOSPHERE

THE DIURNAL VARIATION OF WIND DIRECTION AT CALGARY

Further Comments

By

Professor R.W. Longley

This is in reply to Dr. R.E. Munn's comments contained in Atmosphere, Vol. 6, p.29, following my article on Calgary winds (1968) and also to Mr. R.V. Dexter's comments, a copy of which was sent me. Both these gentlemen find a similarity with the well-known land and sea breeze. This has come from a superficial examination of my report. It is worthwhile, in reply, to examine some of the differences between the Calgary situation and that of the sea breeze.

First, consider the temperature. According to the usual explanation of the land and sea breeze, this develops because of a temperature contrast across the boundary. Dexter (1958) shows this in his Fig. 1. According to this diagram, the difference between the normal maximum at Halifax and the sea water temperature at Sambro in July is approximately 18°F. It is this temperature contrast that produces the sea breeze. Because the normal Halifax minimum is approximately equal to the water temperature, there is no evidence of a nocturnal land breeze.

The following table gives some temperatures on both sides of the Alberta-British Columbia boundary for the month of July:

ALBERTA	Mean Max.	Mean Min.	BRITISH COLUMBIA	Mean Max.	Mean Min.
Calgary A.	75	49	Golden	81	47
Banff	73	44	Kimberley	81	47
Lethbridge A.	80	52	Revelstoke	81	51
Cowley A.	76	47	Crescent Valley	82	47
Raymond	82	51	Kamloops	85	54
			Kelowna	83	53
			Princeton	84	53

Here, one has difficulty making comparisons because of varying altitudes, but the best can be made using Lethbridge and Kimberley data. At the same altitude (3018 and 3016 ft.) and close together, they show little difference. Even the minimum at Lethbridge may not be representative for seven years' data at the Experimental Farm indicate that the minimum there is 1.5°F below that at the airport. One finds, using these two stations in particular but the other station data as well, no evidence of the large difference reported by Dexter.

Secondly,consider the wind direction. One well-documented characteristic of sea breezes is that the wind is nearly perpendicular to the coastline initially and veers slowly during the afternoon. Dexter brings this out in his Fig. 9, which recognizes that the wind never parallels the coastline. Munn suggests that the 50 miles from the mountain range to Calgary provides sufficient space for the Coriolis force to act and so to cause the wind to become northwest at Calgary. A description of sea breezes along the south coast of Australia provides some information for comparison. Clarke (1961) presents in his Fig. 4 a "typical sequence". According to this figure, the wind vector parallel to the coast was of significance only 120 miles from the coast and after 2000 h., and even then the wind had a minimum angle of 35° with the coastline. At Calgary any increase of southwest wind, i.e., perpendicular to the mountains, was during the morning hours while the frequency of southeast winds, i.e., parallel to the mountains, began by 09 h. I am not aware of any study of sea breezes at distances of 50 miles or more from the coast which shows the characteristics of the Calgary winds.

On the basis of the information I have quoted, I find myself refusing to accept the conclusion of Mr. Dexter that the Calgary winds are a "sea breeze" effect. Regarding Dr. Munn's comments, I cannot determine whether he explains the winds as a mountain-and-valley wind or a land-and-sea breeze wind. He seems to imply both.

The mountain and valley effect is very evident in the winds at Fort McMurray (Fig. 1), showing the influence of the high land to the south. Lethbridge in the mouth of the Crows Nest Pass has also a mountain and valley effect, but here the shift is from southwest to east, that is along the flow and perpendicular to the mountain range. The winds at Penhold may show some influence of the mountain range and, as at Calgary, have a tendency for southeast winds during the afternoon. But the high land toward Olds to the south and toward Hillsdown to the east make it difficult to sort out the different influences. At Coronation there is very little evidence of a dirunal wind shift. The 11 h. and 23 h. wind roses for Coronation are almost identical to those shown. It is possible, from the evidence available, to suggest that winds from the mountain slopes 50 miles west cause the night-time northwest winds at Calgary. But the hypothesis needs further support before it can be confidently accepted; and to seek for an explanation of the daytime southeast winds in the upslope of the mountain slopes seems useless.

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TOWER INSTRUMENTATION WITHOUT HAZARD

By

J.W. Fraser[1/] *and D.A. Tetu*[2/]

The installation and servicing of instruments at considerable heights above ground is hazardous for personnel without special training or aptitude for this type of work. It is particularly hazardous when accepted safety devices are lacking and during adverse weather conditions such as high winds or freezing rain.

According to the Accident Prevention and Compensation Branch of the Department of Labour, Canada,[3/] workmen's compensation benefits would not be affected by the lack of protective devices but the department concerned would be open to criticism should there be an accident. This guarantee of compensation "should there be an accident" does not justify asking untrained personnel to perform such duties even on a casual basis, but high riggers or steeplejacks are not normally available.

Confronted with the necessity of installing, maintaining and servicing recording wind equipment on a 100-foot steel tower without ladders or safety devices, a tracked instrument support (Figure 1) was developed to accomplish this and to facilitate and expedite subsequent servicing without exposing personnel to mental stress or physical hazard.

Magline of Canada[4/] refined the basic idea of a single-track instrument boom, and fabricated a rigid instrument support capable of being winched up in dual tracks to the prescribed height (or any intervening level) and back down again. It was assumed that the 100-foot 20 Series B LeBlanc and Royle communications tower (Figure 1) was an adequate support structure with minimum torque, and the instrument support was designed for use in winds up to 80 mph with adequate safety factors.

1/. Research Scientist, Department of Forestry and Rural Development, Petawawa Forest Experiment Station, Chalk River, Canada.

2/. President and General Manager, Magline of Canada, Limited.

3/. Personal communication to W.M. Stiell, Acting Director of Petawawa Forest Experiment Station in 1965.

4/. Magline of Canada, Limited, Box 219, Renfrew, Canada.

Magnesium alloy extrusions and plate with composition AZ31B[5/] and properties[6/] to meet ASTM specifications were chosen because of the alloy's excellent strength to weight ratio, its high degree of stiffness, and its relative freedom from inland corrosion.

The actual instrument support structure in the form of a right-angled isosceles triangle (Figures 1, 2 & 3)is made of extruded square tubes (B217-60)[5/] and equipped with nylon glides for ease of movement in the tracks; additional nylon glides support the cable connections to the instrument. The dual tracks (Figure 1),chosen to eliminate torque and oscillation are made of extruded C section (B107-61),[5/] bolted to the cross members of the tower for alignment and greased with a graphite-base low-friction lubricant.

The instrument support is engaged in the track from the open,bottom end and winched up or down, with ordinary trailer winches(Figure 2) on 1/8-inch stainless steel aircraft control cable with a breaking strength of 1900 lbs. The cable holds the support firmly against stops at the top end of the tracks. Although this cable is quite adequate, a simple device could be installed to lock or dog the support at specified levels but it would require an extra wire to release it.

The dual track, the cable pulley at the top of the tower, and the stainless steel cables were installed by professional steeplejacks. The instrument support, with the anemometer in place, was mounted in the tracks and positioned at the 98-foot level (figure 3)by two technicians working on the ground.

The cost of the prototype[7/] and its installation in 1965 was as follows, excluding the cost of the tower:

Tracked instrument support, complete with mounting hardware and cables	...	$500.00
2 Standard trailer winches	...	20.00
Installation	...	100.00
TOTAL:	...	$620.00

5/. American Society for Test Materials (ASTM) coding.

6/. Density : 1.778 gms/cm^3
Modulus of elasticity: 6.5×10^6 lb/ sq.in.
Tensile strength : 38,000 lb/sq.in.
Tensile yield : 28,000 lb/sq.in.
Elongation : 14% of 2 in.

7/. Similar units for installation on different heights of towers are available from Magline of Canada.

Current costs would be somewhat higher, and cost of anti-corrosion treatments should be included when this equipment is considered for use in coastal areas.

This device has been in operation at the Petawawa Forest Experiment Station since August 1965. It has eliminated physical danger from servicing and maintaining a 98-foot-level instrument installation. It has also precluded damage to the equipment, an ever-present possibility when instruments are carried up and down towers, or raised and lowered on ropes.

A final,attractive consideration is that two men working at ground level can raise or lower this device in less than ten minutes. This expedites servicing and maintenance and ensures that instruments are out of operation for the shortest possible time.

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MEETINGS

MONTREAL CENTRE - FIRST MEETING 1968

Dr. André Robert of the Central Analysis Office was the guest speaker for the first meeting of the 1968-69 season on October 16. The title of his talk was "Report on recent meteorological experiments with the spectral method".

Dr. Robert pointed out that the meteorologist has to rely a lot on numerical models to study the atmosphere and he explained the differences between the existing methods for numerical prediction. The grid point method, involving finite difference approximations, has been used predominantly until now. A better method, known as the spectral method, has been evolving rapidly in the last few years. It is more accurate because it involves analytic operations on truncated series instead of finite differences.

Dr. Robert then discussed some of his experiments with the spectral method. He succeeded in alleviating the requirements of computer precision and storage with his choice of component functions. Also, he shortened the computing time for a predictive model by a factor of six by adopting the so-called "implicit scheme".

He concluded by enumerating some of the many uses to which the spectral method is being put. Not only has this method proven its usefulness in many general circulation studies,but also it is being introduced into operational models for numerical weather prediction.

