March/April 1983

ZEPHYR

El Chichón:
the inside story

Environment Canada
Environnement Canada
Canada

NEWS

1982-83 — year without a winter?

Environment Canada climatologists confirmed at the beginning of March that most Canadians had escaped the sting of winter.

From British Columbia to the Maritimes, December through February temperatures were above normal and in the southern parts of the country, there was so little snowfall, that hills, farms and city streets were bare, often for weeks on end.

The mildest part of Canada was the west. Vancouver's January mean temperature was 6.3°C, which is even higher than the normal *March* mean temperature of 5.8°C. Winnipeg's seasonal (December-February) mean of -9.7°C was a surprising 6.6°C above average.

Winter temperatures in eastern Canada were not quite as abnormal. Toronto's seasonal mean temperature was -2.2°C, which is 3.2°C above normal. Montreal's mean temperature was 3°C above normal, and the mean temperature at Halifax was just above normal.

The lack of snow during the 1982-83 winter was even more remarkable than the temperature. For the first time since the winter of 1957-58, Vancouver had no measurable snow. From Alberta to southern Ontario, snowfall was about 50 per cent of normal. Winnipeg had a seasonal total of 53.2 cm and Toronto 52.1 cm, both about half the normal seasonal values.

By the end of January, Quebec City had received only 112 cm, compared to the seasonal average of 201 cm of snow, and had only a thin cover of snow on the ground. Fortunately, enough snow arrived in time for the Winter Carnival.

Quebec and southern Ontario ski industries had one of their worst seasons in years, especially around the Christmas and New Year holidays. On the other hand, heating degree-days, an indicator of home heating requirements were significantly lower in southern Canada — as much as 18 per cent lower than last year in southern Ontario.

Major storms plagued both coasts, but were remarkably absent inland. Torrential rain caused flooding and disastrous mud slides north of Vancouver resulting in loss of life and extensive property damage.

Storms frequented the Atlantic region where rain was often the main feature of the 1982-83 winter. During three days in January, about 250 mm of rain fell on central Newfoundland causing major flooding on the Exploits River and millions of dollars worth of damage when the dam burst at Grand Falls. A February storm staggered New Brunswick with 40 cm of snow.

Diagnosing the cause of the unusually mild winter, climatologists at Environment Canada observed warming in the equatorial waters of the central and eastern south Pacific Ocean. Such events, called "El Nino" have also occurred in other years when Canada enjoyed a mild winter. However, there are instances when El Nino occurred yet the Canadian winter was unseasonably cold. The main reason is obscure. What is certain is there were few southward incursions of cold Arctic air. Most of Canada's weather arrived from warmer source regions to the south and over the Pacific.

Zephyr Highlights

Cover: The violent eruption last year of a Mexican volcano is liable to change Canada's climate . . . and the world's. Here is a series of assessments under the general theme: El Chichón, the inside story. Photo: Canapress.

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Close encounters of a hair raising kind

With a note saying, "Who says life at an upper air station is dull?" Derek Challis, technical officer, Aerological Systems, Field Services Directorate, Downsview passes on these excerpts from reports submitted by various OIC's.

First from Churchill, Man. "Megan Gillespie was on the a.m. run early in the month (October 1982) and after release scurried into the ops. building to ensure the flight was in order. Shortly after, she returned to the hydrogen shed to check the equipment and close the overhead door. To her surprise there was a young polar bear inside the inflation room. Megan gently opened the connecting

door between the electrolyser room and the inflation room and said, "What are you doing here you b.....?" at which the bear retreated and ambled off, allowing Megan to close the door and get back to the flight. So ends another saga from the polar bear capital of Canada."

