

Hole-Punch Cloud Moves Across Halifax Skies

A striking weather phenomenon called a "hole-punch" cloud moved across the skies of the Halifax and Dartmouth area of Nova Scotia on the afternoon of December 21, 2000.



A "hole-punch" cloud that formed over the Halifax and Dartmouth area of Nova Scotia on December 21, 2000.

Photo: John Parker

Typically, when this cloud formation occurs, a jet stream moves rapidly above a cloud deck, which is made up of layers of ice crystals and super-cooled water droplets. Interaction between the jet stream and the cloud deck produces a wave action (possibly gravity waves between the stable layers) that causes the ice crystals in the descending portion of the wave to fall into the super-cooled liquid layer. This action enhances ice crystal growth at the expense of the super-cooled water droplets. Precipitation then falls from the cloud, eroding a hole in the deck.

The dry atmosphere in the mid-layers below the cloud deck helps to sublimate the precipitation,

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Check Out Our NEW LOOK!

To be more environmentally friendly and in response to the results of our recent reader survey, this will be the last issue of *Zephyr* published in hard-copy format. Instead, be ready to check out our new look on-line. If you don't have access to the Internet, but would like copies of *Zephyr* to be printed out and mailed to you, please fill out the special request form on page 10.

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Denis Bourque Receives Citation of Excellence

Employee Denis Bourque was awarded the Citation of Excellence in recognition of his dedication and commitment to the development of the Meteorological Service of Canada (MSC) video. The video, which communicates MSC's role in Canada, has been presented

at a variety of Government committees, and has received an excellent response.

While balancing his Ministerial support responsibilities, Denis faced the considerable challenge of producing the 15-minute video in French and English—a task he tackled with great enthusiasm. He developed its concept, gathered a wide range of audio-visual material from across the country, and consulted with experts throughout its production. The video has helped to raise the profile of the MSC within the Government, and will serve as a promotional piece for years to come.

In addition to receiving a commemorative plaque for his tireless commitment to the project, Denis earned an MSC pin and a watch for his 25 years of service.



Denis Bourque with his commemorative plaque.

Photo: Marc Boucher

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ZEPHYR

Published by the Communications Directorate of MSC, Environment Canada, **Zephyr** is a newsletter for and about the staff of the Meteorological Service of Canada.

Zephyr is your newsletter. We would like to hear from you. Your submissions, story ideas, graphics and pictures are most welcome. Submissions for the summer issue should be sent to us by May 18, 2001.

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Hole-Punch Cloud Moves Across Halifax Skies

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resulting in virga (precipitation not reaching the ground). This virga hanging from the bottom of a cloud is often mistaken for a funnel cloud—particularly in the warmer months when convective cumulus clouds are common.

The hole-punch cloud in Halifax occurred from out of a deck of high alto-cumulus or low cirro-cumulus clouds located 4000 to 6000 metres above the ground. Above this deck of cloud, cirrus within a jet stream moving west-southwest at about 167km/h crossed overhead. The entire event, which lasted almost thirty minutes, was made even more unusual when the hole-punch cloud became properly aligned with the sun, forming a parhelion or "sun dog" in the ice crystals.

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Atmospheric Monitoring Awards Presented

The Meteorological Service of Canada's Pacific and Yukon Management Committee took time on January 30 to acknowledge the dedication and accomplishments of a number of Atmospheric Monitoring Division staff, who were presented with plaques and gift certificates for local restaurants.

In recognition of his many years of leadership in support of Environment Canada's National Marine Buoy Programs, Ron McLaren received the Citation of Excellence. Ron has long been recognized as the National Focal Point for the Marine Buoy Program, and much of the cooperative relationship MSC enjoys with the Canadian Coast Guard (CCG) in Pacific Region can be attributed to the excellent relationship he maintains with the CCG regional managers. Ron has also represented Environment Canada at numerous Data Buoy Co-operation Panel conferences over the years and hosted a very successful one in Victoria last fall.

Mark Torgerson also received the Citation of Excellence for his outstanding work in support of the Regional Barometry Program and Station Information System. By the end of this year, all mercury barometers in the region will be replaced with digital alternatives—a task that first requires all comparisons between the operational barometers to be completed and the regional database updated. Mark is the regional office focal point for the databases and is responsible for certifying when the new barometers may be used operationally. He has also made significant contributions to the new amendments to the Canadian Air Regulations with respect to Altimeter Ground Stations.