Stan Woronko
Secretary, Montreal Centre

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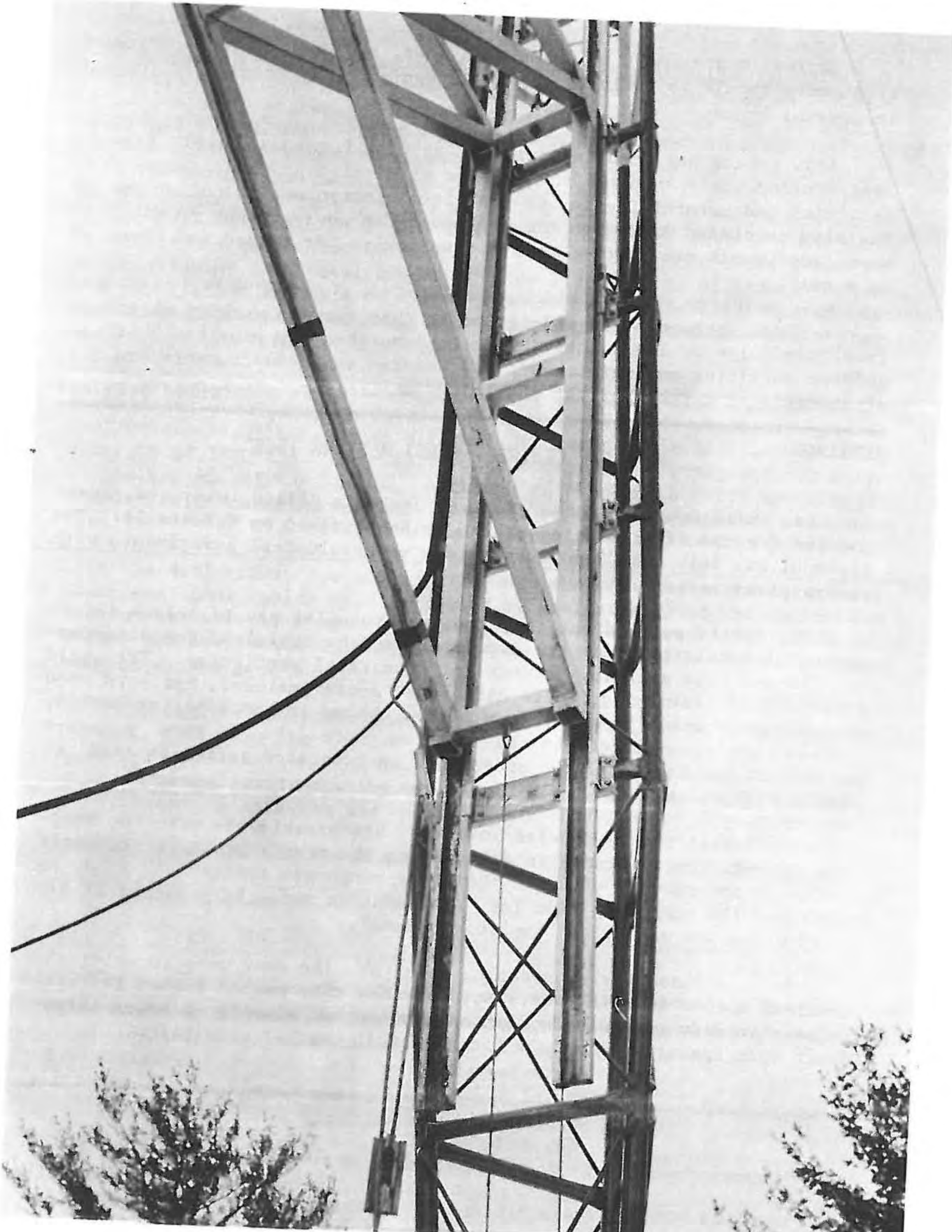

Figure 1. Detail of track construction and mounting

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LA RIVIÈRE TORNADO, JULY 20, 1968

E.H.V. Dexter

Meteorological Service of Canada

INTRODUCTION

Tornadoes are a severe weather phenomena of the southern Canadian Prairies. Because of infrequent reports of their occurrence, roughly one per summer season since the turn of the century, and also by virtue of their destructive power, the report of a tornado is a newsworthy event.

On the evening of July 20, a devastating tornado ripped a million dollar path of destruction across southern Manitoba. Fortunately there was no loss of life. The path of this storm was in a readily accessible area of the Province. It paralleled a main west-east highway and crossed a resort town where a press photographer was vacationing. It was also sighted by several technically trained individuals. Thus its progress and many details of this particular storm are well documented.

This article will attempt to describe some of the happenings on this eventful evening.

THE SYNOPTIC SITUATION

The synoptic chart for July 21 at 0000Z is shown in Figure 1. This chart shows a low pressure area associated with the Maritime front moving east across central Saskatchewan. At the same time a wave on the Polar front is moving eastward along the International Border and was centred at Pilot Mound. The initial development of the tornado took place at the crest of this wave.

The prediction of severe weather over the southern Prairies has been closely studied over the past few seasons by the Prairie Weather Central at Winnipeg[1]. These studies have developed a set of criteria for the occurrence of severe weather and reference to Figure 1 will illustrate some of these factors.

The Shilo evening radiosonde observation was missing. However, a southerly wind of 40 knots was reported at Winnipeg, and Fargo also reported a wind of the same magnitude at 5000 feet. This indicated the development of a pronounced southerly low level jet. This resulted in forcing a narrow tongue of moist air northward with the axis directed towards the scene of the occurrence. Dew points in this moist tongue had increased steadily and had reached as high as 74°F at Grand Forks. Maximum temperatures in the warm sector had exceeded 100°F over South Dakota and reached well into the nineties in North Dakota. It will be seen from the diagram that the maximum temperature ridge running from Devil's Lake to Aberdeen is located west of the low level moisture tongue. There is also a strong intrusion of dry air from western North Dakota where dew points have dropped sharply to as low as 29°F at Dickinson. It has been recognized that the placement of the low level hotter and drier air adjacent to the moist tongue and a wind flow that provides a strong gradient from dry to moist is an essential parameter in tornado development.

The Showalter Index in the warm sector air mass was -2. This would be generally accepted as lending weak to moderate support to tornado development.

At upper levels the jet stream extended eastward across the area of interest from a maximum of 110 knots over Montana. The tornado occurred at the right exit, generally considered a favourable location.

Radar scanning from the Prairie Weather Central had indicated the development of a strong line of echoes from north to south-west of Lake Manitoba to the wave crest. Tops were reported to 52 thousand with an area of maximum tops to 60 thousand in the southern end of the line.

THE PATH OF THE STORM

The tornado traversed a path roughly 25 miles in length over a period of approximately two hours. The path and points of principal known damage are shown in Figure 2.

The funnel was first sighted by Meteorological Technician Ballegeer at approximately 2330Z near the junction of Highways 3 and 34 east of Pilot Mound.

(i in Fig. 2) By driving along Highway 3 eastbound the path of the storm was followed. It was seen to touch down in a hay field north of the highway and raise a large column of dust. Swirling along it crossed a farmyard on the brow of the hill leading to the Pembina River Valley (ii in Fig. 2).

The storm then swept down the narrow but steep gorge leading to the river. Large areas of trees were levelled, a park destroyed and extensive damage inflicted on a farmyard. Dave Bonner of the Winnipeg Free Press, who was vacationing in the area took photographs as the storm approached over the crest of the hill. From there it continued down into the valley, crossing the area of the ski lodge and cabins on the south side of the valley (iii in Fig. 2).

In Figure 4 the trailer has been overturned, the tent that was near the cabin and the fencing surrounding it have been blown away. But more dramatically, the small white building to the right of figure has been completely destroyed.

Fortunately, the storm crossed the south side of the valley and while there was considerable roof damage and the top of one of the grain elevators in town was blown off, the town was spared major damage. As it left the east side of the valley the funnel appeared to be lifting and only slight tree damage and a few downed telephone poles were visible in this area.

However, the storm struck with renewed fury on the plains two miles northeast and above the town of La Rivière (iv in Fig: 2). Several farmyards were destroyed in this area. From there it continued on an east-northeast track, damaging several more farmyards as it passed some three miles north of the town of Manitou (v in Fig. 2).

Reports of damage become sketchy beyond this point but a further sighting was made just west of Miami at 0130Z (vi in Fig. 2). At this time the funnel was crossing an open field and was observed to lift from the ground and draw back into the cloud. A path of heavy rain continued on an easterly course crossing Highway 75 near Ste. Agathe later in the evening (vii in Fig. 2).

EYEWITNESS REPORTS

As in all such cases there were many eyewitness reports and details of personal adventure. There is a residual scepticism about the occurrences of tornadoes in this area and many of these reports helped to dispel this feeling and confirm the presence of a tornado.

The Police Chief in the town of Manitou reported that "At about 7 p.m. the clouds began to form and circle clock-wise. The clouds gained momentum and a cone dropped down to the ground, lifting and touching down in a zig-zag pattern."
Another witness reported, "I seen her coming, a white streak and black, about 150 feet across, she was just a-boiling."

There were several reports of the accompanying noise. One lady described it as a "terrific roaring" while another witness said it approached with "a huge sound like a magnified furnace".

Several reports indicated that it looked like a pillar of dust and smoke. One description added that it was "lifting bales of hay, trees, and other things, dis-integrating them and spewing them out. It was dark and looked like an atomic bomb mushroom. It was in no hurry. There was a big black cloud hovering over it. After the tornado, rain fell".

Among those believing it to be a cloud of smoke was a motorist. He reported, "We went to have a look. The car began to sway from side to side. The car was swerving, then it was going over and over. "The car landed upside down in the ditch and the three occupants were hospitalized.

Other reports such as "I heard a mighty roar - it was black outside. I went to the basement. Our electric clock stopped at 7:50 p.m." helped to pin down the path of the storm.

There were also the "freak occurrences". One farmyard was completely destroyed with the lumber smashed and twisted and driven into the surrounding trees. The only things remaining were the cement foundation and a horse. The latter was unharmed even though it was in the barn when it was demolished.

In another farmyard, four buildings were in a row. The first and third escaped damage. The other two were completely demolished. Steel granaries, in another instance, were picked up and deposited as twisted wreckage more than a quarter of a mile away while metal roofing was wrapped around trees at the same distance.

Another family reported almost unbearable pressure on their ear drums as the storm passed over their house. They had taken shelter in the basement. Suddenly the house lifted a few inches and settled back on its foundation, smashing windows and doors. At the same time there was immediate relief from the pressure.

THE FORECAST PROBLEM

On this particular day the possibility of severe storm activity was recognized as early as 201500Z and consultations were held with the Central Analysis Office in Montreal and with the Severe Weather Centre in Kansas City. Reference to the development of severe weather was made in the guidance issued by the Prairie Weather Central at 201545Z.

