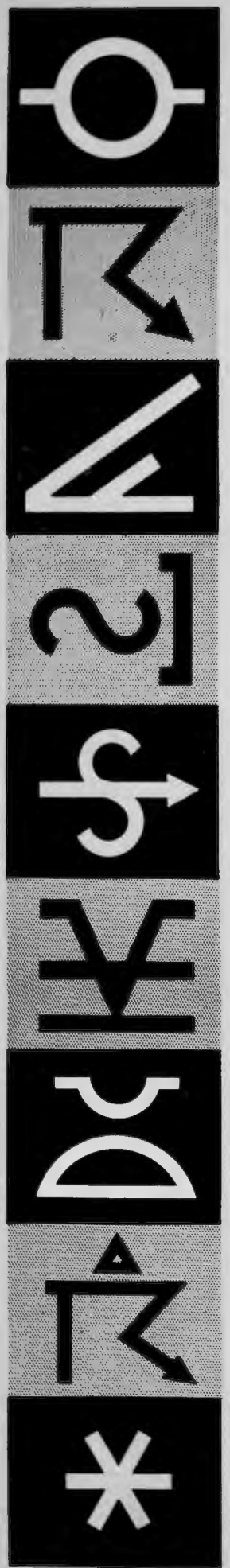

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WMO EXPERT MEETING ON WET AND DRY DEPOSITION

by D.K. Smith

In 1970 the World Meteorological Organization (WMO) began operating a network for the monitoring of long-term trends in background levels of air pollution.

All stations in the network are asked to carry out two observing programs: the collection of precipitation samples for subsequent chemical analysis, and sunphotometer readings from which atmospheric turbidity (opaqueness due to the presence of small suspended particles) can be calculated. Member nations in arid regions of the world are understandably anxious to add some measure of dry deposition, and indeed ecologists everywhere are asking for similar measurements. Additional information on the particulate loading of the atmosphere is also needed because changes in this loading could have complex and important effects on climate.

The desire to monitor the properties of atmospheric particulates and the importance of the precipitation chemistry program led WMO to organize an Expert Meeting on Wet and Dry Deposition. Largely because of work on precipitation collectors which AES has carried out over the past few years, Canada was asked to host the meeting. Accordingly, about 40 participants from 11 countries met in the AES headquarters building November 17-21 to review the state-of-the-art of measuring the amounts and physical-chemical properties of materials reaching the earth's surface in precipitation or as 'dry' particles, and then to make recommendations on procedures for the WMO monitoring network.

Those familiar with the problem of measuring the amount of water reaching the earth's surface, and of the special difficulties when that water falls as snow, will recognize that the meeting faced a difficult job. It was simplified to some extent, however, by keeping in mind three requirements for the specific purposes of the WMO network. First, the measurements must provide information on long-term trends in atmospheric composition. Second, the measurements must be representative of large-scale, not local, conditions. Third, any measurement to be included in the minimum program at this point in time should involve relatively easy sampling procedures, suitable for use in a global network of about 150 surface stations.

Information on the size distribution, mass, number, and chemical composition of particles can be obtained by using a number of relatively simple in-situ sampling devices such as condensation nuclei counters, nephelometers, dustfall collectors, impactors, and filters exposed in various ways (the high volume sampler being the most common). Unfortunately, none of these in-situ techniques meet all of the requirements. The most common difficulty is that the measurements are too easily influenced by local sources of particles, such as wind-blown dust. Some techniques are difficult to standardize; some provide numbers which bear an unknown relationship (if any) to long-term trends in atmospheric composition. Accordingly, it was recommended that particulate measurements should not be considered part of the minimum program at this time.

Participants agreed that a better understanding of atmospheric pathways was required if maximum information on trends was to be obtained from presently-available techniques, including the precipitation chemistry program. Perhaps the major requirement is more information on particles – the relative importance of sources (including formation in the atmosphere from gaseous pollutants), physical and chemical properties, removal processes, etc. It was recognized that most of the in-situ techniques could be useful in such

studies and it was recommended that research along these lines be intensified at the few baseline and expanded-program regional stations in the WMO network. In the long run, techniques such as lidar, sampling from aircraft, satellite observations, and sophisticated radiation measurements are much more promising than surface sampling for the study of long-term trends in atmospheric particulate loading.

Turning to the wet deposition side, the precipitation chemistry program is in better shape. Precipitation removes many pollutants quite efficiently, usually from a considerable depth of the troposphere. The chemical composition of precipitation is thus a reasonable integrator of tropospheric air quality and can be relatively insensitive to small local sources of pollution.

Five years of network operations have provided much valuable experience. The procedure is to collect a one-month sample of precipitation at each station. The samples are shipped to central laboratories and analyzed for pH, alkalinity, acidity, conductivity, and the major ions –sulfate, nitrate, ammonium, calcium, chlorine, sodium, potassium, and magnesium.

A feature of the meeting was a series of reports on precipitation collectors and sampling procedures – an 18-month test of precipitation collectors at the AES Station for Atmospheric Experiments, a Cornell University experiment on the calibration of sampling procedures, a description of the Dutch precipitation-chemistry network, experiments carried out by the Finnish Meteorological Institute in Finland, and deposition measurements over the Great Lakes carried out by scientists at the Canada Centre for Inland Waters. A display of precipitation collectors in the lobby illustrated most of the designs involved and proved to be a popular gathering point for the participants.

It was clear from several tests that collectors without protection against gross contamination (dustfall, insects, bird droppings, etc.) gave samples which were strongly affected by local conditions. Collectors with covers which opened and closed automatically were still subject to contamination from splash-in and fugitive dust, but those which had the tightest-fitting covers gave the most consistent results. Catch efficiencies varied from collector to collector; standardization of aerodynamic design, height, etc., is obviously desirable but this is, and will probably continue to be, an area where it is difficult to make firm recommendations. It was agreed that the precipitation amount measured by standard meteorological methods should be reported in addition to the catch of the collector – an earlier oversight which may strike many meteorologists as peculiar.

Stricter quality assurance procedures and some improvements in analytical techniques were recommended for the chemical-analysis stage of the program. However, the errors introduced in any well-run laboratory should be smaller than those arising in the collection, handling, and shipping-and-storage stages. The chemists pointed out that careless handling of the precipitation sample or collector apparatus can cause significant errors – salt from the observer's hands, or absorption of ammonia gas by an open sample in an occupied room, for example. Experiments were also reported which showed that even carefully-stored uncontaminated precipitation may undergo changes in chemical composition, emphasizing the importance of minimizing the time between sample collection and analysis.

Extension of the analysis to include heavy metals (iron, copper, nickel, lead, etc.) and organic compounds (PCB's, pesticides, etc.) was not recommended at this time. These constituents are important but present special problems. While polyethylene is the best material to use in sampling for the major ions and acidity, it is unsuitable for many

metals and organics which would thus require a separate sampling procedure. Some constituents also require a large sample volume and very sensitive analytical techniques since the concentrations are extremely small – a few parts per billion by weight, compared to parts per million for the major ions.

The details of data reporting received considerable attention. The U.S. Environmental Protection Agency acts as the world data centre for the WMO precipitation chemistry program. Data from each station are received on monthly report forms, quality checked, transferred to computer format, then provided to the U.S. National Climatic Centre for annual publication. Recommendations were made to overcome a number of difficulties involving the report form and quality assurance at the national level.

To summarize, the meeting proved to be an excellent forum for the exchange of information on the practical and scientific problems of conducting a monitoring program for the chemical constituents in precipitation and particles. For the first time, members of the various groups involved – researchers, instrument experts, network operators, chemists, data experts – met to look specifically at the operational problems of present and proposed programs. The resulting recommendations should consolidate the significant advances that have been made in the precipitation chemistry program over the past five years, and point out the directions for eventual inclusion of dry-particle monitoring.

To close on a note more closely related to traditional meteorology than chemical constituents in wet and dry deposition, Toronto's weather during the week of the meeting could not have been better. Sunny skies and unseasonably warm weather prevailed for the first four days. To add spice for the air pollution experts in attendance, the warm spell ended with Toronto's first air pollution episode in some time – a minor one, but enough to trigger provincial control procedures and cause some industries to voluntarily curb emissions. And for the foreign meteorologists who had done an applied-climatology study before coming, a cold frontal passage on Friday sent them home gloved, hatted, and with topcoat linings in place – well satisfied with their conclusion that Toronto weather in late November could not be trusted.

