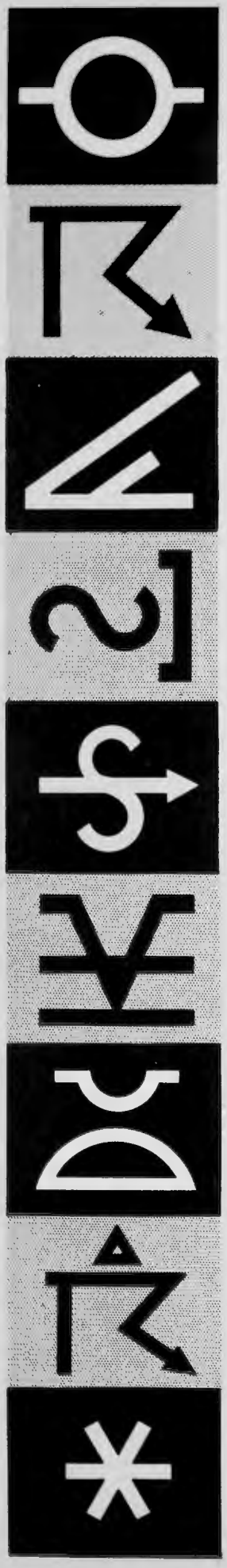

ZEPHYR

SEPTEMBER 1972 SEPTEMBRE

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Editor: B.M. Brent

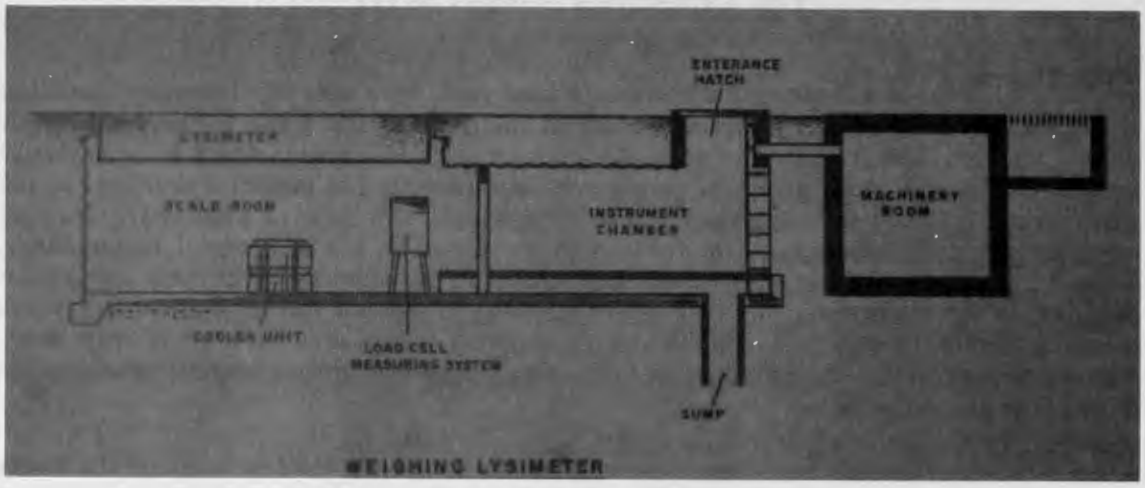
THE LYSIMETER – WHAT IS IT?

What is a lysimeter? What is it used for? Who uses it? These are questions which arise naturally in the inquisitive mind on first hearing the word Lysimeter. But few people are ever likely to hear the word, for it refers to an instrument which is the exclusive tool of a relatively small group of people who are interested in moisture exchange at the earth's surface. How to measure it? How to calculate it? How to predict it? How to improve our understanding of it? These men are found in the sciences of meteorology, agriculture, forestry or biophysics, those sciences which attempt to increase our understanding of the relationship between growing, living things and the environment they live in. Water, being the common denominator of all living things, is at the heart of their work. The lysimeter forms a valuable tool in their struggle towards greater understanding of the moisture exchange processes.

A lysimeter then is an instrument or tool which is used to measure the water vapour flux (or exchange) at the earth's surface. It is rather simple in conception, consisting of a container in which a block of soil is placed and in which plants can be grown. Some means is then provided for measuring and recording the change of weight of the container, soil, plant complex. In fact you would have a lysimeter if you took one of your household potted plants and set it on an accurate weighing scale so that you could measure weight changes. The weight changes represent a measure of the gains or losses of water of the system brought about by natural processes such as transpiration by plant leaves, evaporation from the soil, rainfall and dew deposition. The great advantages of the lysimeter is that it measures these things directly and does so from surfaces which are the natural ones found in nature.

It is because of its ability to measure accurately the combination of evaporation and transpiration, called evapotranspiration, that the lysimeter finds one of its most important uses – the evaluation of other techniques for computing or measuring the vapour flux. These other techniques vary in complexity but some are based on measurements made by relatively simple instruments such as are found in the measuring networks of most meteorological services. Those based on simple instruments are potentially very useful and could be widely used. Verification of their accuracy by other means is consequently very important, and this has been provided by direct measurements using lysimeters. By providing a good indication of soil moisture, lysimeters can also be used to indicate when the wilting point of plants is approaching and so provide a basis for the control of irrigation. Used in conjunction with measurements of temperature, humidity and carbon dioxide gradients they can provide information on atmospheric carbon dioxide uptake by plants and in turn on plant production of carbohydrates, that is, on food production. These and many other uses which will be brought out in a moment make the lysimeter a worthy instrument for study and development.

While the basic concept of a lysimeter is quite simple, to achieve a good instrument many factors need to be considered. One of the most important of these is the need to produce in the lysimeter growing conditions for the plants which are as close as possible to those in the surrounding natural soil. For example, the moisture present in the soil, and the temperatures in the soil must be the same as those in the surrounding soil, and crowding of the plant root systems by use of small containers, such as usually occurs in the household flower pot, must be avoided. These considerations have resulted in a wide variety of sizes and shapes of containers being used. Some of those built have been large enough in which to plant full grown trees while others, containing a grassy clod, are about the size of a saucer.