However, it was not possible at this stage to pinpoint the area of activity and forecasts for the area did not carry tornado warnings. A further deterrent under such circumstances is the inability to control the communications media, whose "efforts" on several previous occasions have resulted in public anxiety bordering on panic.

The application of severe weather forecasting techniques worked extremely well in this case and with additional experience it can be confidently stated that a worthwhile service to the public can be provided, conditional upon its controlled dissemination and proper use.

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THE DESIGN AND BENEFITS OF AN AUTOMATIC PICTURE*

TRANSMISSION (APT) NETWORK

J. Clodman

BACKGROUND

(a) Purpose Of Canadian APT Project

With the advent of weather satellites it quickly became clear that a number of questions needed answering to determine how Canada could best make use of this challenging and powerful new meteorological tool. As part of a program to evaluate the use of satellite observations, the Meteorological Service of Canada, with the assistance of the National Research Council of Canada and the Telecommunications and Electronics Branch of the Department of Transport, embarked on an Automatic Picture Transmission Research and Development Project. The purpose of the Project was to study the feasibility design and operating procedures for a possible Canadian APT Network. All aspects involving the reception and use of APT-mode observations were to be examined to assist with the planning for an operational system.

(b) Project Activities

In the first stage of the Canadian APT activities (1963-1964), a station to receive APT was developed at the laboratories of the National Research Council of Canada. This station successfully received APT photography from the TIROS VIII and NIMBUS I weather satellites placed into orbit by the U.S.A. In addition, a transportable station was built and successfully tested in the Canadian Arctic (Frobisher Bay). After further development two stations were built in 1965 by a Canadian commercial company for use by the Meteorological Service as Research and Development stations. For evaluation purposes, the stations were

*Originally presented at the United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, August, 1968.

located in close proximity to potential operational users so that the output could be tested under operational conditions. One station was located at Halifax near the Atlantic Weather Central and the Ice Central of the Canadian Meteorological Service to study the use of APT for oceanic weather forecasting and for reconnaissance and forecasting of ice in navigable waters. The second station, known as the Satellite Data Laboratory, was located at the Toronto International Airport in close proximity to the Toronto Weather Office. This station carried out studies on a wide variety of problems including APT equipment improvement, resources required for a Network, potential uses of weather satellite output, etc. so as to assist with the development of a comprehensive plan on the use of weather satellite output in Canada.

(c) Purpose of this Paper

The potential usefulness of weather satellite data makes it advisable for all countries to move ahead rapidly in this field especially as APT receptions can be carried out very economically in terms of their information content. At the same time care must be taken that the explosive rate of development in this field does not render facilities built today obsolete in a very short time. In considering a system for receiving weather satellite output in Canada, the large geographic extent, relative to the size of the population and economy in this country, creates limits on the amount that can be expended in any given region. The near proximity of the United States also raises the question as to whether it is preferable to use direct APT receptions or to obtain weather satellite photography over landlines from large U.S. facilities which receive global output by means of signals stored in the satellite. These and other questions were studied in the Canadian Project and it is thought that other countries may find some of the results of the Canadian studies applicable to their own situation. In the space available in this paper the results can be touched on only superficially but more detail can be made available by direct enquiry.

APT STATIONS

(a) Aspects Of Station Design

It is not intended, here, to go into the technical aspects of station specifications. The optimum design will depend, in part, on the level selected in the hierarchy of stations of more and more sophisticated and costly design. In essence, an APT station consists of a highly sensitive radio receiver plus an antenna and output devices. Thus, some of the considerations in determining the quality of the equipment can be listed as follows:

(i) the ability of the receiver to receive and use weak signals;

(ii) adequate dependability in order to minimize 'down-time' with associated picture loss, and to permit low maintenance and repair costs;

(iii) the capability of acceptable reception under some reasonable ambient noise conditions;

(iv) an antenna system capable of precise tracking of a satellite and of reception even when the satellite is very low on the horizon;

(v) an output device or devices capable of providing photography of adequate size without significant information degradation;

(vi) the capability of being operated without excessive manual intervention or control;

(vii) the ability to switch rapidly and easily from one satellite signal to another;

(viii) the potential for upgrading the system as the technology advances, etc. The price for which a station can be built ranges from a few thousand dollars to $50,000 or more. It should be borne in mind, however, that, for the most part, the extra cost of a high-quality station can be readily justified because of the additional data and information received by such a station.

(b) Description Of High-Quality APT Station

The specifications for a Canadian APT Station were developed after suitable investigation of commercial sources of such equipment. The components and features of the proposed station are indicated below:

(i) The antenna is directional and high-grain, and is steerable by remote control. A programmer, pre-set according to the satellite orbital information, controls the antenna tracking.

(ii) The system incorporate several cavity filters of different wave-lengths and these can be readily switched in, to match the frequency of the transmission.

(iii) An analogue magnetic tape recorder permits recording of the signal for later playback through an output device, without significant degradation in picture quality. The tapes can be used for archiving and for making extra copies of the photography.

(iv) An oscilloscope (kinescope) is used to monitor the signals as they come in and permits good-quality small photographs to be obtained using a polaroid camera.

(v) An automatic photographic facsimile system makes APT photographs available with virtually no loss in picture detail.

(c) Antenna Location And Operation

Some aspects of the antenna system deserve special mention. The tracking programmer, used to date, requires setting up each pass by hand in advance, using a set of switches. However, for future stations, in addition to the manual control, it is proposed to have a digital paper-tape control system which can operate the receiver and provide the tracking information. As many passes as desired can be placed on the paper tape in advance and the system will then operate automatically. Ideally, the antenna should be located reasonably close to the building which houses the receiver. However, there is an overriding requirement that the antenna should be placed where there is little or no contamination from ambient radio noise and signals. This means avoiding areas in the near vicinity of regular ground-to-ground and ground-to-air voice transmissions and of vehicular traffic. It is advisable to carry out a radio-noise survey before determining the site of the antenna. If the antenna has to be located far from the receiver this will increase significantly the costs of the lines carrying the signals from the antenna to the receiver and the transmissions controlling the antenna.

(d) Output Devices

For convenience and efficiency it is advisable to be able to play the signal directly through an output device and simultaneously record on magnetic tape. This permits the tape to be used for playback for additional or improved copies and as an archive medium. In the Canadian Project three types of output were examined:

(i) electrolytic facsimile (paperfax)
(ii) photographic facsimile (photo-fax)
(iii) polaroid photography of a kinescope (cathode-ray tube)

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THE CONSUMER AND THE WEATHER FORECAST

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The mounting losses of property and income which result from extreme weather events, the ever increasing use of the atmosphere as a transportation route, man's ability to modify his atmospheric environment (deliberately or inadvertently), and the ever present control which the atmosphere (the rain, the snow, the wind, the humidity, and the sunshine) exerts over our "economy",are all significant in today's society. The predictions of the atmospheric scientist, and in particular those of the weather forecaster, are, therefore, of considerable economic and social value. These predictions include weather forecasts issued several times a day to the general public and this paper attempts to give a better understanding of the general public's desire for, and appreciation of, weather forecasts.

During the past decade many advances have been made in the atmospheric sciences, including the improvement of techniques for weather forecasting,and a greater awareness of the demand for weather services by consumers. For example, the Canadian Meteorological Service has in recent years provided weather forecasts and services relevant for road maintenance (snow warnings, heavy rainfall forecasts), water control (forecasts associated with irrigation, flooding, droughts), forestry (low humidity, lightning suppression probabilities), agriculture (longer range forecasts, frost warnings), scheduling of power production, oil deliveries, retail sales campaigns, as well as specialised marine and aviation forecasts. It is, nevertheless, fair to say that the public weather forecasts have not improved in presentation or impact. Moreover there is an inevitable change (through time) in the reaction of consumers to weather and weather forecasts. It is, therefore, important that weather forecasters are aware of the public's reaction to forecasts.

Twenty years ago a survey of University of Toronto students on weather technology was published (Controller, Canadian Meteorological Service, 1949). In 1967 a similar study was conducted at the University of Victoria. Both studies used questionnaires, but in the earlier study they were completed by 200 second and third year psychology students whilst in Victoria 400 first and third year geography students were involved. In each case the sample was small and not without bias. First, both groups were relatively young and it is possible that younger people are more willing to accept the discomforts resulting from the weather than older people. Second, the normal weather patterns of Toronto and Victoria are not directly comparable in that Toronto's precipitation is often showery and not in large amounts whereas the temperature provides many surprises. This contrasts with Victoria where the temperature regime is much more regular and predictable and precipitation becomes a more critical parameter insofar as interferring with daily activities.

Despite these reservations and possible bias, it is believed that some meaningful comparisons can be made. The questions and the replies (expressed as a percentage of the total number of replies) were as follows:

1. *How frequently do you normally read, listen (or watch) the daily weather forecasts?*

	U. Victoria	U. Toronto
(a) Almost always	15	20
(b) Fairly often	43	47
(c) Hardly ever	42	33

2. *What does the phrase "westerly winds" mean to you?*

It means blowing from:

(a) East to west	10	5
(b) West to east	90	95

3. *A wintry afternoon on which the clouds were so thick that you had to work by artificial light would be best described by you as:*

(a) Cloudy	2	6
(b) Dull	33	30
(c) Gloomy	27	21
(d) Overcast	38	43

4. *For the purpose of your everyday activities a wind forecast would be most helpful if expressed as follows:*

		U. Victoria	U. Toronto
(a)	Southwest winds of 25 m.p.h.	27	10
(b)	Strong southwest winds	19	64
(c)	Strong southwest winds of 25 m.p.h.	54	26

5. *Assuming that a "clear" day is the direct opposite of an "overcast" day, how would you describe a day something between the two (e.g. with 7/10 of the sky covered by clouds)?*

		U. Victoria	U. Toronto
(a)	Fairly bright	0	4
(b)	Cloudy	11	22
(c)	Partly cloudy	36	64
(d)	Dull	4	8
(e)	Partly clear	15	*
(f)	Mostly cloudy	34	*

6. *A day on which the visibility was good and there were few clouds (e.g. no more than 2/10 of the sky covered) would best be described as:*

		U. Victoria	U. Toronto
(a)	Fair	22	19
(b)	Sunny	29	17
(c)	Clear	41	40
(d)	Bright	8	24

* Not specifically asked, but these items were suggested by some University of Toronto Students. They were, therefore, included in the University of Victoria questionnaire.