PRECIPITATION COLLECTOR DISPLAY AES HEADQUARTERS, NOVEMBER 17-21 1975
EXPOSITION DE COLLECTEURS DE PRÉCIPITATIONS ADMINISTRATION CENTRALE DU SEA DU 17 AU 21 NOVEMBRE 1975

From the right:/De droite à gauche:

Sensor stand for ERNI (spinning disc sensor)

ERNI automatic collector (Switzerland) – housing cover removed to show bottle and control panel.

MISCO automatic collector (USA) – smallest collector, sensor head to right.

AAPS automatic collector (Finland) – twin containers, one for precipitation-only, one for dustfall-only. Best design features for Canadian conditions.

WONG automatic collector (USA) – modified to AES specifications, presently in use at Canadian stations in WMO network.

CCIW Snow Collector (Canada) – bulk collector (open at all times, Alter shield to increase catch efficiency, spikes around rim of collector to discourage birds).

Socle du détecteur du collecteur ERNI (détecteur à disque tournant)

Collecteur automatique ERNI (Suisse) – (le panneau amovible a été enlevé pour montrer le bidon et le tableau de commande).

Collecteur automatique MISCO (USA) (le plus petit collecteur exposé) à droite, le détecteur.

Collecteur automatique AAPS (Finlande) à deux réservoirs, l'un réservé aux précipitations, l'autre aux retombées de poussières. Les caractéristiques de ce collecteur sont les mieux adaptées aux conditions du Canada.

Collecteur automatique WONG (USA) modifié d'après les spécifications du SEA, actuellement en service dans les stations canadiennes du réseau de l'OMM.

Collecteur de neige du CCIW (Canada) pour la collecte en vrac (toujours ouvert, muni d'un écran Alter pour en améliorer l'efficacité de collecte, le collecteur est entouré de lames pour en éloigner les oiseaux).

RÉUNION D'EXPERTS SUR LES DÉPÔTS HUMIDES ET SECS ORGANISÉE PAR L'OMM

par D.K. Smith

En 1970, l'Organisation météorologique mondiale (OMM) a entrepris l'exploitation d'un réseau chargé de surveiller l'évolution dans le temps des niveaux de la pollution atmosphérique.

Toutes les stations du réseau doivent mener deux programmes d'observation: recueillir des échantillons de précipitations à des fins d'analyse chimique ultérieure et faire des relevés au photomètre solaire pour le calcul de la turbidité atmosphérique (opacité causée par la présence de petites particules en suspension). Les pays membres situés dans les régions arides du monde tiennent, et on les comprend, à inclure certaines mesures des dépôts secs et, bien sûr, les écologistes du monde entier réclament des mesures analogues. Des renseignements supplémentaires sur la charge de l'atmosphère en particules est également nécessaire parce que des changements de cette charge pourraient avoir des répercussions complexes et importantes sur le climat.

L'intention de surveiller les propriétés des particules atmosphériques et l'importance du programme de la chimie des précipitations ont conduit l'OMM à organiser une réunion d'experts sur les dépôts humides et secs. Le Canada a été prié de tenir la réunion sur son sol en grande partie à cause du travail que le SEA a effectué sur les collecteurs de précipitations au cours des dernières années. Une quarantaine de participants venus de onze pays différents se sont donc retrouvés à l'Administration centrale du SEA du 17 au 21 novembre afin d'analyser l'état d'avancement des travaux sur la mesure des quantités et des propriétés physico-chimiques des matières qui atteignent la surface de la terre sous forme de précipitations ou de particules "sèches"; ils devaient ensuite faire des recommandations sur les méthodes à adopter par le réseau de surveillance de l'OMM.

Ceux qui connaissent bien le problème de la mesure de l'eau qui arrive à la surface de la terre et les difficultés particulières quand cette eau tombe sous forme de neige, reconnaîtront qu'il s'agissait d'une entreprise ardue. Celle-ci a pourtant été simplifiée dans une certaine mesure par un rappel constant des trois conditions à remplir pour répondre aux buts particuliers du réseau de l'OMM. Tout d'abord, les mesures doivent fournir des renseignements sur l'évolution à longue échéance de la composition atmosphérique. Ensuite, les mesures doivent être représentatives des conditions à grande échelle et non pas à l'échelle locale, et, en fin de compte, toute mesure à inclure, à l'heure actuelle, dans le programme minimal doit faire appel à des méthodes d'échantillonnage relativement faciles qui puissent être utilisées dans un réseau mondial composé d'environ 150 stations en surface.

On peut obtenir des renseignements sur la taille, la répartition, la masse, le nombre et la composition chimique des particules à l'aide de dispositifs d'échantillonnage in-situ relativement simples tels que les compteurs de noyaux de condensation, néphélomètres, collecteurs de poussière, impactors et filtres exposés de différentes façons (le plus courant étant l'échantillonneur de grand volume). Malheureusement, aucune de ces techniques in-situ ne permet de faire face à tous les besoins. La difficulté la plus courante réside dans le fait que les mesures sont trop souvent influencées par des sources locales de particules telles que la poussière soulevée par le vent. Certaines techniques sont difficiles à normaliser; d'autres fournissent des résultats dont le rapport (éventuel) avec l'évolution à longue échéance de la composition atmosphérique est inconnu. C'est pourquoi il a été

recommandé de ne pas considérer la mesure des particules comme faisant partie intégrante du programme minimal, à l'heure actuelle.

Les participants sont tombés d'accord qu'il faut d'abord mieux comprendre les comportements de l'atmosphère si l'on veut obtenir le plus de renseignements possible sur l'évolution à partir des techniques dont on dispose actuellement, y compris du programme de chimie des précipitations. Le plus grand besoin est peut-être d'avoir plus de renseignements sur les particules, l'importance relative des sources (y compris leur formation dans l'atmosphère à partir de polluants gazeux), les propriétés physiques et chimiques, les procédés de suppression, etc. . . Il a été admis que la plupart des techniques in-situ pouvaient être utiles dans ces études et il a été recommandé d'intensifier la recherche dans ces directions dans les quelques stations régionales du réseau de l'OMM qui se consacrent aux programmes de base et aux programmes élargis. Les techniques telles que le lidar, l'échantil lonnage à partir d'aéronefs, les observations par satellites et les mesures très perfectionnées du rayonnement sont, à la longue, plus prometteuses que l'échantillonnage en surface pour l'étude de l'évolution à longue échéance de la charge de l'atmosphère en particules.

Quant à l'étude des dépôts humides, le programme de la chimie des précipitations marche mieux. Les précipitations débarrassent assez bien l'atmosphère de nombreux polluants, habituellement à partir d'une hauteur considérable de la troposphère. La composition chimique des précipitations est, par conséquent, un bon intégrateur de la qualité de l'air troposphérique et elle est relativement peu sensible aux petites sources locales de pollution.

L'expérience des cinq années d'exploitation du réseau s'est avérée précieuse. La méthode consiste à recueillir, dans chaque station, un échantillon des précipitations d'un mois. Les échantillons sont expédiés aux laboratoires centraux et analysés pour la détermination du pH, de l'alcalinité, de l'acidité, de la conductivité et des ions majeurs – sulfate, nitrate, ammonium, calcium, chlore, sodium, potassium et magnésium.

Au programme de la réunion figurait une série de rapports sur les collecteurs de précipitations et les méthodes d'échantillonnage: un rapport sur les essais de collecteurs de précipitations effectués pendant dix-huit mois à la station d'expérimentation atmosphérique du SEA, un autre sur l'expérience menée par l'Université Cornell sur l'étalonnage des méthodes d'échantillonnage, une description du réseau de chimie des précipitations de la Hollande, des expériences réalisées en Finlande par l'Institut météorologique finlandais et des mesures des dépôts sur les Grands lacs effectuées par les chercheurs du Centre canadien des eaux intérieures. Les collecteurs de précipitations exposés dans l'entrée du SEA illustraient la plupart des modèles en question et représentaient, pour les participants, un lieu de rencontre très fréquenté.