WEIGHING LYSIMETER

Man's ingenuity has also developed a wide variety of means for weighing the soil container, from a straight forward mechanical weighing mechanism, to a hydrostatic system in which the soil container is floated in liquid and the change in level of the liquid is used to indicate the change of weight. Mounting the soil container on electrical devices called loadcells, which change their electrical output as the load on them changes, is another method which has been used. The instruments are still in a state of development which will doubtless produce other ingenious ways of improving their performance.

The Atmospheric Environment Service has been participating in this development for the past ten (10) years and has produced several interesting designs which have been used in the study of such things as tobacco blight and corn growth. This work has been the result of close collaboration between the Atmospheric Instruments Branch and the former Climatological Division, and now continues through the collaboration of the Atmospheric Instruments Branch and the Atmospheric Research Directorate. The latest instrument, which is the largest so far, has been installed at the Meteorological Research Site, Woodbridge. Its soil container is twenty feet (20) in diameter and three feet (3) deep and, together with its supporting platform, weighs 120,000 pounds. With its ability to measure weight changes of as little as one half (½) a pound it stands as one of the most sensitive instruments in the world. This weight sensitivity enables it to detect gains or losses of moisture on it corresponding to 0.0078 millimeters depth of water. This is adequate to record even light dew deposits. Moderate to heavy dew occurrences cause weight changes of ten to fifteen pounds. High rates of evapotranspiration for a full day cause weight changes of 300 pounds. Even with such sensitivity the instrument will still record the occurrence of heavy rain which will add about 3,000 pounds weight in twenty-four (24) hours.

Performance characteristics such as these make the instrument an important research tool. Its potential has been further enhanced at Woodbridge by setting up a complex array of supporting instruments to measure temperature, moisture and wind profiles, soil moisture, radiative energy fluxes from the sun and earth, soil temperature and other important characteristics of the surface air layer. These measurements are now being used in an energy balance study of evaporation pans in an attempt to make pan measurements more useful to hydrologists and agriculturalists and in the performance evaluation of dew gauges and precipitation gauges. An attempt is also being made to use the lysimeter to evaluate evaporation from snow surfaces about which little is known, and to provide

information on snow melt and runoff. A few weeks ago a group from the Ontario Agricultural College, Guelph, and another from the Department of Agriculture, Ottawa, brought together for comparison at Woodbridge newly designed instruments for measuring vapour fluxes. In these comparisons the lysimeter was used as the reference standard. This does not exhaust the uses to which the lysimeter can be put. Indeed it would be hard to find any aspect of the study of surface moisture exchange which could not be facilitated by lysimeter measurements. The instrument which has been constructed at Woodbridge has attracted wide interest. Its size, sensitivity and special features make it particularly suitable as a reference instrument. It is expected that its uses will multiply rapidly as awareness of its potential spreads.

FLAG LOWERING CEREMONY – RESOLUTE BAY

In a note from the Secretary of State to the Canadian Government in March, 1970, the U.S. Department of Commerce indicated a desire to withdraw from joint participation in the weather observing program at the Joint Arctic Weather Stations, Resolute, Alert, Eureka, Isachsen and Mould Bay, N.W.T. In reply, the Canadian Government agreed to a phased withdrawal which would terminate October 31, 1972, an arrangement established in 1947. By the terms of the initial agreement, the U.S. Weather Bureau was to provide fuel, mobile equipment and expendables and the Canadian Meteorological Service would provide the permanent installations. The two organizations were to share equally in the provision of personnel.

The main station at Resolute became an RCAF base in 1954 and finally in 1963, the airport was turned over to the Department of Transport. It is currently operated, under contract, by the Tower Foundation Company of Canada under the supervision of a Regional Manager of Northern Airports, MOT. The combined Weather Office/Weather Station has been operating in the role of a tenant since 1963.

In November, 1970, the last of the U.S. staff was withdrawn from Alert. This was followed by withdrawals from Mould Bay and Isachsen in October, 1971, finally, Eureka in July, 1972. The last of the U.S. personnel was slated to depart Resolute Bay in October, 1972 but an earlier evacuation occurred for medical reasons and plans were made for an official flag lowering ceremony to be held on Sunday, August 27, 1972.

Mr. J. Glenn Dyer, Deputy Chief, Overseas Division of the U.S. National Weather Service, was designated to represent the United States. He, along with C.G. Goodbrand, formerly Superintendent of the Arctic Section, Basic Weather Division, had supervised the JAWS operations since shortly after their inception. Plans were made for both to proceed to Resolute by Canadian Forces aircraft by way of Trenton, Thule, Greenland and Alert. Mr. E.R. Osborne, Manager, Northern Airports, Central Region, representing the MOT, proceeded by Air Canada and Nordair by way of Montreal and Frobisher and J.J. Labelle, representing Central Region, AES travelled on Air Canada and Pacific Western Airlines by way of Edmonton, Yellowknife and Cambridge Bay. By strange coincidence, all managed to reach Resolute on schedule.

A brief outdoor ceremony was scheduled for 6 PM and in anticipation of the usual Resolute weather, prepared speeches were very brief. Seating had been arranged in

Lowering the U.S. Flag – Resolute, Aug. 27, 1972.

front of the flag staffs for some 50 people, and the weather proved exceptionally fine – very little wind, sunny with the temperature near 40. Although few people occupied the seats, interest was very high and photographers were everywhere, even on porches and roofs of adjacent buildings.

Both the flag lowering ceremony and the program that followed the dinner were chaired by J.J. Labelle. The ceremony was opened by Mr. Osborne, who extended a brief word of welcome to visitors and local dignitaries, including representatives of DIAND, DNHW and DPW, the Territorial Government and the local judiciary. Mr. Goodbrand reviewed the historical arrangements and Mr. Dyer responded, paying tribute to the U.S. – Canadian cooperation which so successfully fostered the operation. The ceremony concluded at 6:17 PM CST with the official flag lowering by Constable R. Pollock of the RCMP. Mr. L. Nelson, Superintendent of Tower Foundation, Resolute assisted in folding the flag which Constable Pollock formally handed over to Mr. Dyer.