7. *A forecast reading "Tomorrow will be partly cloudy" means to you":*

		U. Victoria	U. Toronto
(a)	Part of the sky will be covered by clouds all day	34	49
(b)	Part of the sky will be clear, remainder cloudy	45	38
(c)	Rain will fall intermittently during the day	1	2
(d)	The forecaster is only partly sure what to expect	2	7
(e)	Will be cloudy in some areas, clear in others	18	6

8. *In a weather forecast which of these items is usually of most interest to you? (rank position 1, 2, 3, 4).*

(a)	the *temperature* expected tomorrow	2.34	1.78
(b)	the clearness or cloudiness of tomorrow's *sky*	2.77	2.82
(c)	the expected *wind* direction and velocity	3.51	3.64
(d)	the *precipitation* (rain, snow) expected	1.37	1.84

The preceding questions were identical in both the 1948 and 1967 surveys and some meaningful comparisons may therefore be made. Generally, few major differences were found as is evidenced in the responses to question three where percentages favouring dull/gloomy/overcast were very similar. However, in question four, it is reasonably clear that the 1967 survey indicated a preference for specific wind information since the phrase "strong southwest winds of 25 m.p.h." was indicated as being preferable by 54% of the 1967 students, compared with only 26% in the 1948 survey. Further, in question five, the term "partly cloudy" was less favoured (or understood)in 1967 than in 1948.

Today's weather forecaster may be encouraged by the responses to question seven, in that only 2% of the 1967 surveyed students thought that "the forecaster is only partly sure what to expect" - compared with 7% in 1948. However, if the response to question two about the meaning of "westerly winds" has any significance, then at least in Victoria the forecaster still has a difficult task since 10% of the surveyed students thought that westerly winds blew from east to west! This could, of course, simply mean that the University of Toronto student *in 1948* was 'better educated' than his counterpart at the University of Victoria in 1967, but that is another story.

The most significant question as far as the forecaster is concerned is probably question eight, where students were asked to indicate the 'importance' to them of the items in a weather forecast. In the 1967 survey 48% indicated that the *precipitation* expected was the item they most wanted to hear about (with an average ranking of 1.37) compared with only 9% who thought that winds were of most interest (average ranking 3.51). The 1967 survey indicated quite clearly therefore that in Victoria a weather forecast should emphasize (1) the precipitation expected,(2) the temperature, (3) the state of the sky, and (4) the winds, in that order. By comparison the 1948 University of Toronto survey indicated that the *temperatures* were the most important (average ranking 1.78), closely followed by *precipitation* (average ranking 1.84). These results could indicate a number of things, but probably of most significance is that the normal (climatic) conditions (i.e. just how important *are* temperatures, snow, rain, wind, cloud, sunshine, etc. to the consumer of the local weather forecasts) need to be taken into account, and that an ideal forecast (terminology-wise) in one area may not be ideal in another.

Opportunity was taken in the 1967 survey of asking some additional questions and the results appear to warrant comment.

The first question related to the use of the newspaper, the radio, and television as means of obtaining weather forecasts. The results are as follows:

How often do you normally:

	Listen to weather forecasts on the radio	Read the weather forecasts in the paper	Look at weather forecasts presented on TV
Every day	20	5	3
Almost every day	26	9	10
Sometimes	25	37	31
Rarely	8	30	36
Never	4	19	19
Listen but don't pay attention	16	not asked	not asked

These results indicate quite clearly that less than half the students surveyed took an 'active' interest in weather forecasts, and possibly surprisingly only 14% read the weather forecasts in the newspapers regularly, and only 13% looked at the T.V. weather forecast on a regular basis. Radio fared a little better in that 46% indicated that they listened to the weather forecast every day or almost every day. Perhaps the most significant conclusion from the survey was that the great majority of students did not read, listen or watch the weather forecast, and indeed it may therefore be more appropriate for the weather forecasters to concentrate a little more on the 20 to 25%(?) who seem to be interested in their product than on the 75 to 80% who are not interested. The problem is to find out the type of person who *is* interested in the forecaster's product, and then give him the information that he requires.

The second question related to the value of weather forecast. The question was: *"If you were wanting to know what the weather was going to be tomorrow, and you could rely 100% on the information given to you by the weather forecaster, how much do you think the information would be worth to you?"*

	Males	Females	All
Nothing	27	30	29
5 cents	9	9	9
10 cents	14	13	13
25 cents	12	14	13
50 cents	7	12	10
$1.00	7	7	7
More than $1.00	25	16	19

The response indicates a reasonably healthy (financially) attitude to accurate weather forecasts, and it is especially encouraging - from the weather forecaster's viewpoint - that 36% of the students questioned were willing to pay (at least according to the questionnaire) 50 cents or more for information if it was guaranteed to be 100% correct.

The rescheduling of activities because of the weather forecast was the third question. It stated *"Do you reschedule, if this is possible, any of your activities because of the weather forecast?"* Five per cent said "nearly always", 65% "sometimes", 25% "rarely", and 5% "never". Thus 70% occasionally appeared to reschedule their activities because of the weather forecast. However, since according to question one, only 46% regularly listened to the weather forecast, there appeared to exist a communication gap between the 46% and the 70%. However, there are many people who only listen to the weather forecast when something important is scheduled; indeed, it is clear that there are important forecast days as well as less important forecast days and a successful forecasting programme presumably should take this into account.

The fourth question related to the accuracy of the weather forecasts. The question was: *"Of the weather forecasts that you have heard or read during the last few days, what proportion do you think were correct?"* The responses were:

90% or more (correct)	...	9%
75% to 89%	...	46%
50 to 74%	...	27%
20 to 49%	...	3%
less than 25%	...	2%
not sure	...	13%

Perhaps those indicating "not sure" were in reality giving the only really accurate replies, since, as it is well known, the verification of forecasts is difficult. Nevertheless, it is gratifying to note that over half of the students questioned indicated an accuracy (to them) of at least 75%.

Finally, the question: *"Do you think that more money should be provided for meteorological services (including weather forecasting) in Canada?"* was asked. Of the 450 students questioned 39% said "yes", 10% said "no", and 51% were "not sure". Thus, 61% were either not sure or said no, possibly not the most encouraging response to Canadian meteorologists.

No claim for any degree of completeness is made for this survey. Nevertheless, as also reported by Sherrod and Neuberger (1958), a survey such as reported in this paper indicates that the attitudes of the "general public" towards forecasting terms *is* important and may change from time to time and from place to place. In particular, the meteorological profession must remind itself that time may alter the consumer's *understanding* of weather forecasts and weather forecasting terminology, as well as the consumer's *requirement* for weather forecasts. Indeed, more study along these lines may in fact be just as worthwhile in the long run as more accurate forecasting, however desirable the latter is, and this paper is offered as a contribution towards a better understanding between the weather forecaster and the consumer.

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ACKNOWLEDGEMENT

Thanks are expressed to Mr. Owen Lange, B.Sc., a student at the University of Victoria, for assistance in the tabulation of the results, the students and staff of the Department of Geography at the University of Victoria for their assistance in the distribution and participation in the questionnaire, and to the reviewers of this paper for their suggestions.

INTER ALIA

In answer to complaints on the style of type in Volume 6, we have made arrangements for a change. We trust that this change will prove satisfactory to all our members.

There have been other complaints about ATMOSPHERE. In some cases, the causes were beyond the control of the Editorial Staff, in other cases, oversights were made. Walter Hitschfeld's letter is reproduced elsewhere in this issue because it expresses what others of our members have said. Our response to him is also printed so that our members will see the explanations we have made.

Some apologies are due to some authors in the last two issues. There has been typographical errors, especially in the articles by G.D.V. Williams and H.L. Ferguson. We shall try to arrange for a copy of the typed manuscript to go to the author for proof reading before printing, but this will require a larger supply of articles ahead of printing time. This would have been possible for this issue except for the non-availability of the machine on which this issue was typed.

Further apologies are due to the unknown author and unknown source for the valuable guide to scientific literature found in this issue.

- continued on page 27

 - continued from page 14

Since the paperfax has been commonly used in weather chart transmissions it has frequently been adapted for weather satellite receptions. For the most part, this device is adequate when large-scale features of the cloud systems are of interest. However, the paperfacsimile does not provide enough steps in the grey-scale to permit identification of all the cloud detail that is present in the original signal. Thus, for local forecasting and aviation forecasting information is lost if this is the output device adopted. The kinescope polaroid photograph gives better detail but is too small (about 6 cm x 6 cm) to be efficiently used in a forecast office. The Canadian experience suggests that the photographic facsimile is the method of choice, giving a good size (about 23 cm x 23 cm) photograph which permits identification of the picture detail. The grey-scale can be adjusted to give optimum discrimination for the type of detail of greatest interest. The photographs are more readily archived than paperfax output which tends to deteriorate fairly rapidly. The photographic facsimile, in use at present, is based on a modulated light source passing across the face of photographic paper, line by line. Another photographic device, using fibre optics, is being developed commercially in Canada and it will permit more ready switching from one line rate to another. As to costs, the capital and operating costs for a photo-fax is higher than for a paperfax. The kinescope is cheapest to install but its photographic paper is quite expensive.

APT NETWORK DESIGN AND OPERATION

(a) Station Arrangements

The above Section describes a Station which has the full capability of receiving from all types of satellites which transmit in an APT mode. It is not intended to imply, however, that every place which can use weather satellite imagery in real time requires such a station. Experiments have shown that it is quite easy to transmit photographs from a receiving station (primary station) to a secondary station using a telephone line pair. If the received signal is sent directly from the main station all that is required at the secondary station is a skeleton photo-fax slaved to the main station photo-fax. Transmissions from magnetic tape are, however, somewhat more difficult. The APT photographs cover an area approximately the size of North America and, thus, the coverage is adequate for secondary stations unless they are very far from the main stations. In Canada, the large geographic extent suggests a regional set-up with one main station and a number of secondary stations in each region. Smaller countries may find one main station adequate for their purpose or a regional arrangement is possible.