Plusieurs expériences ont démontré que les collecteurs dépourvus de protection contre les gros contaminants (poussière, insectes, fientes d'oiseaux, etc. . .) fournissent des échantillons fortement soumis aux influences des conditions locales. Les collecteurs munis de couvercles qui s'ouvrent et se ferment automatiquement sont encore sujets à la contamination par de la poussière qui s'introduit ou qui passe, mais les collecteurs munis de couvercles étanches fournissent les résultats les plus uniformes. L'efficacité de collecte varie d'un collecteur à l'autre; la normalisation d'un modèle aérodynamique, de la hauteur, etc. . . est évidemment souhaitable, mais il s'agit là d'un domaine où il est difficile de faire des recommandations fermes et il en sera probablement encore ainsi à l'avenir. Pour réparer un oubli antérieur que bien des météorologistes peuvent juger étrange, il a été convenu de faire figurer la quantité de précipitation mesurée à l'aide des méthodes météorologiques normales en plus de la quantité recueillie dans le collecteur.

Des méthodes de contrôle de la qualité plus strictes et quelques améliorations des techniques d'analyse ont été recommandées pour le stade de l'analyse chimique du programme. Cependant, les erreurs qui s'introduisent dans tout travail de laboratoire, même s'il est bien mené, doivent être moins importantes que celles qui surviennent aux stades de la collecte, de la manipulation, du transport et de l'emmagasinage. Les chimistes ont insisté sur le fait que des négligences lors de la manipulation des échantillons de précipitations ou des appareils collecteurs peuvent entraîner d'importantes erreurs, notamment la contamination de l'échantillon par le sel des mains de l'observateur ou par le gaz ammoniac absorbé par un échantillon à l'air libre dans une pièce occupée par exemple. On a aussi signalé des expériences qui montraient que même des précipitations non contaminées et soigneusement emmagasinées peuvent subir des changements de composition chimique, ce qui révèle l'importance de réduire le laps de temps qui s'écoule entre la collecte de l'échantillon et son analyse.

L'extension de l'analyse aux métaux lourds (fer, cuivre, nickel, plomb, etc . . .) et aux composés organiques (PCB, pesticides, etc . . .) n'est pas recommandée pour le moment. Ces constituants sont importants mais présentent des problèmes particuliers. Le polyéthylène est le meilleur matériau pour l'échantillonnage dans le but d'analyser les ions majeurs et l'acidité, mais il ne convient pas pour de nombreux métaux et de nombreux composés organiques pour lesquels il faudrait donc une autre méthode d'échantillonnage. Pour certains constituants, il faut un échantillon de grand volume et des techniques d'analyse très sensibles car les concentrations sont extrêmement faibles, quelques parties par milliard en poids comparativement à quelques parties par million pour les ions majeurs.

On a particulièrement étudié les détails de la transmission des données. L'Environmental Protection Agency des Etats-Unis est le centre mondial des données pour le programme de la chimie des précipitations de l'OMM. Cet organisme reçoit chaque mois un rapport des données de chaque station, en vérifie la qualité, les met sous forme assimilable par l'ordinateur et les fournit au National Climatic Centre des Etats-Unis pour publication annuelle. Des recommandations ont été faites pour surmonter certaines difficultés soulevées par le formulaire de rapport et le contrôle de la qualité au niveau national.

En résumé, la réunion s'est avérée un excellent forum pour l'échange de renseignements sur les difficultés pratiques et scientifiques que l'on rencontre dans un programme de surveillance des constituants chimiques, des précipitations et des particules. C'est la première fois que les membres des différents groupes intéressés, chercheurs, experts en instruments, exploitants de réseaux, chimistes et experts en données, se sont rencontrés pour examiner tout particulièrement les problèmes d'exploitation des programmes actuels et des programmes prévus. Les recommandations qui ont été faites devraient étayer les grands progrès réalisés dans le programme de la chimie des précipitations au cours des cinq dernières années et indiquer la voie pour y introduire éventuellement la surveillance des particules sèches.

Pour terminer sur une note plus proche de la météorologie classique que les constituants chimiques des dépôts humides et secs, ajoutons qu'il n'aurait pas pu faire plus beau à Toronto pendant la réunion. Le temps a été ensoleillé et exceptionnellement doux pendant les quatre premiers jours et, ne serait-ce que pour susciter l'intérêt des experts en pollution qui assistaient à la réunion, la période de temps doux s'est terminée sur une poussée de pollution atmosphérique, la première depuis un certain temps qui, sans être des plus importantes, a suffi à déclencher les procédés de contrôle provinciaux et à amener certaines industries à réduire volontairement leurs émissions. Quant aux météorologistes de l'étranger qui avaient fait une étude de climatologie appliquée avant de venir, le passage d'un front froid, le vendredi, les a obligés à retourner chez eux gantés, chapeautés et emmitouflés dans leur pardessus à doublure, ce qui les a confirmés dans leur opinion qu'il ne fallait pas se fier au temps à Toronto à la fin du mois de novembre.

DR. W.F.J. EVANS – SPECIAL MERIT AWARD

Growing concern about the ozone layer in 1973 culminated in a Canadian decision to investigate the effects of SST-stratospheric pollution. As head of the field experiments section in ARPX, Dr. Evans was authorized to formulate a plan. It gained T.B. approval that summer.

The plan was to investigate the NO_x-ozone problem by carrying a complex of experiments on a balloon platform into the stratospheric ozone layer. Undeterred by warnings by experienced authorities that such an ambitious program would not only take 2 to 3 years for AES to organize, but would also require far larger financial backing to mount, Dr. Evans determined to get the experiment off the ground within one year, and within the allotted budget

Photo/Photographie
ab Photographic

Organizing the resources of his section, and those of the universities of Calgary, Saskatchewan, York and Toronto, co-ordinating the efforts of US/ONR, Raven Industries and SED Systems, Dr. Evans successfully orchestrated Project Stratoprobe I, while personally designing and constructing 3 of the experiments.

On July 6, 1974 a 5 million cubic foot sky-hook balloon lifted a 3,400 lb. payload off the tarmac at Churchill, Manitoba. The 4'x4'x8' gondola carried 11 individual

scientific experiments, 5 built by the universities and 6 by the scientists of ARPX. After 22 hours of flight at 27 km., the package landed near Lake Athabaska in bad weather with winds gusting to 50 mph. Although the gondola and some of the instruments were badly damaged, under the untiring leadership of Dr. Evans, the system was back in operation within 2 weeks.

On July 22 a balloon of 11 million cubic feet floated the gondola to 32 km. This time there were no weather problems. All systems worked perfectly and a successful recovery was made near Uranium City.

For the first time in scientific history, all expected components of the ozone system had been measured. Canada had become the world leader in testing the photochemistry of the ozone layer used in computer modelling, and had achieved a commanding position for an assault on the new threat posed by the Freon-ozone problem. And, because of the unstinting efforts of Dr. Evans, this had been achieved in the incredibly short time of one year, an achievement that required a wide spectrum of skills, of a high order, in scientific investigation, in management, leadership and administration.

Subsequently, Dr. Evans had performed similar services while developing Stratoprobe II. This summer four flights were made through July and August from Yorkton, Saskatchewan. This time the nitrogen experiments were augmented by those designed to determine the chlorine chemistry of the stratosphere.

SCIENTIFIC COMMITTEE MEETINGS AT AES HEADQUARTERS

by Dr. G.A. McBean

In November atmospheric scientists from across Canada gathered at AES Headquarters for the meetings of the Canadian Meteorological Society's Scientific Committee and its sub-committee, the GARP Scientific Committee (GSC). Thirteen scientists attended one or both meetings. The GARP meeting lasted all day, Wednesday, November 5, and was followed by the Scientific Committee meeting on Thursday, November 6. The purpose of both meetings was to review Canadian atmospheric science (GARP related science in the first case) and either take action or recommend action as required. The work of these Committees has in the past had a significant effect on atmospheric science and likely will continue to do so in the future.

The CMS Scientific Committee has taken positions on such items as weather modification, air pollution and climate change. Because of its concern for the trend in weather modification activity in Alberta, the Committee pushed for more scientific input to the decision makers. The result was the appointment to the Weather Modification Board of Professor E.P. Lozowski, who also reports to the scientific Committee as rapporteur on weather modification activities. One of the functions of the Committee is to provide advice to the CMS Executive; a year ago the Committee examined the feasibility of including physical oceanographers in the CMS and recommended on the action to be taken.

At its November 6 meeting, the Committee reviewed several programs. A GARP report was presented by the Chairman of the GSC. A major topic for discussion was the new WMO Precipitation Enhancement Project. This is the first time that WMO has become involved in developing a weather modification program. Canada, through the efforts of Professor List and Dr. Godson, played a lead role in gaining approval for the project and possible Canadian contributions were considered. Another topic was ways of increasing scientific support for Atmosphere. Several years ago the Committee surveyed the manpower needs in atmospheric science. At this meeting the planning for a new survey was begun.