A team award was presented to the following staff in recognition of their dedication to the installation, maintenance and repair of the Atmospheric Monitoring Network systems that are so important to the weather forecast and warning programs: Bill Scott, Drew Pawley, Frank Mirecki, Vaughn Williams, Bruce Lohnes, Matthew McMullan, Robin Lines, Jack Bowling, Nick Draper, Jim Beal, and Verne Jarvi. Congratulations to all!

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Left to right: Brian O'Donnell, Regional Director; Dave Watson, Manager, AMD; Ron McLaren, Head of Marine Services, AMD; and Don Fast, Regional Director General of Environment Canada, P&Y Region.

RESEARCH SCIENTISTS RECEIVE PROMOTIONS

Fourteen research scientists with Environment Canada were promoted in the most recent round of considerations.

Named to the RES-3 level—and now, therefore, in the top half of the research scientist community—are Clement Chouinard, Sam Daggupaty, Luc Fillion, Pieter Houtekamer, Doug Lane, Alain Pietroniro, Laurier Poissant, William Schertzer, André Tremblay and Leonard Wassenaar. Howard Barker and Zhendi Wang were promoted to the RES-4 level, while Jiri Marsalek and Terry Prowse joined the RES-5 senior scientist community. Dr. Marsalek is an expert in urban drainage issues, and is known for his work on tributary loadings to the Great Lakes. Dr. Prowse, who is regarded as a top cold-regions hydrologist, has provided new insights into the hydrology of the Northern River Basin through his studies.

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Pilot Project Looks at Winter Air Pollution in Montreal Area



Left to right : Jacques Rousseau, meteorologist for atmospheric issues; Daniel Caya, communications assistant; Mario Benjamin, project leader; and Gilles Brien, meteorologist for the Montreal Weather and Environmental Services Office.

The Meteorological Service of Canada (MSC), the Quebec Department of the Environment, the Montréal Urban Community, and five local public health departments launched a pilot project to forecast the dispersion of air pollutants in winter in the Greater Montréal area last December.

During the winter, air pollution can be problematic in large urban centres. Under certain weather conditions, the lower layers of the atmosphere can behave like a lid, trapping pollutants from various sources (such as transportation, residential heating and industrial activity) close to the ground. The purpose of the Daily Winter Forecast Pilot Project is to inform residents in the Montréal area of the atmosphere's ability to disperse these pollutants by determining

whether this ability is good, acceptable, or poor. If it is considered poor, a message is immediately transmitted to residents of southern Quebec through the media and local public health departments.

Despite the fact that this method of forecasting is relatively new, performance analyses have confirmed that it is both accurate and effective. Over the long term, this project could benefit other regions and be paired with the INFO-SMOG program to create an integrated air quality program for southern Quebec. For more information, consult the project's web site at <http://www.qc.ec.gc.ca/atmos/dispersion/>.

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Clear Air Vignettes Raise Public Awareness

Recent scientific research indicates that air pollution affects the health of Canadians in ways that are much more serious and widespread than previously believed. Asthma attacks are one of the leading causes of hospital admissions in Canada, and it is estimated that over 5000 Canadians die prematurely each year from the effects of air pollution.

In the interest of communicating to Canadians the seriousness of air pollution as a health concern, the MSC Communications and Outreach Program has joined forces with The Weather Network and MétéoMédia to produce a series of televised Clean Air Vignettes.

Nine short vignettes dealing with winter air quality and associated issues began production in January of this year and were aired on the Weather Network and MétéoMédia in

February. A second set of 15 short vignettes is scheduled to begin production in April, and to air in June. All of the clean air vignettes will be produced in both English and French and will be made available to teachers through the Cable in the Classroom Program.

This outreach activity is part of the MSC Communications and Outreach Program's overall plan to raise public awareness about the issue of air quality. Through its partnership with the Weather Network, the program hopes to provide a large audience of concerned Canadians with a reliable and valuable source of air quality information.

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Old Glory Meteorologists Reunite

Last May, more than 30 meteorologists who served at the Old Glory weather station in Rossland, British Columbia, between 1943 and 1968 were reunited for the first time in 32 years.