A precis of a report from Kuujjuaq in northern Quebec reads: On October 15 Quebec police asked our help to find two people from France missing on a canoe trip near Schefferville. We told them we had three persons available, but when the provincially owned DC 3 arrived the next day we found there was only one extra seat so I went as an observer. The George River runs between 150 m high cliffs but to see what is happening on the ground, you have to fly at 70 m. The pilot did an excellent job turning and banking between the cliffs. Finally, we found a canoe with the bottom missing and some baggage strewn along the shore, but even after flying over each sector two or three times, there was no sign of the travellers. Then we saw a large SOS sign on a beach but no signs of life. After continuing downstream one of the biologists aboard the plane, familiar with the area said he had seen something moving and told the pilot to turn back. After doing a 180 degree turn and flying over the treetops, we saw someone waving a shirt while trying to cross one of the tributaries of the George River.

We climbed back up to 1200 m but kept the man in sight. Circling around for two hours, fervently hoping his companion would turn up. Finally, a police helicopter arrived with a doctor on board, landing just a few feet from the adventurer. We were told the young man seemed in good health despite some difficulty in walking. Unfortunately, his friend had drowned and his body had not been located. The tragedy had occurred a month earlier and the survivor had to cross several rivers and streams in sub-zero temperatures and severe snow and ice. If he had not been spotted he would have had to continue two or three days more on foot before reaching Port-Nouveau-Québec.

The plane in which we made the search was supposed to do a caribou inventory, so on the way back to Kuujjuaq we tried to locate the herd. Despite our efforts, we only saw ten caribou at most. Then, as we were preparing to land we suddenly saw thousands of caribou crossing the river from east to west. The biologists were surprised because the animals usually go from west to east. For three days we watched countless caribou pass the village.

Being visited by a polar bear at an upper air station can be a "nightbearish" experience, even at Churchill, Man. the polar bear capital of Canada.

Morley Thomas, Canada's "Mr. Climate" retires

There was "standing room only" for guests at the presentation honoring Morley K. Thomas, director general of Canadian Climate Centre (CCC). The Downsview auditorium was filled with well-wishers from all AES regions, retirees, personal friends, current staff and members of the Canadian Meteorological and Oceanographical Society (CMOS).

A slide presentation by David Phillips, of the CCC, illustrated Mr. Thomas's career, from his undergraduate days at the University of Western Ontario where he played on the intercollegiate championship rugby football team, through his meteorological service years and on to his recent work with CMOS and the World Meteorological Organization (WMO).

Morley Thomas, d.g. Canadian Climate Centre is wished all the best on his retirement by ADMA Jim Bruce (right) and Reg Noble, a former ADM. Photo: Elsie Traill

Mr. Thomas joined the Canadian Meteorological Service in 1941, underwent forecast weather training and was posted to Dauphin, Man. After World War II he began work in Toronto and in 1949 headed surface climate operations. In 1951 he was seconded to the National Research Council in Ottawa to develop the National Building Code which ensured that construction design matched the extremes of Canadian climate.

As superintendent of climatological operations in the early sixties, Mr. Thomas devoted his energies to the development of climate data networks and climate data processing. He also became very active within the WMO, travelling worldwide to participate in many meetings. When not travelling, he was teaching climatology to meteorologists, a role he filled from 1951 until 1971 when he became branch director of meteorological applications. He became director general, AES Central Services Directorate in 1976 and was appointed director general of the CCC in 1979.

From 1977 to 1982 Mr. Thomas was president of the WMO's Commission for Climatology and Applications of Meteorology and in this capacity guided

the development of the World Climate Program. At the same time within Canada, he was a leading architect of the Canadian Climate Program.

For many years Mr. Thomas has been known as a popular speaker and a prolific writer. In 1949 he co-authored with Clarence Boughner Volume II of Climate Summaries for Canada and since then he has published more than 87 books, papers and reports including "Climate Canada (with F.K. Hare) and the first climatological atlas of Canada. During the ceremony Gordon McKay (acting CCDG), presented Mr. Thomas with bound copies of a selection of these publications. One copy of them will go to the AES Downsview library and the other copy will be kept by Mr. Thomas.