A major asset of the Scientific Committee is its broad representative membership. Its present membership includes representatives from the east coast (Dr. S.D. Smith of the Bedford Institute of Oceanography) and the west coast (S. Nikleva, Pacific Region, AES); from industry (Dr. D.M. Leahey, Western Research and Development, Calgary); from federal and provincial research establishments (Dr. G.G. Goyer (Secretary), Alberta Research Council; Dr. J. Maybank, Saskatchewan Research Council; Dr. G.A. McBean, Atmospheric Research Directorate. AES); and from the universities (Prof. A Boutard, Université de Québec à Montréal; Profs. F.K. Hare and R. List (Chairman) U. of Toronto; Prof. S. Orvig, McGill U.; Prof. G.W. Thurtell, U. of Guelph). The various fields of atmospheric science are also well represented. Members are appointed by the CMS Executive for three year terms.

The GSC is more restricted in its terms of reference in that it deals with GARP-related science. It advises both the CMS and the GARP Coordinating Committee, an NRC management-orientated committee. The GARP Scientific Committee has been actively involved in the planning of Canadian GARP activities since its inception in the late sixties. In 1971 it published a Plan for Participation in GARP and in 1974 a report with further proposals entitled "Canadian Participation in GARP". At its November 5 meeting the Committee reviewed the progress and plans for Canadian GARP activities. The result was eight recommendations for action. One established a GATE Task Force to bring together Canadian scientists for purposes of scientific analyses of GATE data. Another called for a study workshop on climate research to be held not later than the summer of 1977.

The GSC members are appointed by the CMS Executive on the advice of the Scientific Committee. There usually are about ten members, each with an active interest in GARP. At present the members are: Prof. G.L. Austin, McGill U.; Dr. B.W. Boville, AES; Prof. J. Derome, McGill U.; Prof. R. List, U. of Toronto; Dr. G.A. McBean (Chairman), AES; Mr. G.A. McKay, AES; Prof. P.E. Merilees, McGill U.; Prof. M. Miyake, U. of British Columbia; Prof. S. Orvig, McGill U.; Dr. A. Robert, AES.

Both the Scientific Committee and the GARP Scientific Committee were originally established by the National Research Council; the former as the Subcommittee on Meteorology and Atmospheric Science (SOMAS). In 1972 the NRC decided to phase out its role in these areas and to have the national societies take over their functions. The Canadian Meteorological Society took over the responsibilities of SOMAS in 1974 and has expanded its activities. Both Committees usually meet twice a year and their meetings are open to those with an interest in the proceedings. The next meetings will be during the CMS Congress at Laval University.

SCIENTISTS SAY WEATHER CAN MAKE YOU SICK

by Sidney Katz – Star Staff Writer

LEIDEN, The Netherlands Scientists all over the world are exploring the various ways in which changes in the weather influence our health and behaviour.

It's a new field of investigation known as biometeorology. Already, there's growing evidence that the weather plays a significant role in many afflictions including asthma, cancer, bronchitis, heart disease, depression, suicide, arthritis, resistance to infection and moods of restlessness.

"Hardly an organ or function in the human body escapes the effects of weather changes," Dr. Solco Tromp told The Star in an interview here.

Although his name is unfamiliar to laymen, the 66-year old Dutch scholar is probably the world's leading biometeorologist. For the past 20 years the Biometeorological Research Centre, which Tromp founded and still heads, has been issuing a steady flow of research publications dealing with weather and health. The publications describe the investigations not only of Tromp but of researchers all over the world.

Infant Science

Biometeorology, Tromp emphasized, is still an infant science. But already, some of its research findings form the basis of climatotherapy – a new approach to the treatment of disease.

Climatotherapy is conducted in a climatic chamber – a room-sized, circular capsule in which it's possible to replicate any kind of weather.

"We have cured some asthmatics; others have been vastly improved," Tromp said. "The future of climatotherapy is bright."

Here are some of the links between health and weather that have been suggested by Tromp and others:

– Certain variations in the weather apparently affect many important bodily processes, including blood clotting time; blood pressure; the level of trace minerals in the blood, vitamin E level; the blood sedimentation rate; and the white blood cell count.

– In areas where there's low wind velocity, there's also a low cancer death rate. Malignancies of the large intestine, rectum, digestive system, stomach and breast appear to be significantly related to mean annual-temperature.

Birth Defects

– The risk of a child being born retarded or mentally ill seems to vary with the month of birth. This is attributed to seasonal and climatic influences on the mother during the period that the fetus is developing.

– Mental patients have been seen to react to weather changes by increased restlessness and "ill-temperedness." They're more upset when there's an influx of warm air; pacified by the arrival of cold air.

However, according to Tromp, unpleasant weather conditions such as rain and snow seem to seriously affect the staff of mental hospitals but not the patients.

– Suicide attempts seem to occur in clusters on days when there's a sharp cooling or warming of the weather. The tendency to self-destruction is even stronger if these changes are accompanied by heavy precipitation.

– Human beings are significantly affected both physically and emotionally by certain warm, dry winds. In Switzerland and Germany, the "foehn" – a wind that sometimes raises the temperature by 36 degrees Celsius in a few hours – is blamed for increased traffic accidents, epileptic seizures and certain types of serious crime.

'Sharav'in Israel

And in Israel, the hot "sharav" which blows off the desert has been implicated in the excessive production of serotonin, a chemical found in the brain. An abnormal serotonin level causes depression, irritability and sexual apathy.

Canada has its own version of the "ill wind" – the chinook of Alberta. Tromp said he was surprised that researchers in Alberta have not studied health and accident statistics on the days when the chinook is blowing.

Tromp, by training and profession, is a geologist, not a doctor which surprises many people. His rise to eminence as a biometeorologist is something that just happened to him along the way, he said.

He was born in Indonesia and educated in geology at the universities of The Hague and Leiden. Later he worked for oil companies searching for oil deposits in Sumatra, Java and Egypt.

During World War II he helped the Allies find new sources of fuel in unthreatened areas of the world. After a post-war stint with the United Nations as a technical consultant to underdeveloped countries he became professor of geology at University of Cairo.

Founded Centre

But, in 1955, his growing fascination with the effects of environment on health led him to abandon geology and establish the Biometeorological Research Centre in Leiden. Ten years later he was joined by Janneke Bouma, whose name appears on many of the papers and books published by the centre. Tromp's best known work, Medical Biometeorology, is a standard fixture in medical libraries throughout the world.

Much of Tromp's research relates to the effects of rapid temperature change on the body – a process he calls "thermal stress."

The human organism, he explained, has a temperature-regulating device called the hypothalamus, located in the brain. When this is functioning smoothly, a person rarely

suffers illness from temperature fluctuations. But a vast number of people have defective thermoregulators and thus are prone to weather-caused sicknesses which Tromp calls meteorotropic diseases.

The Dutch researcher is the inventor of a quick and simple method of measuring the efficiency of a person's thermoregulator.

The subject places his hand and arm in a tub of cold water for two minutes and then removes it. Every two minutes, the temperature of the palm of the hand is taken and noted on a chart.

In a healthy person the body temperature rises steadily and reaches normal level in about six minutes.

But in a person suffering from asthma or bronchitis the body regains its warmth in jerks and starts, and takes up to 15 minutes to get back to normalcy.

"The thermoregulation of the schizophrenic is disastrous," Tromp said. "He requires 20 minutes – more than three times the average span – to regain normal warmth."

All cancer sufferers have seriously impaired thermoregulation, according to Tromp. Their temperature falls excessively during cooling rises rapidly during the first minute the limb is out of the cold water but thereafter creeps at a snail's pace towards normal. The more serious and widespread the malignancy, the less efficient the thermoregulation.

The rewarming curves of heart patients are shaky, irregular and slow. "That's probably why cardiac patients are so sensitive to weather changes," Tromp said. Treatment with anti-coagulants and other drugs makes the rewarming curve more normal.

Patients with arthritic and rheumatic diseases have poor thermoregulation, as do, for some reason, blind people.

Tromp has discovered that a woman's thermoregulation mechanism goes awry just before she begins her monthly menstrual cycle and it doesn't recover its efficiency until her period is over. Pregnancy appears to knock the thermoregulator for a loop for the first three or four months. But later, around the sixth month, it normalizes.