During its years of operation, the Old Glory station was the highest weather observatory in North America, located nearly 2400 metres above sea level. Situated on Paulson Summit in the Monashee Mountain Range of southern British Columbia, it was funded by the Ministry of Transportation and first began operating in 1943 as an experimental observatory to study meteorology.

The weather station's primary function was to help navigate small aircraft on the flight line between Vancouver and Lethbridge. The Old Glory meteorologists—known as the "Met Men" by locals—reported ice and snow research, studied ice conditions and made hourly weather reports. They also played an important role in measuring the water content of snow for the U.S. Department of Forestry. This information helped determine water content for the spring run-off in neighbouring Idaho, Montana and Washington.



The "Met Men"—back row (l-r): Paul Tian, Peter Wright, Don Todd, Al Storey, Lyle Fleming, Glen Hawthorne, Ellis Gratton and Wayne Syverson. Front Row: Bart Dudley, Al Laatsch, Wil Gibbard and Ted Wilson.

Photo : Trail Times

All of the meteorologists who were involved in the operation of Old Glory required special training and had to be physically able to complete the climb to the observatory, which took anywhere from half a day to two days, depending on the weather. Beyond their specialized training, however, each of the "Met Men" also needed humour and resourcefulness to be able to live together in close quarters, almost 20 kilometers from the nearest doctor or mechanic.

Although the Old Glory weather station eventually met its demise by accidental fire in January of 1968, the meteorologists who lived and worked there together developed lasting friendships. The Rossland reunion was an opportunity for the "Met Men" to reminisce and to share stories of the unique experience that brought them together.

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Meteorologist Featured in Science Textbook

Ted Mcildoon, a senior meteorologist at the Maritimes Weather Centre in Dartmouth, Nova Scotia, is featured as a weather expert in a chapter on Weather Data and Forecasting in McGraw-Hill's new *SciencePower 10* textbook. The book offers students opportunities to take an active role in investigating and exploring science concepts, and contains a variety of intriguing scientific facts.

Ted's interview, which is found in the "Ask an Expert" section of the book, discusses how meteorologists forecast weather by studying changes in the Earth's atmosphere, describes how atmospheric data is collected, and explains the difference between satellite and radar images. Since Ted works at the Canadian Hurricane Centre, he also talks about why hurricanes and tropical storms approaching Canadian latitudes are rarely strong enough to be cause for concern.

More information on the *SciencePower 10* textbook can be found at:
http://school.mcgrawhill.ca/booksite/s10_0-07-560363-2/index2.html.

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New Weather Observation Station at Grand Manan

Technical service staff in the Meteorological Service of Canada (MSC), Atlantic Region, recently installed an automated weather observing station on Grand Manan Island in New Brunswick. The automated station, which was funded by the National Search and Rescue Secretariat's New Initiatives Fund, is equipped with a sensor that can detect reduced visibility caused by fog and precipitation over the Bay of Fundy. MSC worked in partnership with island landowners, who provided space to install the automated weather observing station, which will serve many people beyond the shores of the tiny island.

The addition of an automated weather observing station on Grand Manan Island will help minimize potential environmental disasters and incidents, such as ship collisions, throughout the Bay of Fundy region. The Bay of Fundy is heavily used by small craft, including fishing boats and pleasure boats, as well as large super



West-facing view of the Automated Weather Observation Station on Grand Manan Island in New Brunswick.

tankers that maneuver their way through narrow channels. The information provided by the automated observing station is considered to be vital to the overall quality of meteorological support to mariners, including Canada Coast Guard staff and other Search and Rescue personnel throughout the entire Bay of Fundy area.

The new station reports critical weather information on an hourly basis, including wind speed and direction, temperature and

dew points, and atmospheric pressure and visibility. This complements the set of tools currently used by weather forecasters, helping them to predict wind speed and direction over the Bay of Fundy with greater accuracy than ever before. The data is also available to mariners hourly through Environment Canada's Weatheradio system.

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CMOS Congress to be Held in Winnipeg

The 35th Congress of the Canadian Meteorological and Oceanographic Society will be held from May 27 to June 1, 2001, at the Sheraton Hotel in Winnipeg, Manitoba.