The Ministry of Transport arranged the banquet that followed. Invited guests numbered thirty and included all MOT Telecommunications and Electronic and DOE AES staff, as well as the visiting dignitaries. Following the toast to the Queen, proposed by Mr. L. Shea, T and E Area Manager and the introduction of guests by Mr. Osborne, Mr. Goodbrand reviewed highlights of the establishment and operation of the stations and concluded by proposing a toast to the spirit of U.S. – Canadian cooperation which had characterized the entire program. Mr. Dyer in reply, paid tribute to the Canadians and Americans who had participated in the venture and related a number of interesting anecdotes connected with events during the early years when the stations were just being established.

A special feature of the six or seven course dinner was the large cake, about three feet square, which the chef Reno Casterllarin and his staff had prepared. Their artistic handwork was displayed in replicas of U.S. and Canadian flags in icing in the upper corners and 1947–1972 below. Mr. Dyer was given the honor of cutting the cake.

Worth noting is the fact that the event almost did not come off. During the previous night, despite the fact that it was daylight all night long, a U.S. flag was removed from the U.S. flag pole by souvenir hunters. The flag lowered during the ceremony was the last U.S. flag remaining on the base.

DEVELOPMENT PROGRAM OUTLINED FOR AIR QUALITY PREDICTION

Routine, up-to-the-minute forecasting procedures for parameters useful in the Air-Quality area are being developed in the Atmospheric Research Directorate. Several schemes are planned for successive development, each one of increasing relevance, reliability, scope and range. The operational program of forecast 'stagnation charts', initiated by the AES last August, would, according to this plan, be supplemented or supplanted by forecasts of more precise, quantitative indices of the potential of meteorological conditions to favor the build-up of pollutant concentrations.

Later, the present R. & D. program would permit approximate prediction, for specific cities and regions, of values of pollutant concentrations representative for those areas and, finally, to predict the variations within such areas.

The scheme for predicting 'pollution potential' would be based on the use of several quantitative indices that would be predicted for periods, initially, of 24 – 48 hours ahead. There would also be a capability of updating or amending these predictions as frequently as every hour with the output available to the user without delay. This frequently available update capability would also apply to the concentration forecasts to be developed later. The whole prediction program in Air-Quality is associated with the standard weather forecasting system, with strong emphasis on the introduction of computerized methods.

Research is also being pressed forward on techniques for using weather satellite data, especially very high resolution data from the latest spacecraft, for measuring and predicting air pollution areas.

On the larger scale, research is underway on how to predict the flow of air pollutants on a sub-continental scale, particularly large scale trans-boundary flows in (and out of) Canada.

CANADIAN VISIT OF MARINE UNDERWRITERS

By W.E. Markham

Insurance rates for ships operating in Hudson Bay and The Canadian Arctic have always been high, and the Ministry of Transport has in recent years been attempting to educate the underwriters about ice conditions, service provided and risk involved in the hope that more reasonable rates and perhaps longer seasons will result. Although this field is a distant one for a Meteorologist to become involved with, a "modified Meteorologist" can become involved and I was fortunate enough to be invited to accompany the underwriters on this trip in August of 1972.

In some ways this was a renewal of acquaintances for I had participated in a similar visit and demonstration in the Gulf of St. Lawrence in the Spring of 1971. About half of the underwriters returned for the Arctic phase which made the trip socially easy, even though the water and ice conditions were somewhat less promising.

Four underwriters from England, two representing Lloyds and two representing The London Institute of Underwriters participated, along with two Canadian underwriters and one from New York. The party, with the Ministry of Transport National Harbour Board and a Public Relations Officer as escort, assembled for dinner at the Chateau Champlain in Montreal on August 20. I was able to provide an indication during the evening of the dismal ice conditions the group would encounter but despite this foreboding we took off by Nordair to Frobisher with plenty of enthusiasm the following morning. This flight took us all the way to Resolute and I must admit it was quite an eye opener to see the mixed crowd in the Nordair Terminal and compare it with conditions at Resolute ten years ago. On arrival we were taken by helicopter to CCGS LABRADOR and shortly thereafter the ship set off westward to Rea Point. A large Finnish tanker "PALVA" had preceded us and

word was that she was beset south of Bathurst Island. The ship was no sooner under way than the British ship THULELAND bound for Little Cornwallis Island asked us for help in reaching their beachhead. After discussing the ice situation with Ice Observer, Doug Jolly and myself, Captain Tooke decided that this would be an easy operation and diverted northward. Entry was easily accomplished and THULELAND proved to be a capable ship which followed the ice breaker quite easily.

During the night we continued westward to the vicinity of Cape Cockburn and the reason for PALVA being beset became quickly evident, for The LABRADOR too got stuck. We sat in this position, with PALVA about eight miles to the West, all the next day waiting for the pressure to ease, for the best strategy in dealing with ice is often to wait it out. On Tuesday we finally extricated ourselves but were forced to leave the tanker, because her size would prevent her following the ice breaker track.

Upon returning to Resolute the underwriters were taken by charter twin Otter over Norwegian Bay where D'Iberville was attempting to escort six vessels into Eureka Sound. This was certainly an eye opener for the underwriters and the capability of the Coast Guard in Northern escort work was very evident. The fact that the convoy was stuck was unimportant it seemed, for they were most impressed at the progress which has been made through solid ice from Hellgate to Graham Island. CCGS LOUIS ST. LAURENT subsequently arrived to assist the convoy and they did reach Eureka much to the surprise of some of the local residents.

This phase of the operation took place in late August with snow on the ground at the end of the latest, coolest, and shortest summer that has ever been experienced at Resolute. The underwriters felt that seeing conditions at their worst was actually better, from their view point, than observing favorable ice conditions.