Smoking tends to shove the thermoregulator out of joint. Tromp and Janneke Bouma have taken water bath tests at times when they felt a cold coming on. "The arrival of the cold is clearly shown in our changing rewarming curves," said Tromp. "If you take a lot of vitamin C and a warm bath it seems to head it off."

Tromp admitted in the interview that his research with the water bath test raises more questions than it answers. It's not known, for example, if faulty thermoregulation is merely another symptom of illness or is in fact the cause of the illness.

"In biometeorology our areas of ignorance are still vast," Tromp said. "However, it appears certain that many people become ill because their poor thermoregulation makes it impossible for them to withstand weather changes. We can help some of these people – even cure them."

Tromp has had enough success with his system of climatotherapy that similar treatment chambers are now being used in trials in Italy and Sweden.

After years of research with the climatic chamber, covering thousands of people, Tromp challenged the established view that the sole triggering cause of asthma attacks is exposure to allergens such as pollens, dusts and molds. "We found that a lot of attacks occur when there are no allergens present but certain weather changes are occurring," he said.

3 Sessions a Week

Tromp's recommended treatment: Hourly sessions in the climatic chamber, three to five times a week, for a period totalling 60 to 100 hours.

The circular chamber can take eight patients at a time. They sit in comfortable chairs, wearing overcoats and covered with blankets, while clinicians adjust the controls to simulate a high-altitude climate.

The air pressure is set at the equivalent of 6,000 feet, the oxygen concentration is thinned out, and the temperature is lowered to the briskness of a crisp autumn day. Almost immediately asthmatics wheeze less, breathe easier and claim to feel better.

"We can entirely cure young asthmatics and bring about substantial improvement in patients with a 10-to 20-year history of illness," Tromp said. "Climatotherapy appears to correct the deficiencies in the patient's thermoregulation mechanism."

Other programs involving the climatic chamber are being developed for arthritis, rheumatism, migraine headaches, eczema and various forms of allergy.

Heart Disease

Because it's now the leading killer in most western industrial countries, Tromp has investigated the weather factor in heart disease. His finding: The coronary patient, with his poor thermoregulation, is severely affected by both extremely hot and cold weather. Deaths reach a high during certain periods in January and February; smaller peaks occur in the summer.

"I can predict the number of heart disease deaths based on meteorological data alone," Tromp said.

On the question of cancer, Tromp made these observations: In Norway, Sweden and U.K. there's a strong connection between cancer of the breast and mean annual temperature; people who get cancer are more likely to have been born in the winter months and least likely to have been born in June or July; very high temperatures and high altitudes discourage the growth of malignant tumors; deaths due to breast and lung cancer occur more frequently in winter.

Tromp also claimed there's reason to believe that resistance to infection fluctuates with the weather.

He has extensive records showing that when the weather rapidly shifts from warm to cold or cold to warm the levels of various substances in the blood drop. These substances include antibodies – the agents in the blood which repel invading germs.

Holiday Colds

"This may explain why apparently healthy people returning from a holiday in a warm climate often catch a respiratory infection," Tromp said.

Biometeorologists also believe that many home, traffic and industrial accidents can be blamed on the weather.

On certain days when a storm is brewing, Tromp said, human reaction time is reduced by as much as 25 per cent. Storm centres emit a multitude of long electromagnetic impulses – 1,000 times as many as on bright weather days. "These long waves interfere with our ability to react quickly," Tromp explained.

When Canadian researchers at Queen's University, Kingston, studied car accidents that had occurred during a three-month period in Frontenac County, they found 81 per cent of fatal crashes and 73 per cent of non-fatal mishaps had taken place when the barometric pressure was falling, indicating the presence of a storm centre nearby. When they checked on similar periods over the previous three years, similar percentages prevailed.

Mating Urge

Biometeorologists suspect the weather even plays a role in the decision of men and women to mate and have children.

It seems that when it comes to reproduction, humans prefer the temperature to be between 60 and 65 degrees Fahrenheit. It's also true, according to one English biometeorologist, that conceptions are most numerous on days when there's an above-average number of sunny hours.

But the scope of biometeorology embraces plants and animals as well as humans. Already, several findings in the field have boosted the production of crops and livestock. Even greater contributions are possible in the future.

Whether biometeorology can realize its full potential depends on whether its practitioners can overcome two important obstacles.

"First," said Tromp, "since most of us engaged in research are not medical doctors, anything we publish about health is regarded with some scepticism by most members of the medical profession.

"Second, because it's a new and unfamiliar field, many people view biometeorology as a branch of the occult, like astrology. That makes it difficult to attract funds for our research.

"It's nothing like that. Biometeorology is a serious field of scientific investigation, which, if pursued, can yield rich dividends."

AUTOMATED WIND WAVE PREDICTION

Last summer marked a significant advance in environmental forecasting with the successful operation of an automated wind wave prediction procedure in the Beaufort Sea Computerized Prediction Support System (CPSS). This system was developed by Meteorological Services Research Branch as part of the Design Study of the DOE Beaufort Sea Project to support offshore oil drilling and minimize threats by the often hostile environment. The wave prediction procedure was developed for incorporation in the CPSS by Dr. S. Venkatesh of Atmospheric Dynamics Corporation.

Wave generation is a complex problem involving stresses exerted by the wind on water surfaces. It has been found that satisfactory answers for deep water waves can be obtained from empirical relationships fitting data and taking the same form as theoretical relationships for the case of simplified sinusoidal wave generation. This approach was followed in the Beaufort Sea application. The success of the procedure is dependent to a large measure on good predictions of the surface wind and the length of fetch of the waves. The CPSS is designed to meet this need in an optimal way. It has available hour-by-hour surface wind information for past and future times, as well as past and predicted locations of the leading edge of the ice pack. In addition, the CPSS can assimilate new meteorological data nearly continuously into the analysis and forecast production cycles so that utilization of new and recent historical information is maximized. The wind wave prediction procedure is therefore able to account for waves produced by a moving wind field containing winds that undergo time and spatial variations, and to account for fetches limited by land and by moving ice boundaries.

The full potential and impact of the automated wind wave prediction procedure is still to be determined. A limited amount of fine tuning done this past summer during the Beaufort trials led to a noticeable improvement in the wave predictions. The major storm of the season occurred on August 26, shortly before the ice closed in and after the fine tuning had been completed. On this occasion, the automated wind wave prediction procedure forecast wave heights to reach 13 feet, with a wave period of 8 seconds, at the location of a drilling barge operated by Canadian Marine Drilling Limited. Instruments mounted on the barge recorded wave heights of 14 feet and the observed wave period was about 6 seconds. Evaluation of the procedure indicates that results of comparable superior quality are routinely obtainable, provided accurate data for driving the procedure are available from other components of the CPSS. Consequently, the major effort in improving the procedure is centred on upgrading diagnoses and predictions of the surface wind and on predicting the leading edge of the ice pack, with the expectation of high quality wave forecasts in deep water.

LES CANADIANISMES DE BON ALOI

par Hélène Gignac

Rares sont les non-initiés qui croient à l'existence d'une langue proprement québécoise. Bien sûr, l'on admet que les Québécois parlent différemment des Français, mais cette différence ne réside que dans l'accent et les régionalismes. Se limiter à ces détails qui forment l'essence même de toute langue, c'est nier qu'il existe au Québec une culture proprement québécoise.

Qu'est-ce au fait que la culture? Globalement, c'est l'ensemble des aspects intellectuels d'une civilisation. Or, les aspects intellectuels regroupent à la fois le politique, le social et le culturel. L'identité propre d'un peuple s'acquiert donc avec la reconnaissance de son patrimoine culturel. Et que dire de la langue? Véhicule de la culture de génération en génération, elle est d'abord et avant tout un élément vital de cette même culture. Les assises de la culture québécoise ne peuvent être mises en doute!

Un retour aux sources s'impose ici. Depuis 1763, date de la conquête anglaise, le Canada a cessé d'être rattaché à la France. Il s'ensuivit une évolution différente du français parlé au Québec de ses racines premières. Fortement imprégné aux conditions de vie, le franco-québécois a évolué au même rythme que ses usagers. Il faut dire que le milieu canadien s'y prêtait fort bien. Les conditions d'existence rigoureuses, le détail de la faune et de la flore, le folklore, obligeaient "l'habitant" à enrichir son français (celui du XVII^{e} siècle, sinon du XVI^{e} en créant des termes nouveaux.