(b) Scope And Requirements For APT Receptions

The Canadian APT R. & D. Project examined the various resources required for Network operations including capital costs, operating costs, personnel requirements, maintenance costs, landline rental, training programs, etc. It is clear that these will depend to an important extent on the number of photographs which it is planned to receive, on the amount of pre-analysis provided to the users and on the number and type of users to be supplied.

The receptions that can be received by the equipment described above include not only the standard APT transmissions from operational and experimental orbitting satellites (ESSA series, NIMBUS series) but also transmissions in an APT mode from some of the ATS earth-oriented satellite photographs and charts received by the satellite from a ground station. The Canadian Satellite Data Laboratory received excellent photographs from ATS-1 even though it was only about three degrees above the horizon and about 25,000 miles away. In addition to photographs taken in the visual range, some satellites transmit infra-red imagery available at night and receivable by a suitably equipped APT Station. Although giving somewhat less resolution than the APT photographs the infra-red transmissions (known in the past as DRIR or Direct Readout Infra-Red) can indicate cloud and surface detail resulting from temperature gradients or contrasts.

USES OF WEATHER SATELLITE IMAGERY

(a) Characteristics

Following are some of the characteristics of weather satellite photography which contribute to its great value as a meteorological observation tool.

1. *Spatial Continuity.* The observations are horizontally continuous and this eliminates interpolation and aliasing and, thus, the ambiguity often present in synoptic charts.

2. *Timeliness.* Provides information on a synoptic scale with virtually no time lag.

3. *Pattern Detail.* Provides information on a scale smaller than is normal on synoptic charts.

4. *Visual Integration.* Permits integrated visualization of weather systems in a way readily acceptable to the human mind.

5. *Analysis And Weather.* Makes it easy to relate the existing weather with weather systems and flow patterns.

6. *Independence of Communications Systems.* Provides large-scale weather information even if normal systems of communications have broken down.

7. *Completeness of Coverage.* There are no areas of inadequate coverage as in conventional observation systems.

8. *Surface Detail.* Information on the underlying system, such as snow and ice coverage, is made available.

(b) Meteorological Uses

1. *Map Analysis*

The techniques for interpreting cloud photography for use in large-scale numerical weather prediction still need development although some subjective use can be made for this purpose. The photography has already proved valuable in routine map analysis for locating and tracking fronts and cyclones especially in areas where conventional observations are inadequate.

2. *Weather Forecasting*

The identification and tracking of clouds and cloud systems using APT pictures makes this photography an extremely useful forecast aid. Severe weather systems (hurricanes, thunderstorms, tornadoes) can be followed and the information made available for both public and aviation uses.

3. *Weather Presentation*

APT photography available in real time has been found very useful for briefing pilots and despatchers. It has also received excellent acceptance in weather presentations on television.

4. *Research And Climatology*

APT photography can be used to assist in studies where knowledge of cloud conditions is important and to establish the cloud climatology of various areas.

(c) Satellite Cloud Photo Interpretation

It is possible to carry out substantial pre-analysis of the cloud systems before making the observations available to the weather forecasters. In Canada, it was found that the optimum approach was to train the forecasters in the use of the photography and, thus, permit them to select the information of interest for their particular problem. Thus, it is proposed to add only geographic information on the photographs to permit easy location of the features of interest. To assist in the operational use of the photographs a 'Guide to Satellite Cloud Photo Interpretation' was prepared which indicates the principles to be used in interpreting the pictures. A substantial number of illustrative photographs are attached with features of interest pointed out, and overlays of the associated meteorological charts available. With a small amount of training, and the availability of the Guide, the forecasters quickly became experienced and adept at use of the photography.

(d) Information On The Earth's Surface

1. *Ice Reconnaissance And Forecasting*

APT photographs have become a very useful supplement to aerial reconnaissance for observing and forecasting ice in navigable waters. Canada has a large program of this kind in connection with shipping in the Arctic, the North Atlantic and the Gulf of St. Lawrence. The APT permits better use of the aircraft and these observations can sometimes be obtained when the aircraft cannot fly. With better resolution and other developments such as colour photography the benefits for ice forecasting can be expected to increase.

2. *Hydrology*

APT photographs are being analysed to give information of interest to hydrology including studies on the break-up and freeze-up of lakes, on seasonal advance and retreat of the snow-line and on changes in snow cover in large isolated basins, both at high altitudes and high latitudes. The large-scale energy exchanges in connection with freezing and thawing will be examined and attempts will be made to develop methods to assess snowpack depths from APT photographs. These studies can lead to the use of the photography for spring river and flood forecasting.

- continued on page 32

ACKNOWLEDGEMENTS

While the writer did spend some time in the area subsequent to the storm, much of this material has been gleaned from press reports and other sources.

A deep debt of gratitude is owed to Mr. Dave Bonner of the Winnipeg Free Press for the use of his photographs and his comments; also to Mr. W.Crowley and the Canadian Forces Base at Portage la Prairie for supplying aerial views of the area; to Mr. Arthur Ballegeer, a Meteorological Technician at the Prairie Weather Central who followed the storm by car; and to Mr. R.A. Cauwenberghe, a professional engineer who supplied a comprehensive report of his sighting of this storm.

REFERENCES

(1). On the Feasibility of Incorporating Procedures and Forecasts of Severe Summer Weather Storms and Winter Storms Within the Prairie Weather Central. (Unpublished submission by S.V.A. Gordon)

-continued overleaf

INTER ALIA - continued from page

McGILL UNIVERSITY, DEPT. OF METEOROLOGY - STAFF SESSION, 1968-69

Professors :	B.W. Boville (Chairman); W. Hitschfeld[1]; J.S. Marshall[2]; Svenn Orvig
Associate Professor :	R.R. Rogers
Assistant Professors:	B.E. O'Reilly; P.E. Merilees
Research Associates :	E. Vowinckel (Clim); E.H. Ballentyne (Radar); R.W. Fetter (Radar); J. Bradley (Dyn); G. Ragette (Hail); T. Takeda (Convection)[3]
Sessional Lecturer :	M. Kwizak

and in the context of their research, the following members of other departments:

K.L.S. Gunn and E.J. Stansbury (Physics)
R.H. Douglas, G. Vali (Agricultural Physics, Macdonald College).

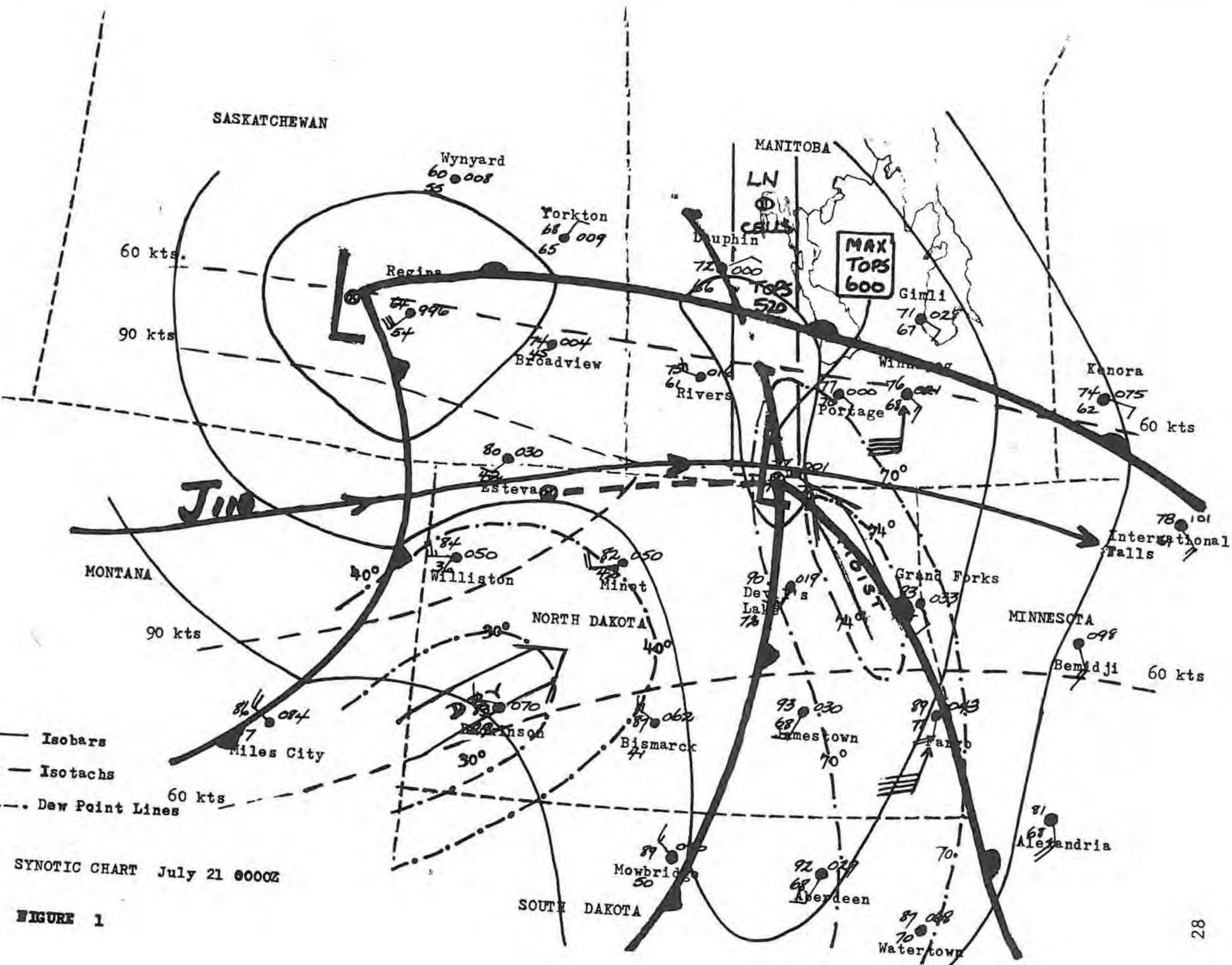
1. Prof. Hitschfeld was appointed Vice-Dean of the Physical Science Division last autumn.