After returning from Norwegian Bay we were very shortly bound by Nordair for Frobisher where Captain Pottie (MOT Ice Operations Officer) and Ice Supervisor Ralph Van Humbeck had organized a dinner of Arctic char with all the trimmings, liquid and solid. From Frobisher we then flew, by MOT Viscount, to Churchill where an elaborate round of the harbour installations, briefings by the Hudson Bay Route Association and by the National Harbour Board, provided a thorough knowledge of the problems encountered in carrying grain from Churchill.

Despite the Route Association's presentation, the underwriters felt that full use was not being made of the whole shipping season when insurance rates are at their minimum and it appears that no specific extension can be expected in the near future.

During this brief visit we were all awarded certificates certifying us as Polar Bears (inspectors) with a notification that it's advisable to do most inspecting while indoors!

The return flight to Ottawa by Via Thunder Bay (again in the MOT Viscount) was a rest period after the busy round of activity of the preceding week. A formal debriefing was held on Monday at which it was possible to make the point about the shortest Arctic summer on record and that the difficulties the underwriters witnessed were as expected. I would estimate that the visit did do the task intended as far as the Arctic position was concerned and certainly the knowledge gained at Churchill was useful although abrupt improvements in insurance rates can hardly be expected.

RETIREMENT PARTY FOR MR. W.L. GUTIERREZ

"Old timers" (joined Met. Service prior to 1945) at the retirement party for Bill Gutierrez, Edmonton, Sept. 15, 1972.
Standing left to right: Hartley Sinclair, Gerry Tallman, Deane Smith, Bill Gutierrez, Fred Burbidge, Clarence Thompson, Don Currie, Al Turner, Dick Longley.
Seated: Mrs. G. Tallman, Eileen Crouch, Mary Watson, Sybil Cleary.

On September 15, 1972, a farewell dinner was held at the Edmonton International Airport for Mr. W.L. Gutierrez who is retiring after nearly 32 years with the A.E.S. Bill joined the Meteorological Service as a forecaster on March 1st, 1941 after several years as a school teacher. Deane Smith, the Regional Director, A.E.S., traced Bill's career from the Weather course in Toronto to OIC at Saskatoon and OIC of the RCAF Weather Station in Prince Rupert in 1942–43. After a stint in Vancouver, Bill came to the Forecast Office in Edmonton in 1946. He was shift Supervisor for many years and since May, 1972 he has been the Officer-in-Charge of the Arctic Weather Central.

Several telegrams with best wishes on his retirement were read, including one from the Assistant Deputy Minister of the A.E.S. Mr. J.R.H. Noble. Messages were also received from Bill's many friends at Head Office, Toronto, the University of Alberta, Resolute Bay, and from the U.S.A.

The Climatologist from the Edmonton Weather Office, Mr. Al Turner, prepared a summary of the weather that Bill had encountered during his career, and our artistic typist Diane Baier, drew some posters highlighting special events in Bill's past.

Bill and his lovely wife Margaret, have recently bought a new home on the edge of the Broadmoor Golf Course in Sherwood Park. Bill now has a supply of golf balls (they keep falling in his garden). With this incentive, Bill has decided to start to play golf. The Regional Director, A.E.S., presented a golf cart and a set of golf clubs to Bill on behalf of Bill's fellow workers in Edmonton and his many friends across the land.

VOYAGE METEO-JEUNESSE

Par Normand Guérin

Mercredi le 23 août, j'avais le plaisir d'amener huit adolescents de l'atelier Météo-Jeunesse des Loisirs de la Cité, visiter un des plus importants centres météorologiques du pays, celui de Montréal.

Le voyage, une gracieuseté de Québécair, fut des plus réussi, grâce aux bons soins et à l'amabilité du personnel de cette Ligne Aérienne.

Le départ régulier du F-27 nous permis d'atteindre Montréal l'avantmidi et notre premiére visite fut au Bureau Central d'Analyse, centre nerveux de la météorologie. Dans ce bureau, l'homme et la machine travaillent de concert à l'analyse et à la préparation de prévisions qui sont ensuite diffusées à travers le Canada. Nous y avons vu comment des techniciens en météorologie pointent les informations provenant de tous les pays de l'hémisphére nord sur des "mappemondes" comment ces informations proviennent jusqu'à la salle de télécommunication par téléscripteurs et également comment les cartes météorologiques sont retransmises à travers le pays par procédé "fac-similé", et efin comment un ordinateur électronique analyse les informations et dessine des cartes-météo et également élaborent des prévisions.

Aprés s'être familiarisé avec le Bureau Météorologique de Montréal, nous avons profité de l'occasion pour nous rendre à la tour de contrôle de la circulation aérienne d'oû nous avons pu assiter au décollage du plus récent et du plus imposant des réactés, le Boeing 747.