C'est ainsi que sont nés les canadianismes, et plus particulièrement, les québécismes. Le but de cette chronique qui se veut mensuelle, c'est de présenter des mots ou des expressions qui illustrent une réalité proprement québécoise. Rejeter leur existence, c'est porter atteinte non seulement au patrimoine culturel, mais aussi aux moyens d'expression des sujets parlants.

Les six canadianismes qui suivent se rattachent directement à l'hiver.

– Banc de neige: n.m. (1722) Amas de neige entassée par le vent.

– Bordages: n.m. (1632) Bordures de glace des rivières, des fleuves. Glaces adhérentes aux rives.

– Bordée: n.f. (16^{e} siècle) Forte chute de neige. Dans le patois saintongeais, le mot "bordée" signifiait "tombée en grande quantité". Il y a donc eu réutilisation d'un ancien mot français en son sens intégral.

– Frasil: n.m. En ancien français, l'adjectif "fresé" voulait dire orné et plissé. Sans doute à partir de là, et sous l'influence du mot latin signifiant "torche" (qui a donné le mot fraisil au français technique moderne), on commença dans l'Orléanais à appeler frasi de la braise en poussière. Il est facile de comprendre comment les Canadiens en sont arrivés à employer le mot frasil pour désigner des parcelles de glace flottant à la surface d'une eau mouvante. Le frasil, c'est de la poussière de glace dans l'eau, de la dentelle de glace, de la glace qui offre l'apparence de l'effritement.

– Poudrerie: n.f. (1695) "J'ai fait mordre la poudre à ces audacieux", écrivait Racine. Cela explique que l'on ait employé le mot poudrerie au Canada pour désigner "une poussière de neige qui tourbillonné". On peut aussi imaginer que c'est poudroirie, dérivé de poudroyer, qu'on a dit d'abord et qu'une mauvaise prononciation a déformé le vocable, car poudrerie désigne en Amérique du Nord une neige agitée par le vent, une neige qui poudroie, c'est-à-dire soulevée.

INTERNATIONAL PYRHELIOMETER COMPARISONS

The fourth International Pyrheliometer Intercomparisons (IPC-IV) was held at Davos, Switzerland, from 5-25 October, 1975. Previous intercomparisons were held at Davos in 1959, 1964 and 1970. International intercomparisons are usually held every five years to enable Regional Radiation Centers to reference their standard pyrheliometers to the International Pyrheliometric Scale 1956 (IPS-1956). Standard pyrheliometers are the basic reference instruments used in the calibration of national radiation networks.

National Radiation Centers from WMO Region VI also took part in the intercomparisons. This resulted in an unusually large group of radiation standards being present, 33 Angstrom pyrheliometer and 12 absolute radiometers in all. J.R. Latimer of the AES National Atmospheric Radiation Centre represented Canada.

The results of the comparisons between instruments representing the IPS now in use and new absolute radiometers based on SI units show a difference of 2 per cent. As a result of IPC-IV all calibration factors of participating primary standards will be adjusted to give irradiance values in SI units. The old IPS-1956 will be abandoned in the near future.

MAPPING THE WEATHER – THE JAPANESE WEATHER REPORT

In the old days, the Japanese used to hang out a faceless, stuffed paper doll called a teru-teru bozu to pray for fine weather. Some still make teru-teru bozu (priest of sunshine) out of superstition, and, if they follow the ancient custom, will paint in the doll's facial features or douse it with sake when their wishes are fulfilled. Most Japanese today, however, prefer to rely on the Government's Meteorological Agency whose scale and technological level make it one of the best in the world.

Weather forecasting varies in emphasis according to the climatic features of the region and their influence on human activity. In countries like India, meteorological information personnel are most concerned about how high the temperature will rise during the day. In Japan the question most asked is whether it will rain and how hard, for Japan's rice crop depends on rain, and floods are a threat after heavy downpours.

Japan is a rainy country. Tokyo's annual rainfall is 1,563 mm compared with 1,135 mm for Shanghai, 1,123 mm for New York, 653 mm for Rome, 594 mm for London, 585 mm for Paris, and 575 mm for Moscow.

Bordering the eastern side of the Eurasian Continent, the Japanese islands stretch from 45°31'N to 24°02'N latitude. This vast north-south geographical spread combined with Japan's mountainous terrain produces the widest range of meteorological conditions, that are further complicated by the variations of the four seasons.

The first Japanese weather map was drawn in 1883, thirty years after the French produced the world's first under an international cooperation. Most industrial countries had weather maps by the end of the 19th century.

Collecting Data

Today, the Japan Meteorological Agency gathers millions of items of data from a multitude of monitoring systems on the ground, at sea, in the air and in outer space on a round-the-clock basis. This data, together with weather information from other countries, is fed into giant computers whose output is analyzed by experts as the basis for a constant stream of weather information that is disseminated by newspapers, televisions, radios and telephones.

The Agency's computer input comes from five sources:

– Weather rockets shot to an altitude of 60 km to monitor wind speed and direction, temperature, atmospheric pressure, and humidity. The Agency sends up a rocket once a week and is one of the 50 member countries of the World Meteorological Organization that do so under WMO's information exchange system.

– Weather balloons sent up from 18 locations in the country twice a day. The balloons carry equipment that transmits meteorological information relayed to Agency headquarters in Tokyo. This, too, is part of the international effort in which all WMO members participate.

– Ground monitoring stations. There are 150 scattered throughout the country, most of them consisting of equipment housed in simple wooden structures. Since they are at ground level, they also monitor rainfall.

– Observation ships. The Agency has six such vessels packed with the latest equipment that roam coastal waters as well as the high seas as far as New Guinea.

– Robot buoys containing monitoring equipment. This is a relatively new idea that was begun two years ago. The Agency now has four such buoys, one in the Japan Sea, one in the Pacific, one in the East China Sea and one near Southeast Asian waters.

The unending stream of data from these sources is fed into a computerized Automated Data Editing and Switching System (ADESS) along with data received from weather agencies in Asia, the United States, India and Australia.

Computerization

Sorted and edited, the output from ADESS is read by experts who translate the information into maps of current and anticipated weather patterns. The output also goes to other experts who do that all-important job of weather forecasting.

In addition to output from ADESS, the Agency's weather forecasters are assisted by meteorological data from radar stations and weather satellites as well as by a separate Automated Meteorological Data Acquisition System (AMeDAS). Radar weather stations, of which there are 20 in Japan – the best known is on the summit of Mt. Fuji – record cloud distribution and movement. Japan relies on the United States for weather satellite temperature surveys and photos of cloud formations, but it hopes to have its own by 1977.

AMeDAS is a new and uniquely Japanese system that employs medium-sized computers, the Hitachi Computer 8350, to process data on rainfall so that the amount of rainfall at any given moment in any part of the country can be determined instantly. This is vitally important to prevent disasters in rain-prone Japan. It is generally agreed that had such a system been available earlier, much damage and loss of life from typhoons could have been avoided. The AMeDAS computer gets its data on-line from equipment at 1,313 locations throughout the country, strategically placed on an average of 17 km apart. Data normally is sent in every hour but can be moved every ten minutes if necessary, as when using current rainfall patterns to forecast the volumes and areas of torrential rain in the immediate hours ahead so that disaster-prevention measures can be implemented in time.