2. Prof. Marshall is Director of the Observatory and of the new McGill Weather Radar Observatory.

3. Dr. Takeda is visiting from Japan.

There are 20 M.Sc. and 23 Ph.D. students registered in the department.

B.W. BOVILLE



SYNOTIC CHART July 21 0000Z

FIGURE 1

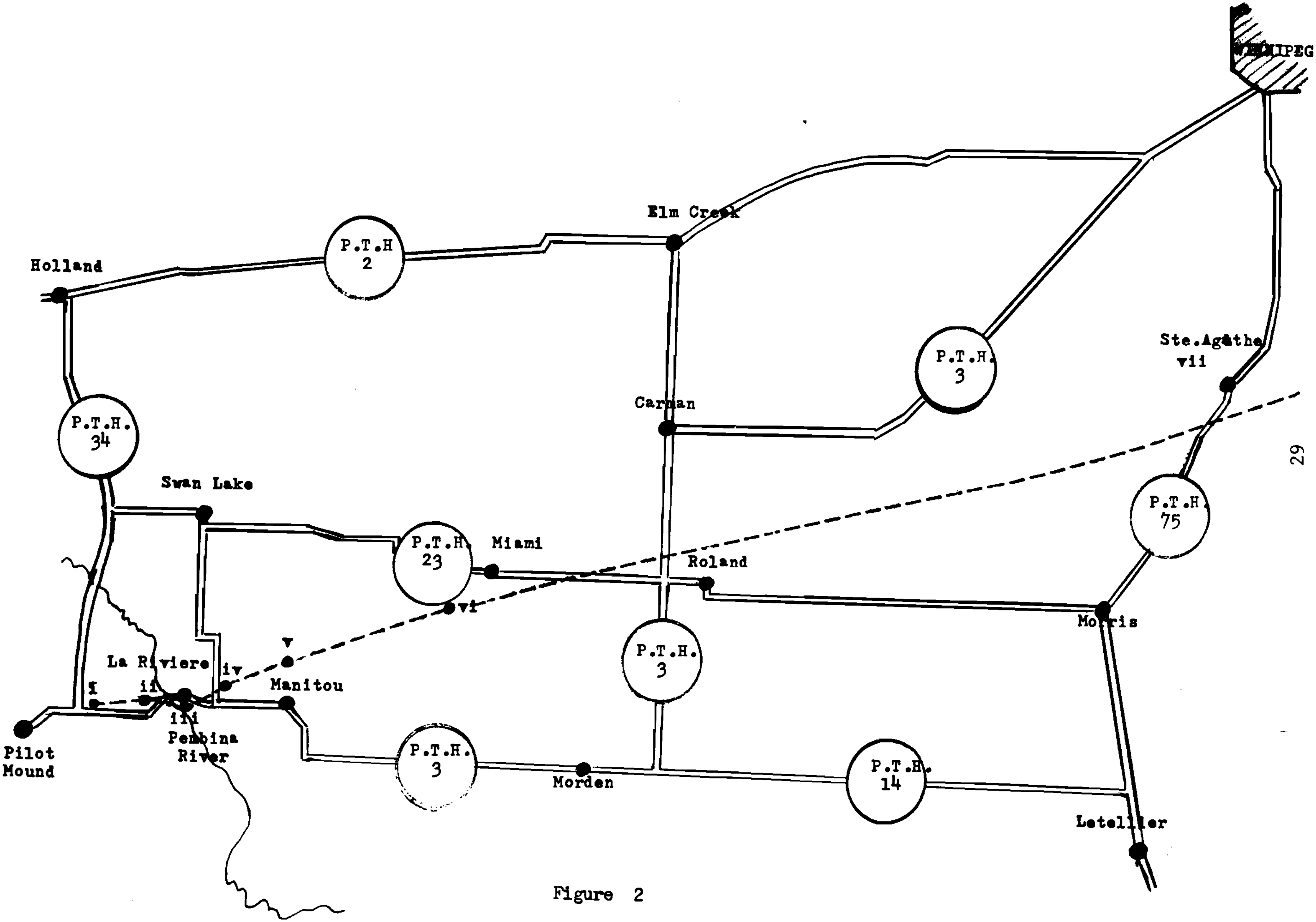

Holland
P.T.H
2
P.T.H.
34
Swan Lake
P.T.H.
23
Miami
vi
Roland
Carman
P.T.H.
3
Ste.Agathe
vii
P.T.H.
75
La Riviere
iv
v
Manitou
i
ii
iii
Pembina
River
Pilot
Mound
P.T.H.
3
Morden
P.T.H.
14
Letellier

Figure 2

Figure 3. Tornado passing over cabins. Note the white pillar in the upper right hand portion

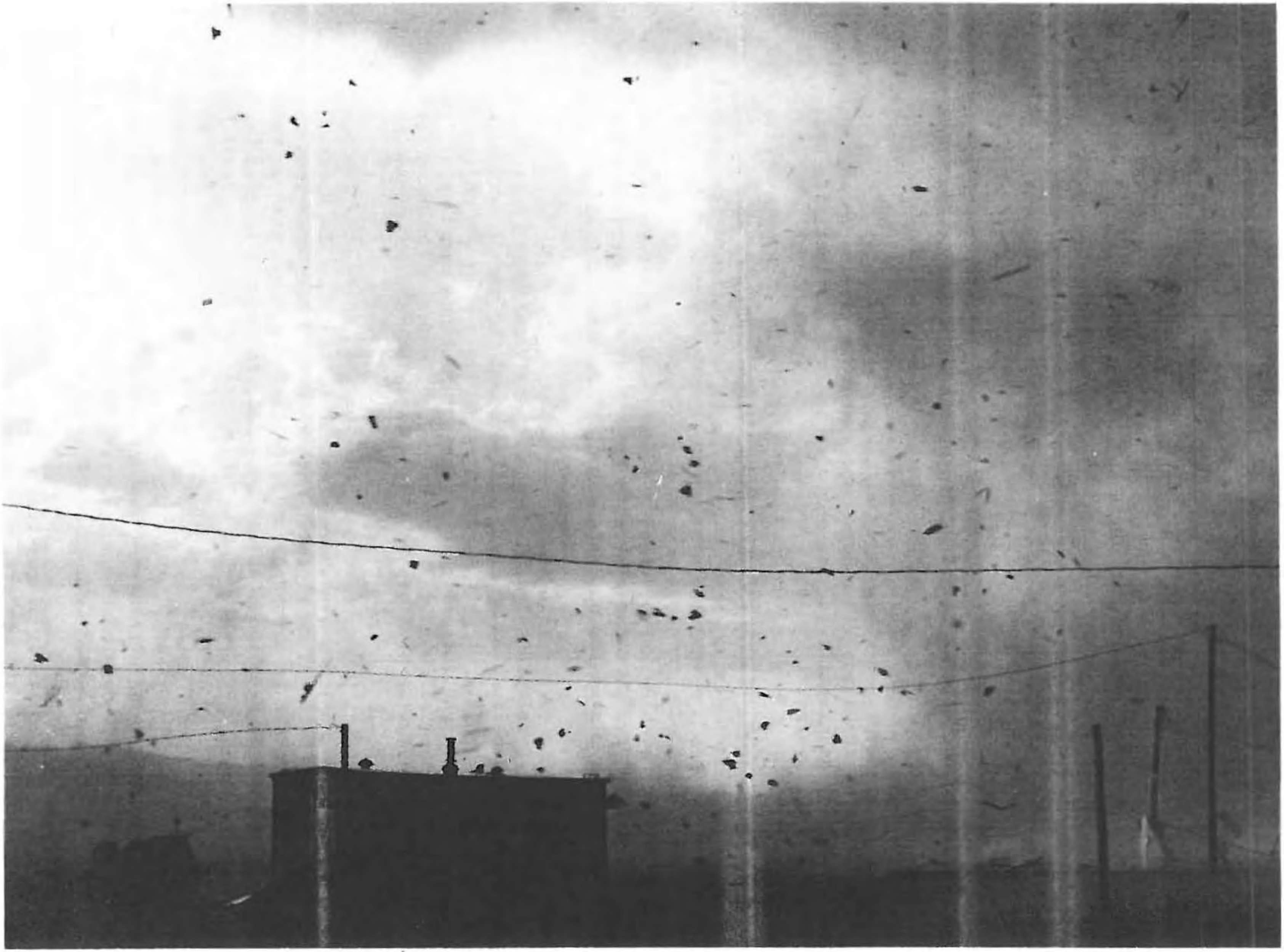


Figure 4. The wake of the tornado. The white shack has been destroyed and air is filled with debris.

(APT) Network - continued from page 26

3. Geology

Although the higher resolution of earth resources satellites will give much more information on geological questions the weather satellites have already been used for some interesting studies. For example, lineaments found on APT photographs have been related to deep crustal disturbances in one study. Another study is examining the terrain as shown on satellite photographs to see whether they indicate meteorite craters.

(e) Other Studies

Other studies and uses involving APT photography can be cited and the list is still growing. Explorations in the far north, where the isolation makes it difficult to use conventional meteorological channels, can benefit from APT receptions. Cloud climatology and studies can be related to a number of problems, e.g. tree disease, wildlife habits and movements, agricultural planning, and so forth. Most of this latter class of activities does not require real-time photography but the ready availability of the photographs is a distinct side benefit of an APT system.