A mix of lectures, self-directed studies, computer and practical exercises, weather-office simulations, team-building exercises, and many other tools will help the interns develop the necessary skills, and on-the job training will take place after the program has wrapped up for the year. Steve Miller,

program coordinator in Atlantic region, estimates that the new interns will be ready to report to their first posting by April 1, 2001.

The theme of this year's congress is "Extreme Weather," and all aspects of extreme weather events that occur globally (including severe thunderstorms, tornadoes, tropical cyclones, flooding, droughts, and blizzards) will be covered. Presentations will place particular emphasis on forecasting, impacts, warning and emergency preparedness,

remote sensing, atmosphere-ocean interactions, and climate modeling and variability as they relate to extreme weather. The Congress also welcomes papers on other aspects of meteorology and oceanography.

For more information, visit the Web site at: <http://www.pnr-rpn.ec.gc.ca/air/cmoss-cmo/>.

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Marine Forecasters Board the Algonorth

Early last December, Jennifer Hay and Charles Creese—two meteorologists from MSC's Thunder Bay Weather Centre—took a three-day trip across the Great Lakes aboard the Algonorth, a 222-metre lake ship. The purpose of the trip was to familiarize the forecasters with the Great Lakes, shipping operations, and the marine community's reporting of wind and weather.



Meteorologist Jennifer Hay records weather observations in a log book in the wheelhouse of the Algonorth cargo ship on the morning of December 2, 2000.

Photo: Charles Creese

During the summer shipping season, approximately 80 Canadian lake freighters operate on the Great Lakes, and report wind and weather observations to marine forecasters through a relay system. While aboard the *Algonorth*, MSC staff familiarized themselves with this system, taking weather observations eight times each day.

Some points of interest to the forecasters included the sparse and sometimes unreliable reporting of data and the importance of an accurate forecast to the ship's navigator. Precise weather information is critical when a navigator is maneuvering a ship through narrow or shallow shipping channels—especially when high winds make navigation

hazardous. In northerly to westerly gales on Lake Erie, for example, water is pushed to the eastern end of the lake, while water levels at the western end fall, requiring ships to wait in deeper water until these levels return to normal and waves subside.

Although these ships depend heavily on accurate forecasting, current methods for acquiring precise data from the ships are not ideal. For instance, anemometer heights on the lake freighters are located approximately 30 metres above the water surface, while the ideal level for an anemometer is 10 metres above the surface. Large differences in wind speeds can occur between these levels in a stable atmosphere. Also, most of these ships do not have the ability to provide a time-averaged wind.

Rather, weather observers must take an instantaneous measurement and then subtract the effect of the ship's speed and direction. Equipment that has not been calibrated for several years and failures in the relay system also affect the accuracy of data collection and forecasting.

Since the marine forecast is so critical to ships operating on the Great Lakes, work is currently underway to improve data collection and, ultimately, the overall quality of the marine forecast.

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Digital Units Replace Mercury Barometers

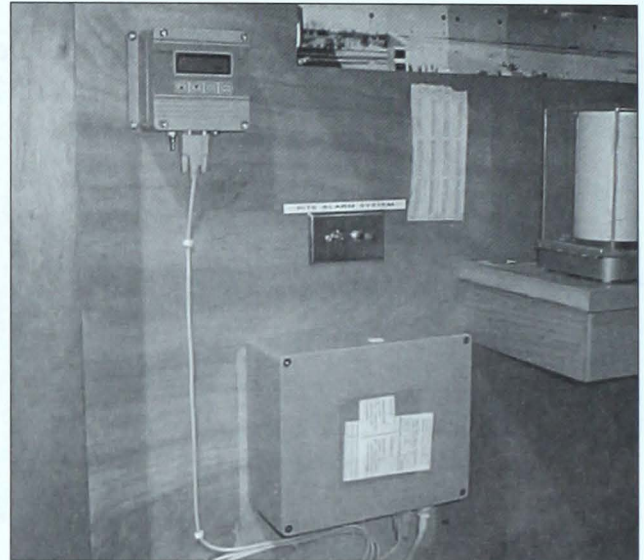
In the fall of 1999, the Meteorological Service of Canada (MSC) began a project to replace all mercury barometers currently used at Canadian aviation weather observing stations with triple-cell digital barometers.