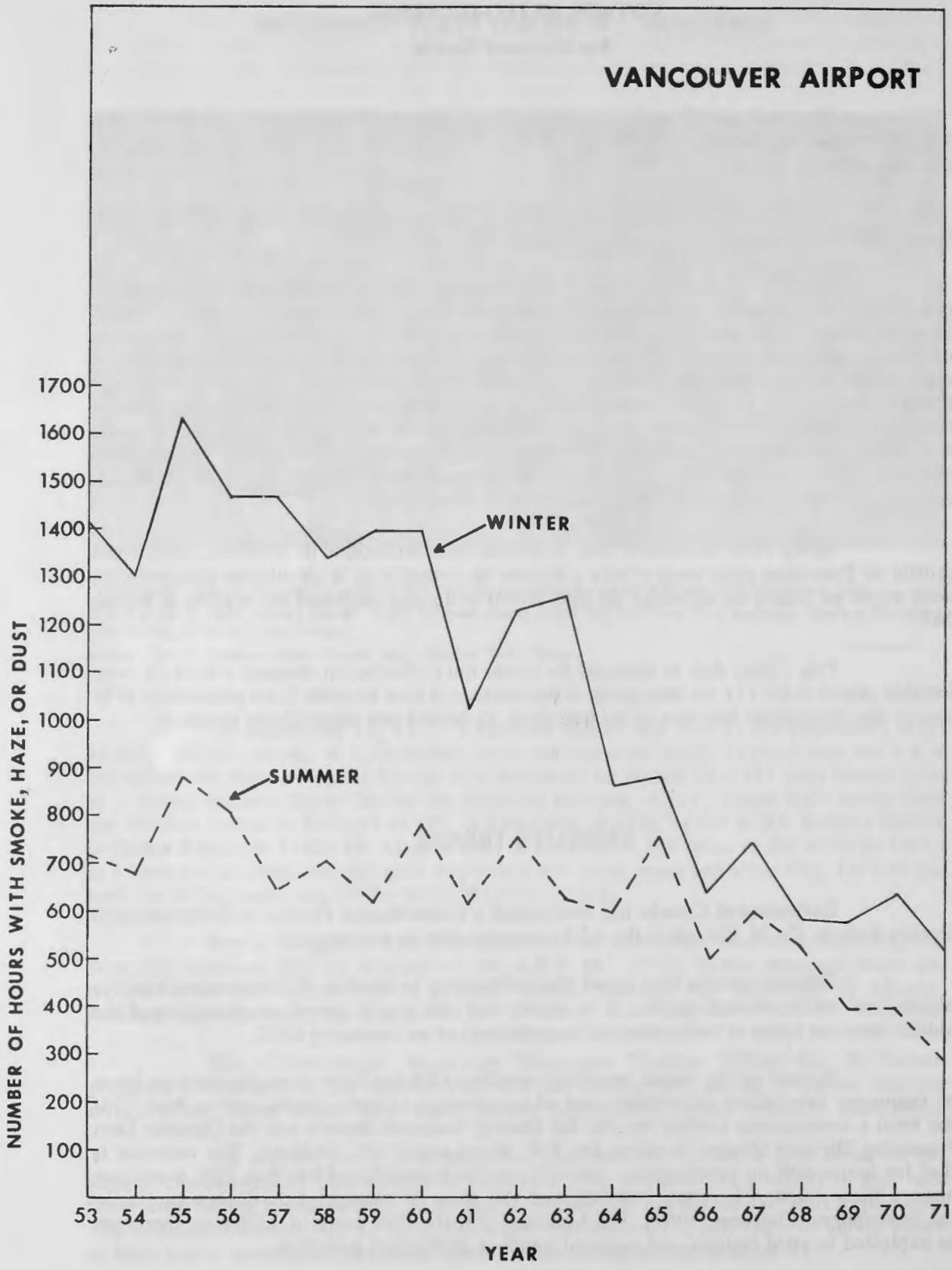
Puis c'était déjà le moment du retour qui s'effectua en douceur à bord du comfortable réacté BAC 111 un peu épuisé d'une journée si bien remplie. L'empressement et le sourire des charmantes hôtesses ne fut que chose en beauté une merveilleuse escapade.

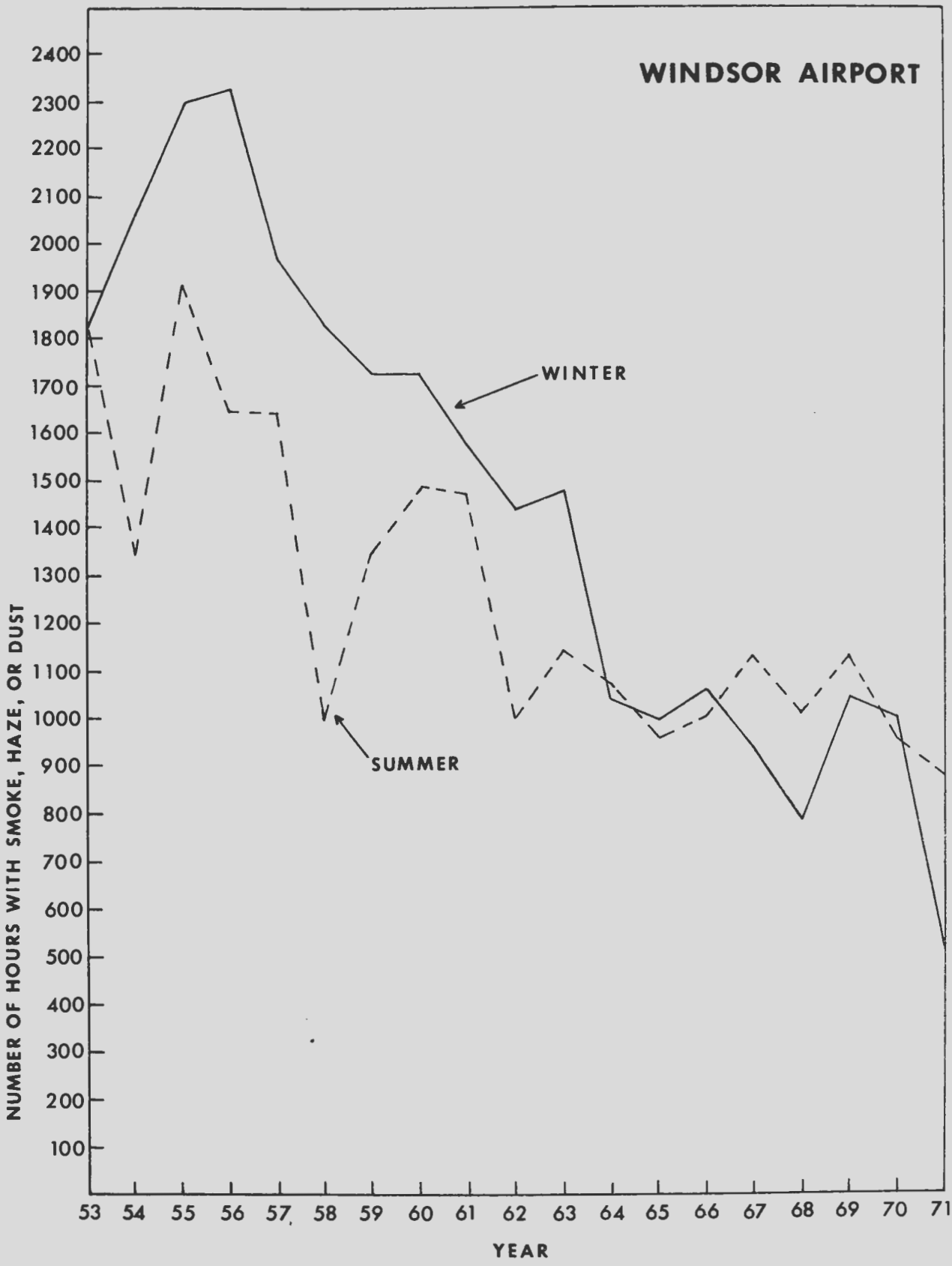
VISIBILITY TRENDS

Environment Canada has established a Cross-Mission Project on Environmental Quality Indices. Dr. M. Kwizak is the AES representative on this project.