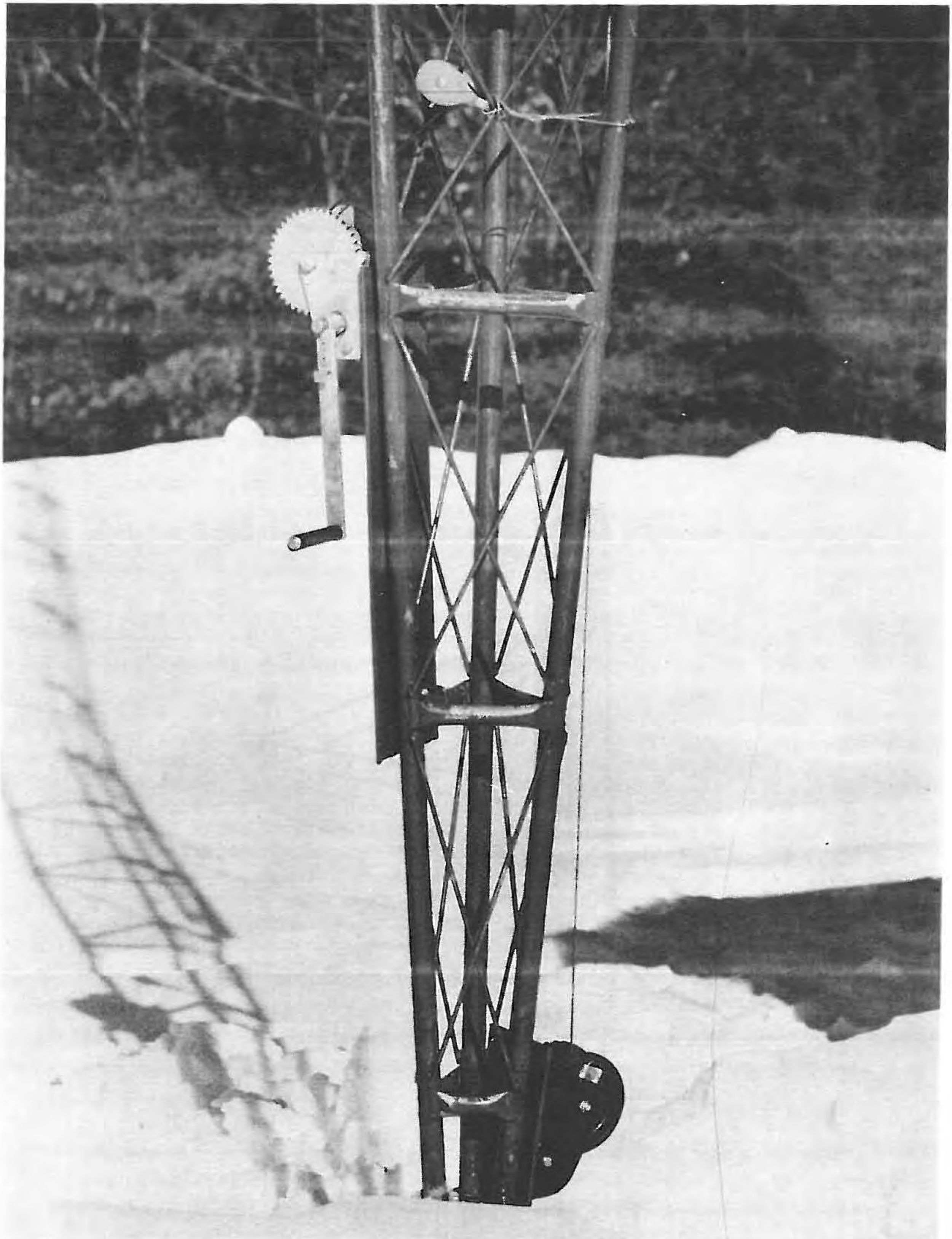


Figure 2. Winches mounted at base of tower for raising or lowering instrument support structure

- continued from page 6

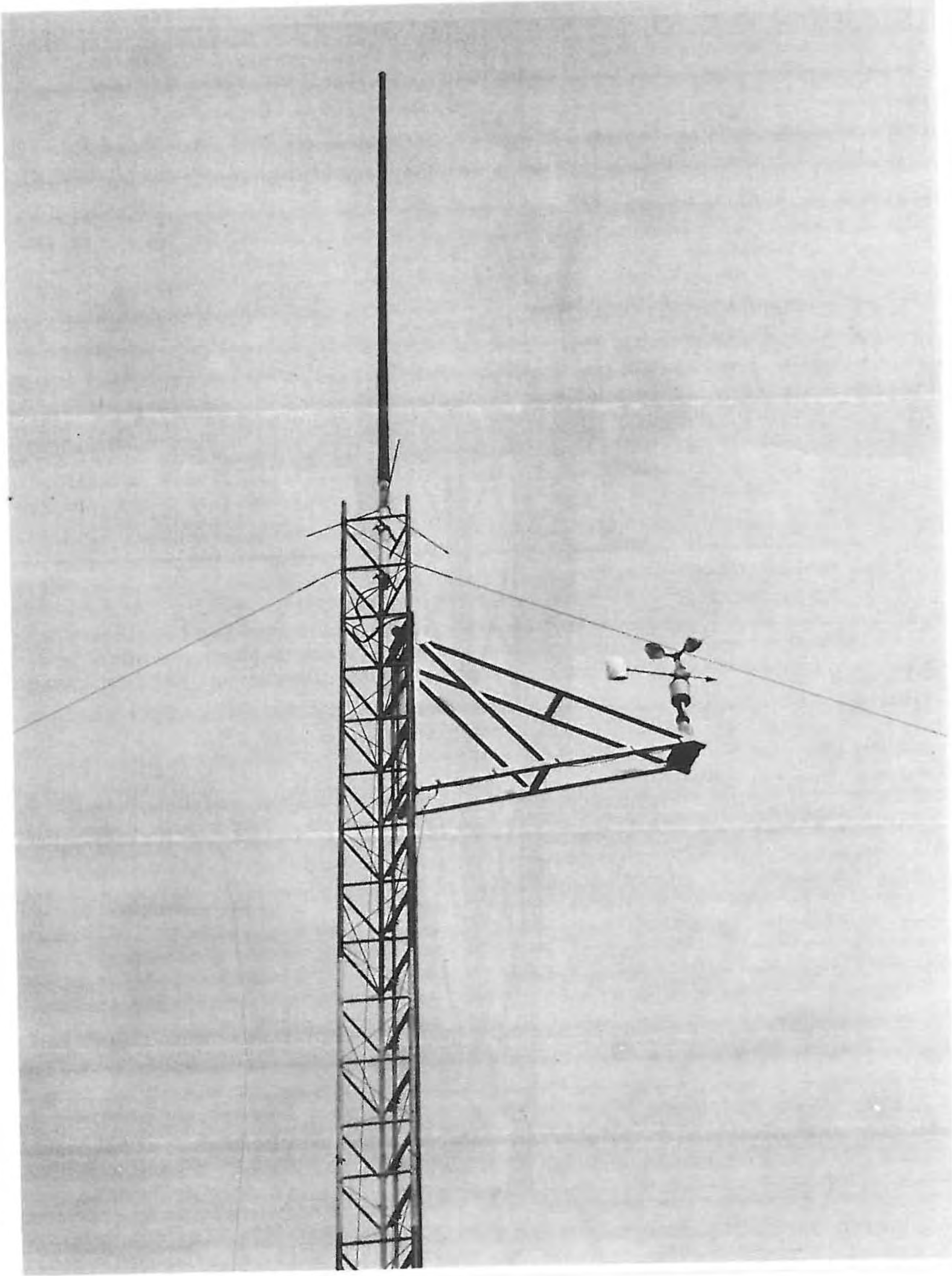


Figure 3. Close-up of instrument support structure at top of tower

-Con't from page 2

Although one may, on a first examination, consider that the wind shift at Calgary is another example of a "land and sea breeze" or a "mountain and valley wind", a closer examination shows that the situation is more complex. The temperature contrasts necessary for a sea breeze are lacking. The wind shift is much more sudden and more complete than found in the usual descriptions. Also the distance from the mountains is much greater than those in any studies I have been able to examine. The original article suggested that pressure variations provided some of the answers. I have pursued this matter further, and have a report almost ready to be submitted for publication which supports this hypothesis. But the report fails to explain the pressure variations found.

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MEETINGS continued from page 32