Leading a list of speakers who praised Mr. Thomas's contributions to climatology and to the AES was Jim Bruce, the assistant deputy minister who announced the dedication of a Morley K. Thomas Award for 30 years continuous service by volunteer climate observers across Canada. Other speakers included former ADM Reg Noble, offering greetings from AES retirees, Richard Asselin, bringing best wishes from CMOS, an organization with which Mr. Thomas had very close links and Gord McKay who provided a detailed outline of Mr. Thomas's career.

One other item on the agenda was a humorous revue put on by the CCC players portraying a day in the life of the CCDG with David Phillips playing MKT, dressed in bright plaid jacket (Christmas attire) and one of his old homburgs.

Mr. Thomas replied with a few anecdotes and a reception then followed.

Morley Thomas and his secretary Lorraine Kiely both look very relaxed at the former's retirement party.

EOW Committee receives national status

The AES Equal Opportunities for Women committee (EOW), active within the Downsview building since 1977, has been given national status, it was announced by Susan Falla, convenor of the national AES-EOW coordinating committee.

The elevation of the committee to national status, effective May 1982, has necessitated the naming of a regional contact for each AES region across Canada. In addition, a Downsview EOW sub-committee was formed in September 1982. This sub-committee reports to the AES-EOW National Committee and is involved with monitoring the Qualification Enhancement Program (QEP), maintaining the EOW bulletin board, liaising with the AES Day Care Centre board of directors and arranging seminars at AES Downsview.

The formation of the sub-committee has led to the naming of an EOW representative for each AES Directorate.

Commenting on the reorganization, Miss Falla said the EOW had been the sole advisory group to the AES Management Committee (AMC) on all matters related to the status of women, equal opportunities and affirmative action as related to women. Added Miss Falla, "The committee now has overall responsibility for coordinating all AES-EOW activities and providing direction to AES managers across Canada on these programs."

She said there was no change from the DOE Deputy Minister's January 1977 exhortation: "to ensure that within a reasonable period of time the representation of male and female employees approximates the proportion of qualified and interested persons of both sexes available by occupational group and by level."

New weather station at Fort Nelson

AES has opened a new Upper Air Station facility in Fort Nelson, B.C.

The new station replaces older buildings which have been in use since 1947 and were in need of extensive repairs. Construction of the facility began in May, 1982 at a cost of $1 million.

The new Upper Air Station is uniquely designed to emphasize safety. The station releases balloons filled with hydrogen — a gas which must be manufactured and handled with care. The new building contains a detector which activates a ventilation system when gas levels reach a certain point. The building is also constructed of a steel frame with blowout panels for walls in order to minimize danger to employees and damage to the building in case of an explosion.

The station forms an integral part of the national upper air network which includes three other B.C. stations located in Prince George, Vernon and Port Hardy.

The hydrogen-filled balloons are released twice per day in order to collect weather data in the upper atmosphere.

An instrument package and small radio which are attached to the balloon measure air temperature, humidity, pressure, wind direction and speed. The information, which is vital in analyzing the atmosphere and predicting future weather, is transmitted to major Weather Centres across Canada and around the World.

Second Suggestion Award for Aerology Instructor

Mr. Dave Tidbury, an aerological instructor at the Meteorology Training Centre in Cornwall, was recently presented with his second Suggestion Award. His latest suggestion involved replacing head sets used in the calibration of U2A wind equipment with inexpensive indoor/outdoor intercom systems, for which he was awarded $200. Dave is a regular contributor to the Suggestion Award program, having submitted seven suggestions to date, of which two have been accepted and two others are still pending. In the accompanying photo, Mr. Lloyd Berntsen (right), Director of Training Branch, is shown presenting Dave with his award.

For suggesting that compressor oil in electrolyser generators located at weather stations be changed every 10-15 days instead of once a week (amounting to a considerable saving across the network), Linden Tanner of Shelburne Upper Air Station (N.S.) has won a Suggestion Award Certificate. He is seen here (right) at a presentation ceremony with Fraser MacNeil, chief, Data Acquisition Services, Atlantic Region.