Citizens' groups have urged the government to develop indices, national and/or regional, of environmental quality. It is argued that this would permit an evaluation of the hidden costs (in terms of environmental degradation) of an increasing GNP.

As part of the initial feasibility studies, AES has been preparing various types of frequency tabulations of visibility and of occurrences of haze, smoke and/or dust. This has been a co-operative venture by the Air Quality Research Branch and the Climatic Data Processing Division (Project Leaders Dr. R.E. Munn and B.S.V. Cudbird). The rationale is that for hours with no precipitation and with relative humidities of less than 70%, there is an inverse linear relation between visibility and the mass of suspended particulate matter in the atmosphere (Charlson, 1969). The historical climatic data bank of AES may therefore be exploited to yield regional and national trends in particulate pollution.


VANCOUVER AIRPORT
WINTER
SUMMER
NUMBER OF HOURS WITH SMOKE, HAZE, OR DUST
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
YEAR


WINDSOR AIRPORT
WINTER
SUMMER
NUMBER OF HOURS WITH SMOKE, HAZE, OR DUST
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
YEAR

The tabulations are still being analyzed but two of the early results are shown in Figs. 1 and 2, which display the secular trends for a very simple index: the annual numbers of hours when smoke, haze and/or dust were reported at Vancouver and Windsor airports. The data are divided into summer (May to October) and winter (January to April and November-December) months. The improvement over the years in this index of air quality is due to pollution controls and to sociological factors (the use of cleaner domestic fuels, etc.). These are admittedly two of the better examples of downward trends. At some locations, the frequencies are very low with the exception of large "blips" in particular years, presumably due to forest fires (1953 at Fort Smith, N.W.T.; 1961 at Dauphin, Man.; 1961 at Kenora, Ont.). At Toronto and Montreal Airports, the downward trend is not so evident, perhaps because the cities have been expanding outward towards the airports, and perhaps also because of an increased summer production of photochemical particulate matter. Miller *et al.* (1972) have reported that summer haziness is increasing in Ohio, Kentucky and Tennessee.

The visibility study would not have been possible without the large AES climatological archive. Through foresight, perseverance and dedication, AES has a data bank which provides both national coverage and continuity over many years, and which is unequalled in any other Service of Environment Canada. With many new environmental questions arising almost daily, the climatic archives will serve a multitude of uses in the years to come.

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Miller, M.E., Canfield, N.L., Ritter, T.A. and Weaver, C.R. (1972). Visibility changes in Ohio, Kentucky and Tennessee from 1962 to 1969. *Mon. Wea, Rev. 100,* 67-71.

BURNABY LAKE TOWER

Work has started on a 300-foot pencil slim tower in the industrial area west of Burnaby Lake to provide the Federal Weather Service with data on the flow of air pollutants. The site is on Still Creek Avenue just west of Douglas Road.

The steel tower is triangular with a 20-inch face and will be almost invisible to the residential community half a mile away.

The Tower will have sensors about thirty feet up the pole and at the top. Continuous information on wind direction and speed and on variation of temperatures will be fed into electronic data logging equipment housed at the base of the Tower.

This information will show the ebb and flow of pollutants over the urban area as well as provide information on wind stresses for construction purposes, optimum height of chimney stacks and wind variability for the design of heating and air conditioning systems.

The Atmospheric Environment Service has numerous weather stations at ground level over the Greater Vancouver Region, but this is the first attempt to sample the atmosphere in depth.

This Tower will be the first to be constructed in British Columbia. Other towers are in operation in the Toronto Metropolitan area, Ottawa, Montreal and Hamilton. These installations all form part of a national program aimed at providing more information on urban climate to engineers, scientists and air pollution authorities.

AIR POLLUTION RIG rises 300 feet near west end of Burnaby Lake. Workmen Rod Elliott, bottom, and Bob Irvine install sensors on new tower which will record weather and pollution.

SERVICE DE L'ENVIRONNEMENT ATMOSPHERIQUE

RETIREMENT OF WEATHER CHIEF

Mr. D. (David) Strachan, Officer-in-Charge of the Vancouver Weather Office retired from the Atmospheric Environment Service on September 15 after a distinguished thirty-five year career with the Federal Public Service.

A native of Scotland, Mr. Strachan immigrated to Canada in 1935 and joined what was then known as the Meteorological Service in 1937. He served with British Commonwealth Air Training Stations at Camp Borden and Saskatoon in the early years of the war, and in 1941 returned to the Vancouver Office as Aviation Forecaster. He was appointed Chief Forecaster in 1960 and Officer-in-Charge in 1964.

His understanding of Atmospheric Science in general, West Coast Meteorology in particular, and his ability to impart this knowledge was well-known to colleagues and aspiring meteorologists.

Mr. Strachan will continue to live in Vancouver, although his retirement plans include some world travel. He has always had a wide and avid interest in sports, and has been a long-time member of the Vancouver Lawn Tennis and Badminton Club.

SCIENTISTS STUDY WATER BALANCE

Beginning on September 15 and lasting through December 15, a major scientific effort is to be made to study the complex movement of water substance (vapour, clouds and precipitation) in the atmosphere above Lake Ontario. It is anticipated that the results will contribute to improved weather forecasts and water resource management in the Great Lakes area. The program will utilize instrumented balloon ascents from six points around the shores of the lake to probe the atmosphere up to 8 times a day. Four years in the planning stage, it will be the most intensive study of this type ever undertaken over such a comparatively small area.