Forecasts in Depth

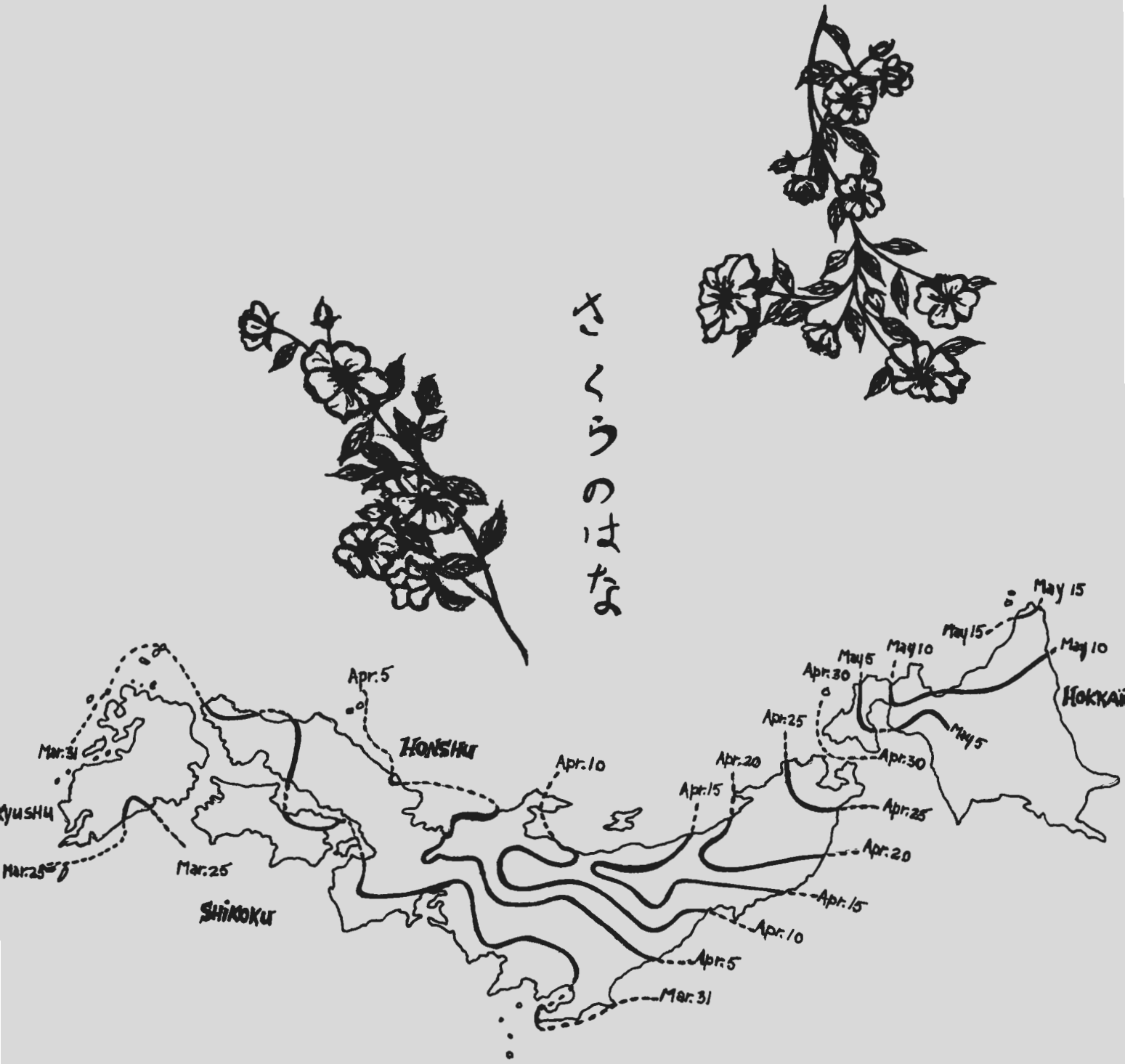
Unfortunately, computerization has not necessarily improved forecasting accuracy. Officials say they have been and still are right 70 to 80% of the time, which is more than the public gives them credit for. What computers have done, in addition to saving power, is to provide forecasts in much greater detail and depth. For example, if forecasts could previously predict only when it would rain, now they predict how long it will rain, the volume of rain in a given hour, and so forth.

The Meteorological Agency issues forecasts five times a day for Tokyo, more often if weather conditions require. Each forecast covers the weather for the next 40 hours, and includes a detailed report of meteorological conditions prior to the actual forecast.

The Agency also provides many supplementary services, such as special weather warnings for the railways, storm and lightning warnings for power companies, pollution warnings when atmospheric contamination exceeds approved levels, special weather information for farmers, and special reports for fire departments when low humidity and high winds call for extra precautions.

One of the most popular of the Agency's services is the "cherry blossom front." Drawn like a weather map, it shows when the cherry trees will blossom in different parts of Japan and was begun several years ago in response to public demand. The Agency also produces a map in the fall showing when and where the leaves will turn red, for viewing the autumn foliage, especially the maple, is also a favorite pastime for Japanese sightseers.

In spite of the voluminous data that the Agency has to work with, officials say they still need much more, especially on a worldwide basis. To promote better weather information, WMO established the World Weather Watch in 1963, which has three world centers – Washington, Melbourne and Moscow – where world weather maps are compiled for daily distribution to WMO's 128 members. Under the world centers are 22 regional centers, of which Tokyo is one.



Map of the cherry blossom "front", showing when the cherry trees bloom in different parts of Japan.

Japanese officials emphasize that better meteorology depends on the extent to which nations cooperate in making weather information available worldwide. Fortunately, this is one area in which everyone seems to agree.

THE FORECAST IS . . . .

CFB Petawawa key point in weather link

by Bill Montaigne
Journal Reporter

PEMBROKE – Have you ever wondered where the newspapers, radio and TV gets their daily weather forecasts from?

For the Ottawa Valley, Ottawa and even Toronto, part of this forecast comes from the Armed Forces Weather Station at CFB Petawawa. Warrant Officer Keir Guindon, who is the weather briefing expert of the station, explained that one of the reasons Petawawa is important in the forecasting link is because it is situated between two weather systems – east and west – and Petawawa forecasts which way the weather fronts will move.

The Petawawa Armed Forces weather station began operations in 1972 when the then operating federal weather station closed its doors. But the modern sophisticated weather instruments were not installed until this year, and it was comparatively recently that Toronto and Ottawa began to depend upon Petawawa for their weather information. Petawawa is the only weather station now between North Bay and Ottawa, and because it is between two distinct weather systems, its reports are uniquely relevant. The weather station also provides weather information for armed forces aircraft and helicopter training flights, for long-range flights and for aerial search and rescue operations. But anyone may phone in and ask for information, whether it's a private pilot; a boater going fishing up the Ottawa; or a traveller driving in any direction.

All weather information – taken each hour, 24 hours a day, is telexed into the main meteorological station at Montreal, where it is correlated with other information from other weather stations and the nation's weather is then forecast. However, several newspapers, radio and TV sources phone Petawawa directly from Ottawa and Toronto, said the warrant officer, for update information.

Hourly, the pressure (barometer reading), temperature, humidity, wind direction and speed, amount of snow or rain if any, sky conditions, visibility and cloud ceiling are measured and transmitted.

Visibility is determined by comparing the actual visibility to a 360 degree panoramic photograph with landmarks measured in feet. Cloud ceilings are determined by trigonometry (at night a searchlight is beamed at the clouds). Balloons filled with helium and tracked by theodolite are also used.

Petawawa is only one of two weather stations in Ontario which has the highly sophisticated Dewcel remote reading physchrometer for temperature readings and humidity readings. The other physchrometer is in Trenton.

There are eight men on the duty roster to keep the station operating 24 hours a day, seven days a week. A minimum basic Grade 13 is a prerequisite to become a weatherman. The trainee is given a three-month course, after which he apprentices in a weather station for from four to six weeks. He is then qualified as an observer – which means he can read the gauges and report his findings, but under supervision. There follows two more 14-week courses and another 18 months of apprenticeship.

Capt. Norm Fraser, right, a helicopter pilot, gets a weather briefing from WO Keir Guindon
Le capitaine Norm Fraser, pilote d'hélicoptère, (situé à droitesur l'image), écoute les renseignements météorologiques que lui transmet Keir Guindon du bureau météorologique.

(Bill Montaigne/Journal)

THE EARLY BIRDS

MA Class – 1940-41/Cours de maîtrise – 1940-41
Back row: à l'arrière: Prof. Bernhard Haurwitz, Des Kennedy, Wendell Hewson, Al Conway, Bill Noble, Clarence Boughner, Bill Middleton
Middle row: au centre: Lloyd Geldart, Jack Turner, Andrew Thomson, Herb Chadburn
Front row: à l'avant: Bob Graham, Don Cameron, Ade Lenahan

MA Class – 1940-41/Cours de maîtrise – 1940-41
Back row: à l'arrière: Lloyd Geldart, Bill Noble, Ade Lenahan
Middle row: au centre: Clarence Thompson, Don Cameron, Jack Turner
Front row: à l'avant: Herb Chadburn, Al Conway, Prof. Bernhard Haurwitz, Bob Graham

Photo Courtesy/Les photos sont une gracieuseté de
Clarence Thompson

LES CANCERS SONT LIÉS À LA POLLUTION

Extrait du journal "Le Devoir"

WASHINGTON (AP) – La pollution de l'environnement est généralement considérée comme la cause principale des cancers humains. Pourtant, la plupart des éléments polluants sont mal connus. Telles sont les deux principales conclusions d'une étude commandée par la sous-commission de l'environnement de la Chambre des représentants, et dont le président, M. George Brown Jr., vient de rendre publiques les grandes lignes.