The mercury barometers—which are up to 70 years old—create an increasing risk of both human exposure and environmental contamination due to leaking mercury. Human error in performing barometer readings and calculating pressure values is also a concern with mercury barometers, since accurate pressure readings from aviation weather stations are critical in the computation of altimeter settings, which are used by pilots for aircraft landings and take-offs.

Furthermore, very stringent regulations make it very difficult and costly to transport the mercury barometers, especially when this involves air freight. The need for periodic cleaning and calibrations of mercury barometers, which is both costly and labour intensive, will also be eliminated.

New Vaisala PTB220 digital barometers will be used to produce atmospheric pressure observations at all hourly aviation and synoptic weather observing stations in Canada. In addition to being safer for the environment and the personnel who use them, the digital barometers will help eliminate human error in performing and transcribing barometer readings and in calculating pressure values—specifically altimeter setting and mean sea-level pressure.

Unlike the mercury barometers they are replacing, the Vaisala digital barometers are easier to maintain and are not as susceptible to exposure to temperature extremes or to damage brought about by routine commercial shipping.



A Vaisala PTB220 digital barometer at the London, Ontario, airport.
Photo: Neil Diamond

The project to replace all remaining mercury barometers will continue through the year 2002, and will eventually allow MSC to completely automate the barometric monitoring program in Canada.

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Road Weather Systems and Services Workshop

The Meteorological Service of Canada (MSC) held a National Workshop on Road Weather Systems and Services with all Regions and National Directorates at its headquarters in Downsview, Toronto, January 8 and 9. The objective of the workshop was to review the MSC's present and future activities in support of surface transportation—a sector that will require substantial meteorological services in the coming years in order to provide safe, efficient, and

environmentally sustainable transportation throughout our long harsh winters.

A large number of presentations were received. Réal Daigle, André Cantin, Denis Paquette, Bill Hartman, and Rosemary Tabory each provided a short report on the surface transportation activities within their respective Regions. Bill Mander of the Environmental Protection Service provided an update on the Road Salts Assessment completed under the *Canadian*

Environmental Protection Act. Dr. Yves Delage and Louis-Philippe Crevier provided updates on modeling activities, and Bruno Prémont gave an overview of the informatics structure developed over the last several years at the Ottawa Regional Centre. Barry Green outlined the Cost Recovery Framework, and Paul Delannoy, national RWIS project coordinator, briefed the group on the proposal for a Road

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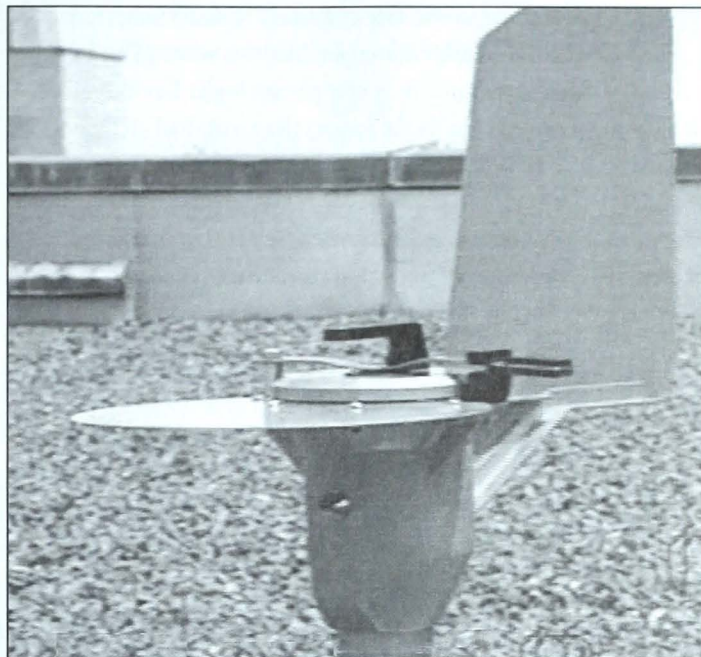
2000 POLLEN AND SPORE FORECAST PROGRAM

An experimental pollen and spore forecast program for Halifax and area was established during the summer of 2000, based on a partnership arrangement between Saint Mary's University, the Meteorological Service of Canada (MSC), and the Lung Association of Nova Scotia. The goal of the project was to provide timely information to allergy sufferers about airborne allergenic pollen, as well as fungal and mould spore content in Halifax, Nova Scotia.