FEBRUARY 1969 MEETING OF SOMAS

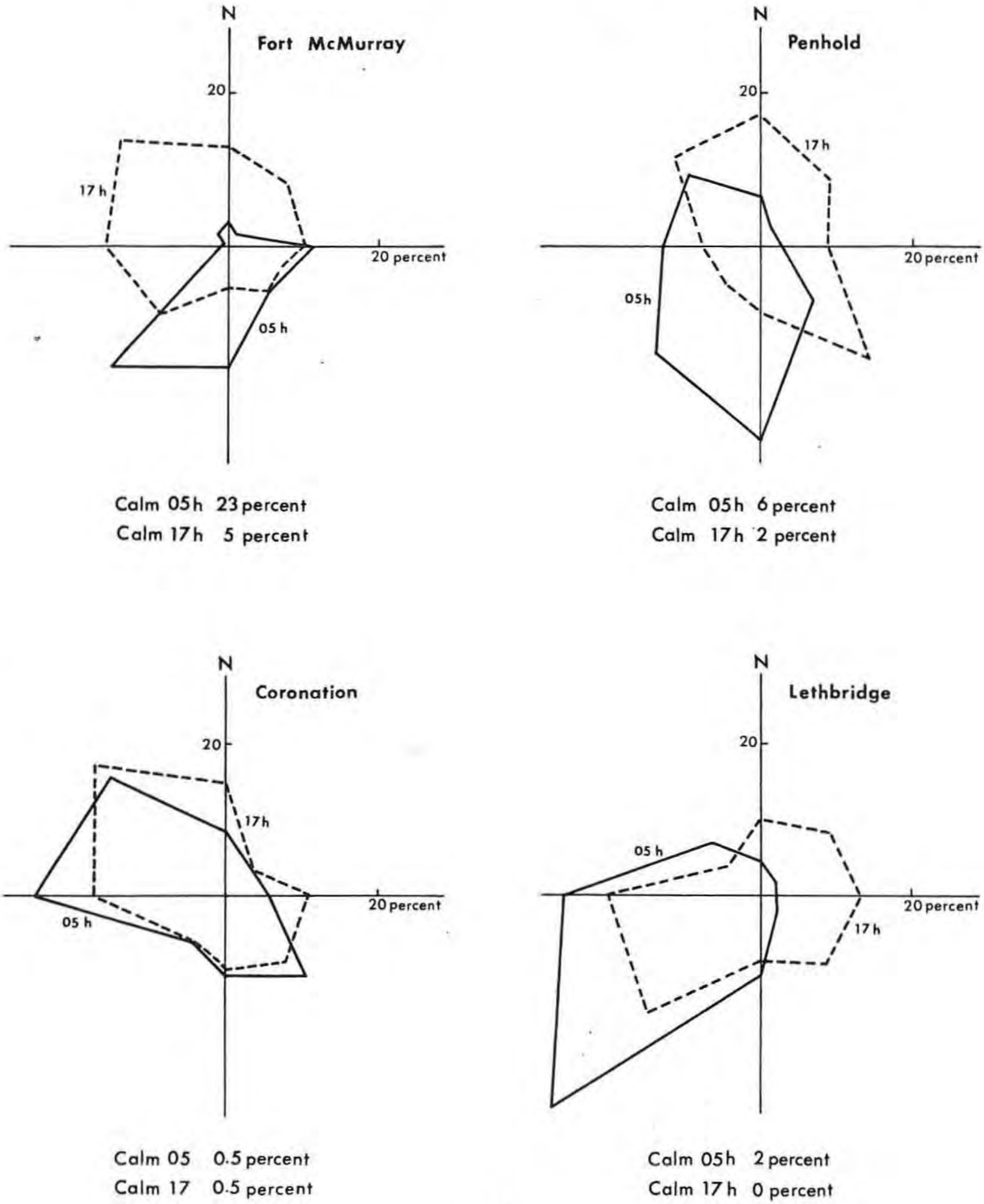
The Sub-committee of Meteorology and Atmospheric Sciences of the Associate Committee on Geodesy and Geophysics of the National Research Council met in Ottawa on February 20, 1969. At the meeting the Committee endorsed the principle of legislation for the registration of plans and the reporting of operations, for public access, of all weather modification activities in Canada, and expressed a desire for liaison with other NRC committees dealing with aspects of space programmes applicable to the atmospheric sciences. The Committee plans to work closely with the National Research Council, the Meteorological Branch and other Government Agencies in planning for a national Global Atmospheric Research Programme (GARP). The three-year terms of six members of the Committee terminate in March, and six new names were proposed for appointment to the Committee. The Chairman, Prof. Walter Hitschfeld of McGill University is one of those retiring and it was proposed that Prof. B.W. Boville, Chairman, Department of Meteorology, McGill University, replace him.

1969 CONGRESS

Council has decided that a special Congress Supplement to ATMOSPHERE be printed this year. Due to lead time necessary for printing, the Supplement will not be mailed to all members prior to the Congress, but will be available at registration for those attending. Subsequently, the special supplement will be mailed to all members with Volume 7, No. 2 about mid-year.

In order that our members have a list of papers and authors ahead of the Congress, this information will be included with one of the pre-Congress mailings.

FIG. 1 Wind roses for 05 h and 17 h MST
July, 1946-1965



19 December 1968

The Editor, Atmosphere
Canadian Meteorological Society
c/o 315 Bloor Street West,
Toronto 5, Ontario

Sir:

I appreciate your experimenting with format, layout and contents of "Atmosphere". Such experimentation however requires your receiving (and occasionally heeding) reactions from your captive readership. This introduction enables me constructively to criticize, indeed to damn, your latest issue (3, vol 6).

Type: "all caps" make for the dullest possible appearance, and are tiresome to read. Sub-headings are a good idea, but need to be carefully graded and placed, so that separation between different matters is not obscured: On p. 102, does "Acknowledgements" belong to the preceding material, or does it introduce a separate item; where does "Inter Alia" belong? "Continued on p. XX": An intolerable strain is placed on the reader by this "measure of economy". Some articles come in three or more bits. A particularly confusing result of your policy is p. 115. And while you are looking at it, will you check whether the diagram of p. 114 (or that of p. 116) is so placed that it relates sufficiently well to the text? In fact, regarding the diagrams, it is often not even clear to what articles they belong.

Contents: Several of the articles are interesting, but are too long; and the layout makes skimming through them impossible. Remember, "Atmosphere" is not a standard scientific journal. It could carry notes on the recent climate of Canada or its parts; or on Canadian hydrological or pollution problems; or other scientific items, especially relevant to the members of the Society. But I doubt that Atmosphere should make available 23 pages to the articles beginning on pp 81 and 87. This is not a judgment of the intrinsic value of these contributions; only of their relevance to "Atmosphere".

Yours etc,

Walter Hitschfeld

December 27, 1968

Prof. W. Hitschfeld,
c/o Dept. of Meteorology,
McGill University,
Montreal, P.Q.

Dear Walter:

Thank you very much for your summary of the SOMAS meeting and your letter of December 19. The former will appear in Vol. 6, No. 4, and the latter, along with a portion of this letter in Vol. 7, No. 1.

You are not the first to complain about the type. We have programmed the change to begin with Vol. 7, No. 1. It was held off this long because some of the material for Vol. 6, No. 4 had already been typed, and we decided to keep it uniform.

I admit that we have not been doing a thoroughly professional job of layout. We hope that a little experience will correct this. The economies involved in breaking articles are appreciable. If we continued the practice of fifty free reprints for each article, and returned to the continuous format, the costs of printing increase by about 70%. This is because the old plates cannot be used for the reprints.

There are several possible solutions to this problem - the choice will require a decision of Council. We could drop the free reprint policy. Alternatively, we could introduce page charges. I wonder if either of these actions would be in the best interests of the Society.

The content question is a difficult one. Because we have attempted to put out four issues in six months, we caught up with our supply of material. At the moment, we are in fair shape for the first two issues in 1969. But the problem goes deeper. If we edit too heavily, I fear that those submitting papers will be reluctant to spend the time making the suggested alterations. Once ATMOSPHERE has achieved the status for which we are aiming, this may no longer be valid. One way that you could help in this is to encourage your colleagues to submit articles. So far, we have received nothing from McGill except for your notes on SOMAS.

Compliments of the Season to you, and to all of your colleagues at McGill.

Regards,

J.A.W. McCulloch,
Editor,
ATMOSPHERE.

A KEY TO SCIENTIFIC RESEARCH LITERATURE

	What He Said	What He Meant
1.	It has long been known that	I haven't bothered to look up the original reference but ....
2.	Of great theoretical and practical importance	Interesting to me
3.	While it has not been possible to provide definite answers to these questions	The experiment didn't work out, but I figured I could at least get a publication out of it
4.	The W-PO system was chosen as especially suitable to show the predicted behavior	The fellow in the next lab had some already made up
5.	Three of the samples were chosen for detailed study	The results on the others didn't make sense
6.	Accidentally strained during mounting	Dropped on the floor
7.	Handled with extreme care throughout the experiment	Not dropped on the floor
8.	Typical results are shown	The best results are shown
9.	Agreement with the predicted curve is: Excellent	Fair
	Good	Poor
	Satisfactory	Doubtful
	Fair	Imaginary
10.	It is suggested that...it is believed that...it may be that	I think
11.	It is generally believed that	A couple of other guys think so too
12.	It is clear that much additional work will be required before a complete understanding	I don't understand it
13.	Unfortunately, a quantitative theory to account for these results has not been formulated	Neither does anybody else
14.	Correct within an order of magnitude	Wrong
15.	Thanks are due to Joe Glotz for assistance with the experiments and to John Doe for valuable discussion	Glotz did the work and Doe explained what it meant

THE CANADIAN METEOROLOGICAL SOCIETY

LA SOCIETE METEOROLOGIQUE DU CANADA

THE CANADIAN METEOROLOGICAL SOCIETY CAME INTO BEING ON JANUARY 1, 1967, REPLACING THE CANADIAN BRANCH OF THE ROYAL METEOROLOGICAL SOCIETY, WHICH HAD BEEN ESTABLISHED IN 1940. THE SOCIETY EXISTS FOR THE ADVANCEMENT OF METEOROLOGY AND MEMBERSHIP IS OPEN TO PERSONS AND ORGANIZATIONS HAVING AN INTEREST IN METEOROLOGY. THERE ARE LOCAL CENTRES OF THE SOCIETY IN SEVERAL OF THE LARGER CITIES OF CANADA WHERE PAPERS ARE READ AND DISCUSSIONS HELD ON SUBJECTS OF METEOROLOGICAL INTEREST. ATMOSPHERE IS THE OFFICIAL PUBLICATION OF THE SOCIETY. SINCE ITS FOUNDING, THE SOCIETY HAS CONTINUED THE CUSTOM BEGUN BY THE CANADIAN BRANCH OF THE RMS OF HOLDING AN ANNUAL CONGRESS EACH SPRING, WHICH SERVES AS A NATIONAL METEOROLOGICAL CONGRESS.

FOR FURTHER INFORMATION REGARDING MEMBERSHIP, PLEASE WRITE TO THE CORRESPONDING SECRETARY, CANADIAN METEOROLOGICAL SOCIETY, P.O. BOX 851, ADELAIDE STREET POST OFFICE, TORONTO 1, ONTARIO.

THERE ARE THREE TYPES OF MEMBERSHIP – MEMBER, CORPORATE MEMBER AND STUDENT MEMBER. FOR 1969, THE DUES ARE $7.50, $25.00 AND $1.00, RESPECTIVELY. ATMOSPHERE IS DISTRIBUTED FREE TO ALL TYPES OF MEMBER. APPLICATIONS FOR MEMBERSHIP SHOULD BE ACCOMPANIED BY A CHEQUE MADE PAYABLE TO THE CANADIAN METEOROLOGICAL SOCIETY, WITH EXCHANGE ADDED FOR NON-TORONTO BANKS.

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