Selon cette étude, 70 à 90% des cancers pourraient être liés à la pollution. "Les dommages causés de façon chronique par la pollution sur la santé de l'homme constituent aujourd'hui l'un des plus sérieux problèmes médicaux."

"Notre capacité à diagnostiquer correctement les conséquences d'origine chimique sur la santé est tellement limitée que nous n'appréhendons probablement qu'une petite partie de ces dommages", lit-on également.

Parmi les domaines les moins explorés: les conséquences de la pollution sur les cultures, les relations entre la pollution et la pluviosité, les altérations climatiques générales provoquées par l'action de l'homme.

BURN LOWE MEMORIAL AWARD

The Burn Lowe Memorial Award was established by the Canadian Meteorological Society Winnipeg Centre several years ago. The purpose of the memorial award was to honour the name of an outstanding meteorologist A. Burnett Lowe, whose many talents included an intimate knowledge and interest in disciplines related to meteorology.

One of Burn's major projects was the review of the historical records of early western Canada extracting weather details from the diaries of explorers Henry Kelsey, Peter Fidler and others, and from the archives of the Hudson's Bay Company. He published several articles in "The Beaver" and in "Weather".

Mr. Russenholt, the recipient of the award, is recognized as a pioneer historian and in many aspects was a kindred spirit with Burn in his interests in meteorology and natural science. When television came to Winnipeg, Mr. Russenholt became the local weather man, exploiting his cartooning ability in his chalk displays and capitalizing on "The Heart of the Continent Theme". The pattern of his telecasts set a standard that is still emulated by local telecasters. For these reasons and since the memorial is designed for an award to those who have promoted an interest in meteorology within the Winnipeg Centre boundaries, it was felt appropriate to make the award to Mr. Russenholt.

Previous recipients of the award have been Cornelius "Corny" Warkentin, a meteorologist now deceased who was a popular figure across western Canada and excelled in public relations for the service. Last year the award was made to Mr. S.V.A. Gordon, O.I.C. of the Prairie Weather Centre, a close friend and associate of Mr. Lowe in recognition of his outstanding leadership and pathfinder qualities in the field of computerization of weather office routines.

PERSONNEL

The following have accepted positions as a result of competitions:
Les personnes suivantes ont accepté ces postes après concours:

75-DOE-WIN-CC-518	CENTRAL REGION Senior Met. Tech. EG-ESS 5 T. Magnusson
75-DOE-WIN-CC-539	CENTRAL REGION Supervisor Transportation & Administration AS 1 V. Sackellarides
75-DOE-WIN-CC-550	CENTRAL REGION OIC Thompson EG-ESS 6 G.K. Bond
75-DOE-WIN-CC-553	CENTRAL REGION OIC Coral Harbour EG-ESS 5 T.A.R. Drozdz
75-DOE-WPNA-CC-068	WESTERN REGION Senior Meteorological Tech. A.O.S.E.R. EG-ESS 8 G. Thomson

The following transfers took place:
Les transferts suivants ont été effectués:

D. McBain	From: De Vernon, B.C. To: A Alert, N.W.T. (EG-ESS 6)
K.V. Pilon	From: De Alert, N.W.T. To: A AES Headquarters (EG-ESS 4)
R.E. Strainer	From: De Mould Bay, N.W.T. To: A Eureka, N.W.T. (EG-ESS 4)

D. Fournier	From: De Resolute, N.W.T. To: A Trout Lake, Ont. (EG-ESS 3)
R.E. Thoren	From: De Mould Bay, N.W.T. To: A Atlantic Region (EG-ESS 3)
P.J. Yarema	From: De Prince George, B.C. To: A Mould Bay, N.W.T. (EG-ESS 4)
D. Cadger	From: De Trout Lake, Ontario To: A Coral Harbour, N.W.T. (EG-ESS 4)
J.S. McDuff	From: De Winnipeg, Man. To: A Western Region (EG-ESS 3)
T.A. Danks	From: De Yukon Weather Office To: A Maritimes Weather Office
M.M. Danks (Mrs.)	From: De Yukon Weather Office To: A Maritimes Weather Office
N.L. Dressler	From: De CFB Edmonton To: A Victoria Weather Office
C.L. Cherney (Ms.)	From: De CFB Portage la Prairie To: A CFB Moose Jaw
S.A. Hattie	From: De ARD, AES Headquarters To: A 22 NRWC North Bay

The following are recent Graduates AOTC:
Nouveaux diplômés de AOTC:

R. Fredrick	To:A Alert, N.W.T.
R.D. Crawley	To:A Eureka, N.W.T.
D. Volk	To:A Isachsen, N.W.T.
R.R. Goyer	To:A Isachsen, N.W.T.
R. Kirpatrick	To:A Mould Bay, N.W.T.
D.D. Howett	To:A Mould Bay, N.W.T.
L. Burgess (Ms.)	To:A Resolute, N.W.T.
R. Gropp	To:A Resolute, N.W.T.
L.J. Laing	To:A Trout Lake, Ont.
H. McCort	To:A Trout Lake, Ont.

The following is a recent Graduate MOTTI (75-7):
Nouveau diplômé de MOTTI (1975-1976):

J. Kachkowski To:A Atikokan, Ont.

Separations
Démissions

J.L. Knox (Regional Director)	Pacific Region	Retires Dec. 13, 1975
E.J. Gregga	DMetOc	Retires Dec., 1975
J.G. Henderson	DMetOc	Retires Dec., 1975
J.R.F. Warr	Trenton	Retired Oct., 1975
D.R. Borer	Western Region	Resigned Nov., 1975
R.B. Wandler	Central Region	Resigned (Atikokan)
W. Smith	Central Region	Resigned (Gimli)
D. Michalczuk	Central Region	Resigned (Trout Lake)

TRIVIA

Les Astres

Nos lointains ancêtres n'avaient aucune idée de la nature et de la distance des astres. Le ciel était pour eux une demi-sphère solide, une sorte de cloche qui reposait sur la terre.

Cette croyance a persisté longtemps dans l'esprit du peuple, pour qui le ciel était une immense voûte, formée d'une substance opaque et solide, de composition indéterminée, pas très éloignée de la terre, et derrière laquelle se trouvait le Paradis.

Les étoiles étaient soit des trous dans la voûte céleste, soit des corps solides lumineux plaqués au firmament. Mus par un mécanisme mystérieux, le soleil et la lune circulaient dans l'espace, à une certaine distance de la voûte céleste. Le soleil était une boule de feu qui communiquait sa chaleur à la terre, la lune une boule froide dont la froideur se faisait sentir jusqu'à la terre à certaines époques de l'année (lune rousse).

Le peuple ne pensait pas que les corps célestes pussent être plus grands qu'on les voit; il les considérait comme ayant leur taille apparente.

* * * *

Prices seem to be falling, but not fast enough to receive any serious bruises.

* * * *

At a local library, a man asked the librarian where he might find a book entitled "Man, the Superior Sex." "Fiction," the young lady at the desk told him frostily, "is two aisles over."

When you give honest advice, have one foot out the door.

* * * *

No person is really independent until he can go to bed any time he feels sleepy.

* * * *

When a fellow is completely wrapped up in himself he makes a mighty small package.

* * * *

Blessed are the young, for they shall inherit the national debt.

* * * *

EXPRESSIONS DIVERSES

Expressions	Signification
Se mettre les deux pieds dans les plats	Faire une gaffe
Avoir du front	Etre audacieux
Mettre sa main au feu	Etre convaincu d'une chose
Un combat à finir	Un combat décisif
Se mettre le doigt dans l'oeil	Faire une bourde
Une mouche à feu	Une luciole
Arrête de dorer la pilule	Arrête de cacher la vérité
Il a du coeur au ventre	Il a du courage
Un barbeux	Quelqu'un qui provoque
Il est fiable	On peut lui faire confiance
Chassez le naturel, il revient au galop.	Rien ne sert de vouloir cacher sa vraie personnalité.
C'est en riant que les chiens mordent.	Il faut se garder des plaisanteries désagréables.
Au plus fort la poche.	Au plus puissant, la réussite.

One hundred years ago during the winter of 1875-1876, Sir George F. Nares' ship "Alert" wintered near the northernmost tip of Ellesmere Island. Canada's most northern weather station established near here, by airlift, on Easter Sunday 1950, was called "Alert" in commemoration of this ship.

"Ce qu'on laisse sur la table fait plus de bien que ce qu'on y prend."