Andrew McCullough, presentation technician, Sudbury Weather Office, AES Ontario Region, who also acts as commander of the RCSCC Admiral Mountbatten, is seen here (right) during the presentation of the Sea Cadet of the Year Award to chief petty officer William Bilsborough (one of his cadets). Also seen is Geoff Meek, port meteorological officer, Ontario Region. In addition, CPO Bilsborough received a Medal of Bravery for saving a life last year.

There was a presentation of Long Service Awards in the AES Headquarters Auditorium April 27. ADMA Jim Bruce, presented plaques to 22 AES personnel. Friends of the recipients were invited to attend. In the photograph — front row left to right: Donald Massey (CCAH), Archie Black (AAM), Bridget Chambers (AAF), Velma MacDonald (CCAS/P), Gail Cross (OAP), Helen Garus (ACSQ), Jim Bruce (ADMA), Nathan Cornfoot (OAEM).

Back row left to right: "Red" Henderson (AAM), Ivan McGregor (OAEW-YZ), John Phillips (CCAA/Q), Freeman Keyte (CCAA/F), Tadeuss Puissans (AFOO), Clifford Holtz (CCAH), Ron Quick (ACSM), Carlton Mateer (ARPD), Anthony Smith (ARQM), Hans Van Leeuwen (ACRC), Kenneth Horne (OAEM), Doug Cassidy (AAGD), Bill McKay (CCAA/Q), Thomas Collins (OAEW-YZ).

Personal report on... El Chichón

by Gordon Black

The American meteorological magazine *Weatherwise* has nominated El Chichón "Weather maker of the Century". Despite this, the climatological effect of an obscure but lethal Latin American volcano was not why I went to Mexico. I was a tourist, in the tropical southeast, seeing Mayan ruins at such places as Chichen Itza and Uxmal.

El Chichón, or Chichonal as they call it in the state of Chiapas, was within 80 km of where I was going, so I simply made a diversion in my rented Volkswagen to try and get a close up view of the 1200-meter mountain that had spewed 500 million tonnes of ash and sulphorous gases into the stratosphere, possibly changing world climate.

Almost everyone has heard of El Chichón, but one aspect of the eruption has been largely overlooked — the damage caused on the ground. Although I saw it nearly eight months after the last big explosion (April 3rd, 1982), I did get a brief idea of the havoc caused by successive waves of ash, hot flying rocks and noxious gases over a wide area. The blast had wiped out whole farms and villages and killed several hundred people.

The nearest Mayan ruin to El Chichón is at Palenque, some 80 km north east. I heard rumors that ash from El Chichón had damaged some of its thousand-years-old buildings, but these proved untrue. In fact the maintenance people had done an excellent job cleaning up the thick layer of ash that had coated many of the relics.

I was told I could drive right by the volcano via a scenic route leading to Tuxtla Gutierrez, the state capital. First I headed for Pichucalco, an attractive small town only 23 km from El Chichón. I soon realized that driving in the vicinity of a recently active volcano would not be easy. Twice I was diverted on to muddy tracks by signs that read "Road rinsing in progress". Apparently, it was necessary to wash the ash right out of the asphalt surface to prevent further corrosion. When I reached Pichucalco, I went straight to the town hall, to find out just what roads were like near El Chichón. A municipal employee told me all highways were closed to private traffic.

View from a light aircraft: a devastated, ash-clogged valley near the El Chichón crater. Photo: Gordon Black.

My face fell: After coming so far, I still might not get to see the volcano. He added that I might get a lift in an official jeep, but not *today* since it was New Year's and all town employees were to remain at their posts to watch the swearing in of the new mayor. Then someone suggested I rent a plane. There was a small airstrip at the edge of town and if I drove out I might find a pilot willing to take me up in his light plane or *avioneta*.