The project, called the Atmospheric Water Balance study, is one of the largest single projects being carried out as part of the International Field Year on the Great Lakes (IFYGL), the major multi-disciplinary program of scientific research on Lake Ontario being carried out jointly by Canada and the United States.

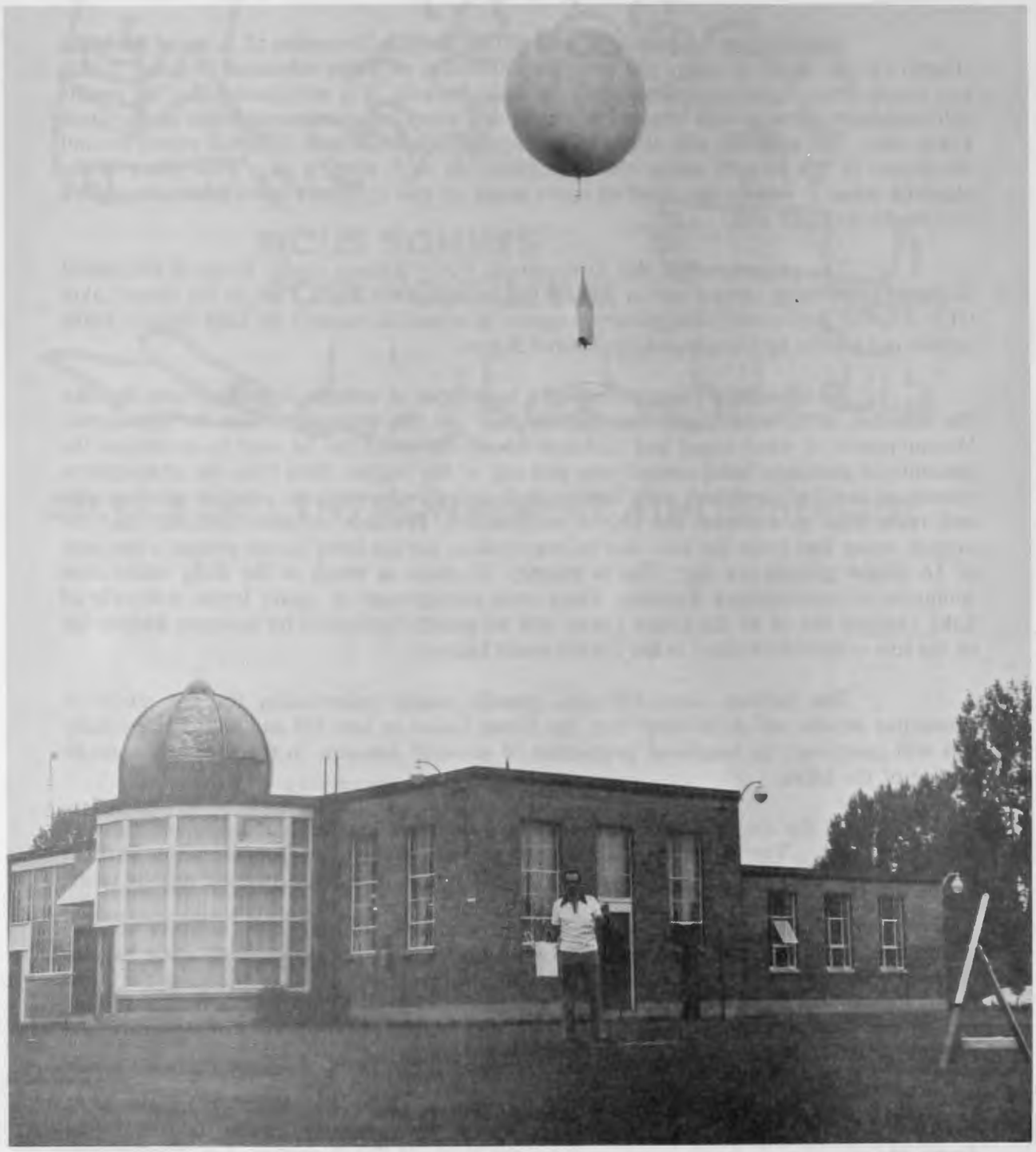
By measuring temperatures and humidities at various altitudes above the lake the amount of invisible water vapour "stored" in the atmosphere can be monitored. Measurements of wind speed and direction at various levels can be used to determine the amounts of moisture being carried into and out of the region. Data from the atmospheric soundings can be combined with surface and aircraft observations, satellite photographs and radar data to estimate the rate of evaporation. Previous estimates indicate that the average water loss from the lake due to evaporation for the three month period is upwards of 16 billion gallons per day. This is roughly 70 times as much as the daily water consumption of metropolitan Toronto. Long term management of water levels, not only of Lake Ontario but of all the Great Lakes, will be greatly facilitated by accurate knowledge of the role evaporation plays in the overall water balance.

The balloon data will also provide useful information for the study of convective storms which develop over the Great Lakes in late fall and winter. Hopefully this will contribute to improved prediction of snowfall amounts in the snowbelt areas to the lee of the lakes.

Of the six balloon-sounding stations three are located in Ontario and three in New York State. The Canadian stations are at Scarborough, at Confederation Park in Hamilton, and at Presqu'ile Provincial Park near Trenton. The latter two are mobile units.

Although upper-air soundings are conducted routinely by weather services around the world, such a concentrated network for studying the atmospheric water balance is unique. It is also significant that the upper air measurements will be made using the latest technological advances. Balloons will be tracked using LORAN-C direction-finding equipment originally developed for aircraft and marine navigation. Consequently the project has aroused the interest of scientists in many countries.

The Canadian portion of the program is under the direction of Mr. H.L. Ferguson of the Atmospheric Environment Service, Environment Canada. In the United States the program is being conducted by the National Oceanographic and Atmospheric Administration with the cooperation of the United States Air Force.