Forecasts were based on a protocol developed in Ireland and issued for 97 days from May 1 to August 31. A Hirst Pollen and Spore trap mounted on the roof of the McNally building at Saint Mary's University ran continuously to trap pollen and spores on a moving, adhesive-coated slide. Air was drawn in at a predetermined rate that closely simulated the rate of human respiration. Each slide was removed after 24 hours, and the spores and pollen grains were identified and counted using a microscope.

The pollen data for each 24-hour period were combined with forecasts of expected weather, provided by MSC's Maritime Weather Centre. This allowed a daily forecast of the pollen release from trees, weeds and grasses, as well as fungal and mould spore numbers.

The day's pollen and spore counts, as well as forecasts of the next day's airborne allergen levels, were issued to the public using the Internet and Environment Canada's Automated Telephone Answering Device. The experimental pollen and spore forecast received good distribution and was useful to those who accessed it.



A Hirst Pollen and Spore trap mounted on the roof of the McNally building at Saint Mary's University.

Photo: Saint Mary's University

Recommendations have been made for an expanded pollen and spore forecast program and an increased monitoring network for the summer of 2001.

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Road Weather Systems and Services Workshop

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Weather System for Canada that is being prepared by the provinces and territories for presentation to Transport Canada and Environment Canada.

The working phase of the meeting divided participants into syndicates around client services, forecasting, monitoring, and information technologies. Their mission was to define likely MSC roles in the future

national integrated network of road weather stations and to estimate the resource requirements for each. A particular focus for all syndicates was factoring-in the participation of the private sector in all scenarios. The groups then presented the results of their deliberations in a final plenary session facilitated by Sharon Jeffers. Many excellent suggestions were made that will be invaluable in

developing MSC's options on road weather services. The discussions revealed a keen interest in participating in the development of road weather services in Canada, as well as healthy concerns regarding the resources required for doing so.

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TOP Weather Stories of 2000

The Meteorological Service of Canada released its summary of the *Top Ten Weather Stories for 2000* this winter. The annual ranking is prepared by senior climatologist David Phillips, and based on such factors as the impact the events had on Canadians, the extent of the area they affected, and their economic repercussions.

From the deadly tornado at Pine Lake in Alberta to the series of torrential rain storms throughout Canada and powerful Hurricane Michael in Newfoundland, the list provides an informative look at the weather events that were on the top of Canadians' minds.

More information on these stories is available at http://www.ec.gc.ca/press/00-12-27_m_e.htm and http://www.ec.gc.ca/press/00-12-27_m_f.htm.

RANK	EVENT
1.	First Deadly Tornado in 13 Years occurred in Pine Lake, Alberta
2.	"Bummer of A Summer" Across Canada
3.	Rain Gushers Flood Ontario and Manitoba
4.	January Storm Surge Wallops Atlantic Canada
5.	Great Lakes Levels – How Low Will They Go?
6.	More Weather Woes Down On The Farm
7.	Flash Flood Drowns Saskatchewan Town
8.	Hurricane Michael and November Gloom
9.	First Winter of the Millennium – Soft and Short
10.	Early Start to Winter 2000-2001

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Zephyr Survey Results

Last December, *Zephyr* conducted an on-line survey of its readers. Out of a total of 1700 Meteorological Service of Canada (MSC) employees, 242 replies were received for a response rate of nearly 15 per cent.

Most respondents (53 per cent) said they had seen most issues of *Zephyr* produced over the past five years. Fifty-nine per cent reported that they had read the publication in paper format, while 34 per cent had read it on MSC's Internet or Intranet. Only 19 per cent of respondents indicated that they would not read *Zephyr* if it was only available in electronic format.

The majority (62 per cent) of those who replied to the survey have never submitted story ideas, articles or photographs to *Zephyr*, and only nine out of the 242 respondents had made a submission more than once in the last three years.

In terms of content, most respondents reported that they enjoy reading about colleagues who have changed jobs, retired, joined or left the department, celebrated long-term employment, and received awards. They were also interested in profiles of MSC employees doing various jobs within the department and in reports on activities from various divisions. Other areas of particular interest were regional news accounts,

ZEPHYR MAILING REQUEST FORM

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information on scientific programs and projects, and discoveries and trends in meteorology. Respondents were less interested in reading articles dealing with management issues.

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