Despite its nearness to El Chichón, Pichucalco looked quite normal, even lively after its ordeal, with many farmers thronging the main square strewn with filigree park benches bearing pink and yellow town crests. I did notice two things, however: there were more pharmacies than cafes lining the square suggesting that people had first aid on their minds more than relaxation; also many of the roofs were patched with metal sheeting after being bombarded by red hot debris.

The people seemed friendly and seeing I was a stranger went out of their way to talk about their lives and experiences of the volcano. One man who owned a photography store, recalled rather emotionally that at the time of the great explosion, despite the temperature being near 30°C, he had experienced "snow" for the first time in his life. He explained that on April 4 the sky remained pitch black even at noon and millions of powdery white particles had floated down giving the town an eerie Christmas card look.

I drove to the airstrip via a narrow, winding road. It was just a patch of grass beside a cornfield with a toolshed for a hangar and some washing on a clothesline for decoration. I was told I would have to wait an hour till a pilot flew in from another airport. I noticed it was a bright sunny day with good visibility. A range of medium high mountains topped by average cloud spanned the

horizon. It looked like good flying weather.

Any doubts I had as to whether I could afford to rent a plane by myself, were dispelled when two other tourists arrived and said they also wanted to fly over the volcano. I was welcome to join them and share expenses.

A mechanic took a bit of extra time tightening up the nuts and bolts; then we finally took off. At first the scenery seemed the same from the air as it did on the ground . . . green, fields dotted with undamaged farms. As we approached the foothills, the landscape turned much bleaker. The tropical vegetation which normally covers all high land in this latitude was ominously absent. The terrain looked so desolate, I had the impression of flying over a far higher mountain range, say the mighty Andes between Chile and Argentina. At the same time the cloud grew thicker and the visibility less clear.

The *avioneta* climbed slowly over the lower peaks, encountering still more cloud. Suddenly the pilot pointed to a gap between the clouds and shouted, "There's Chichonal!" All I saw was a wall of grey rock rising into yet another cloud bank. We were obviously circling the rim of the crater, but visibility made it too risky to go over the top and peer down into the volcano where new layers of ash and lava prepared to re-erupt, a month — or a century from now. However, I did see one sign of El Chichón's terrible power to reactivate: a jet of white steam gushing out of its shoulder.

The highspot of the flight was the return to Pichucalco. As the peaks fell away, we saw an awe inspiring sight: a huge valley of silent gray ash; a "moonscape" without a single house or a farm. Even the roads and the gently winding river were silted up with deadly dust and were faintly visible furrows in the ash. The pilot pointed to spots where whole villages had been wiped off the map. One pueblo had only a single wall of a church left standing.

As the plane headed back east, patches of green began to appear among the grey and the outlines of cattle and horses could be seen around still damaged ranches.

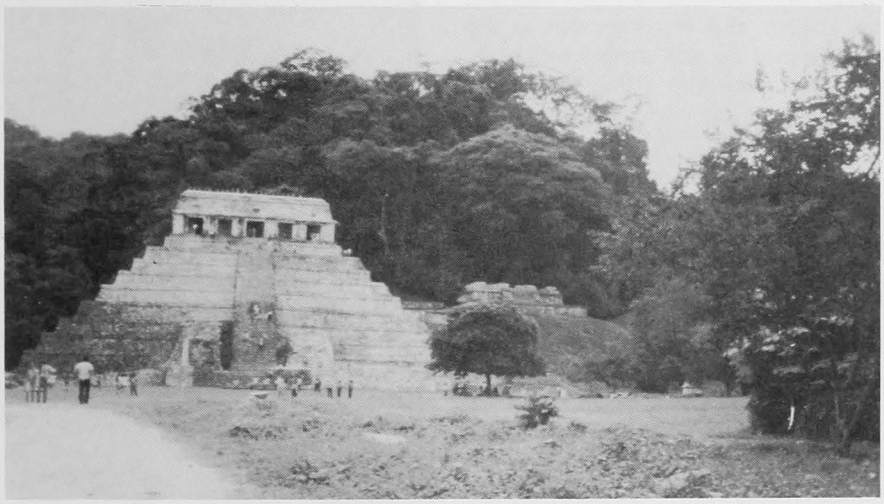
The sight of rehabilitated villages, cultivated fields, bulldozers and tractors was reassuring after our journey into a no man's land that looked as if it had been blasted by an H bomb.