Preparation for Radiosonde Balloon Release – IFYGL Research Program

MEETING OF SPECIAL LIBRARIES ASSOCIATION, TORONTO CHAPTER

A highly successful meeting of the Toronto Chapter, Special Libraries Association was held in our Headquarters building on the evening of September 28, 1972. 95 members and guests had dinner in the cafeteria, then went to the auditorium to see the film "In One Day" and hear a lecture on "Weather Satellites and All That" from C.I. Taggart, who had generously donated his services. A tour of the Satellite Laboratory and the Library rounded out an evening which left all present glowing with admiration for Atmospheric Environment Service, its building and facilities, and for Mr. Taggart whose speech had been both informative and utterly absorbing.

PERSONNEL

September 1972

The following transfer took place:

S. Siok To: School of Meteorology, Trenton

From: CFB Cold Lake

Dr. Marlene Phillips

The Air Quality Research Branch is pleased to have Dr. Marlene Phillips join its staff as a Phytoxicologist with the Criteria and Standards Division.

Dr. Phillips obtained her B.Sc. degree in Biology and an M.Sc. in Plant Physiology at Queen's University. From there she went to the Waite Agricultural Institute at the University of Adelaide in Australia where she obtained her Ph.D. in the study of plant hormones.

From January until August of 1969, she and her husband took an overland trip in a land rover from London, England to India and back again. Prior to joining the Atmospheric Environment Service, she was with the University of Toronto's Department of Biochemistry where she performed post-doctoral studies on anion movements in plant mitochondria.

TRIVIA

Greeks have the answer for tension – worry beads (By Evelyn Oldham)

ATHENS – The Greeks have an answer for tension. It's not dancing, smashing plates, taking pills, or playing the bouzouki. It's a simple, portable relaxer – worry beads.

For generations, coffee drinkers in every café in the country have dangled a string of beads between their fingers, letting them click in time with their thoughts. The combination of the sound, feeling and motion, the Greeks say, has an amazing tranquilizing effect.

In this city, you pass businessmen carrying a briefcase or newspaper in one hand and clicking beads with the other. In an empty shop, all is quiet except for the owner fingering beads. At a sidewalk café, a Greek will hold a drink in one hand and with the other flip the beads around his wrist.

Anywhere – beach, movie, taverna, it doesn't matter – the Greeks will be there clicking beads.

Not every Athenian engages in bead clicking but in the country almost every villager has the worry beads in hand.

Fingering the worry beads is mainly a male phenomenon and each man has his own technique. Some snap one bead at a time; some two at a time. Others toss them around their wrist; some swing them from side to side.

The theory of Connie Soioyanis, a Greek public relations man living on the island of Rhodes, is that swinging the beads helps the villagers shift the weight of their heavy breeches from one side of the body to the other. "The beads have the same effect as braces. Without them, the islander couldn't walk," he says.

The usual worry beads sold in shops have around 30 or less on a chain with a tassel. The chain is smaller than a necklace and bigger than a bracelet. You can buy a set for 20¢ at a sidewalk kosk or as a piece of jewelry in gold or silver inset with stones, the price can go up to $80.

You can often find large worry beads in homes and offices, lying on a table or hanging on a wall, as an ornament.

Purists demand 33 beads, preferably amber or amber glass, strung on a chain. Country people like theirs on leather thongs.

The beads originated in India centuries ago, spread to China, and in the Catholic and Islam worlds were used to measure prayer. In Greece they have no religious significance.

Ask anyone who uses them and he'll tell you that they are a wonderful pacifier. They soothe the nerves and are good for high blood pressure. And, they help smokers trying to kick the habit.

Dr. Paul Dudley White, the heart specialist and medical adviser to the late President Eisenhower, advocated worry beads as a health measure. Once, visiting Toronto for a heart fund conference, he pulled a string out of his pocket, saying. "Fine thing for idle hands, much better than smoking."

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Indian Ocean

m.v. British Robin. Captain A.M.B. Ferguson. Bandar Ma'shur to Lobito. Observers, Mr. R. Wilson, 2nd Officer and Mr. D. Rundle, Chief Officer.

27th-28th July 1971. We include the following purely as 'an interesting experience' and although the exact details of the central characters are somewhat vague we hope the story contains some points of interest.

Albert the Albatross arrived aboard our ship some time on the 27th and there are several theories as to how he came to be where he was but one thing was certain, his arrival was not intentional and he objected to being on board.

Albert, a Black-browed Albatross (Diomedea melanophris) was discovered at 0430 LMT on the morning of the 28th during a slight panic when the ship's engines failed whilst storing at Cape Town. He (or she) was sitting on a lower deck which ran around the midship's housing; he occupied a position at the for'ard starboard corner of this deck which is only a few feet wide and which was almost totally blocked by Albert's vast bulk.

Obviously everyone on the ship had read stories of how stranded albatrosses have to be launched off a ship because there was plenty of advice on how to launch Albert but not many volunteers to do it. There was also a small snag: it was more than likely that Albert had collided with the midship's housing so there was the possibly that he may have damaged his wings, but the extremely intimidating effect of Albert's large beak and the habit he had of turning his head and fixing the gaze of his evil eye (his black brow gave his eyes the appearance of those of a cartoon villian) on to whoever was nearest precluded any attempts to examine him.

So it was decided to launch him and hope for the best. The Chief Officer, the ship's authority on wild life (he supplied the technical information) volunteered to do the launching. Albert's head was covered with a sack (a safety measure taken to prevent any opening of the Mate's blood vessels) and he was placed on the ship's rail, the sack was removed and Albert was launched.

Whatever information is now in print about launching an albatross it was obvious that Albert had not read any of it because he did not play his part and his large bulk plummeted in an undignified manner to the water. On reaching the water Albert must have decided that it would be safer to get airborne. After a comical mixture of flapping and paddling his huge feet Albert slowly became airborne and, without as much as a 'thank you' or victory roll, he departed.

Position of ship at 1200 GMT on 27th: 34° 54'S, 21° 18'E.