A few minutes later we touched down at the tiny Pichucalco airport, watched curiously by Indians in the nearby fields. As we walked to the hangar the pilot suggested I return for another trip tomorrow when visibility over El Chichón might be better. Unfortunately, on a hurried vacation, adventures cannot be repeated.

It was ironic that the time I spent in the vicinity of one of history's most climatologically significant volcanos was blessed with near perfect weather. From a meteorological standpoint the only observable consequence of the eruption was the fiery redness of the sunsets, especially over the Gulf of Mexico.

Despite the local cloud, I saw enough of El Chichón's devastation to convince me that however much it might live up to its title of "Weathermaker of the Century", its main threat, like that of most volcanos, is to the people in the area. They will have to live in its shadow for the rest of their lives, facing sudden death and destruction.

Gordon Black is editor of ZEPHYR



Despite being only 80 km from El Chichón the Mayan ruins at Palenque did not suffer any ill effects.

El Chichón

Update on the volcanic cloud

The climate effects of El Chichón are not obvious so far. Climatologists had been expecting a mean global cooling perhaps half a degree Celsius. However, this may take two or three years to have its full impact. The detection of the climatological effects of El Chichón have been complicated by the occurrence of the sea surface temperature anomaly event which tends to have a warming effect in an opposite sense to the El Chichón volcanic cloud. Overall, the current situation has complicated when studying the climate effects of the El Chichón cloud.

As to what we can expect in the future, we will have to wait until the effects of the sea surface anomaly dissipate. Climate modellers are still predicting a cooling on the time scale of two or three years. As to the influence that El Chichón is having on the stratosphere — it has been stated by Dr. J. Angell of NOAA that the volcanic cloud from El Chichón is heating the stratosphere by a few degrees Celsius in the 22 to 25 kilometer level over tropical upper air stations. The cloud has spread out toward southern tropical latitudes and has spread northwards to 50°; at the same time, the optical thickness in the 20° latitude belt has decreased.

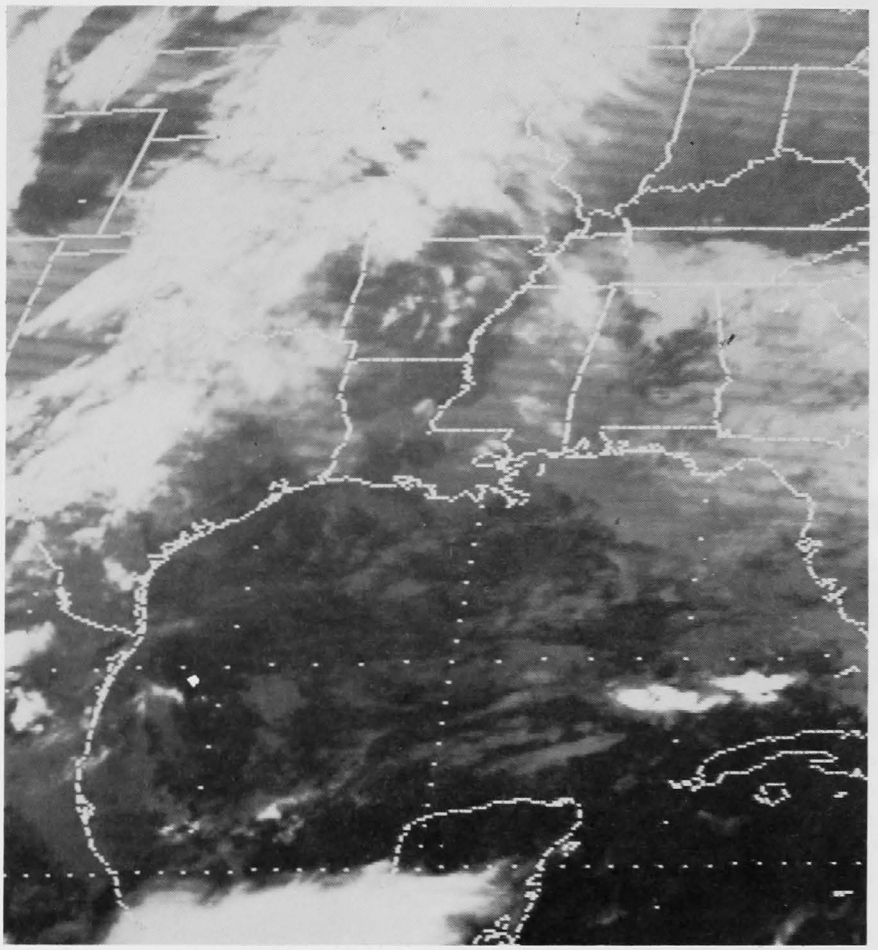
How it will affect the ozone layer?

The El Chichón eruption injected at least 20 megatons of sulphur dioxide to altitudes above 25 km. Even larger amounts of water vapour appear to have been injected into the stratosphere. The effects on the sulphur dioxide and the resulting chemical changes are very complicated; the answer is not obvious, although we expect there may be some effects on the ozone layer chemistry. In addition to the sulphur dioxide injected by El Chichón it appears that large amounts of chlorine compounds may have been injected; this provides the possibility of an ozone depletion due to the enhanced chlorine chemistry which we know catalytically depletes ozone.

How have we measured the atmospheric effects of El Chichón? AES scientists have been conducting remote sensing measurements with ground based instrumentation at Mauna Loa and Toronto, where we have been measuring both optical thickness of the aerosol cloud and the sulphur dioxide overburden as the cloud spread out and evolved with time. We have been also flying similar instrumentation on high altitude NASA research aircraft particularly on the WB57 in the Project Airstream series and on the NASA-AMES Convair 990. On these measurement missions we have made latitude surveys of the optical properties of the cloud, in particular with optical thickness of the aerosol veil and the overburden of sulphur dioxide.

Canadian scientists have played a special part in this work comparable to those from other countries. We began working on this area even before the El Chichón eruptions since we were interested in studying the January mystery volcanic cloud. We had instrumentation prepared and operating before the El Chichón eruption occurred. As a result we were able to make fairly extensive measurements of the volcanic cloud which we hope will be a significant contribution to the scientific body of knowledge on the Mexican eruption. We consider it to be one of the largest injections of sulphur compounds into the stratosphere in this century.

Dr. W.F.J. Evans, chief of the Experimental Studies Division, Research Directorate, Downsview.



This satellite map dated March 29, 1982 shows a huge volcanic cloud covering most of the southern part of the Gulf of Mexico. The volcano which erupted just hours before, is located about 100 km further south.

El Chichón

Even asking the right questions is difficult

It is a truism in atmospheric science that the simplest questions; the questions that are most practical and sensible are the most difficult to answer. The problem can be put this way; in order to say what the effect of El Chichón has been, we would have to know what the climate would have been if El Chichón had not occurred. How can we know this? We do not have the luxury of a number of different atmospheres with which we can experiment. Really, our only choice is to experiment with models of the atmosphere. But such models are only in a primitive stage. Much more

research is needed before we can even approach the question let alone give a definite answer.

Simplistic arguments are of little use for practical answers. The direct effect of El Chichón has probably been a net reduction in energy available to our planet. In a simple way one would think that our climate must get colder. Yet this winter has been abnormally warm! This does not mean that scientists who said that the likely effect of El Chichón was a cooling one were wrong. It just means that one cannot reason or predict as though El Chichón was the only thing that was different. One could argue that our winter would have been even warmer if not for El Chichón! Our climate is a result of many interacting phenomena. It is quite understandable that people want to speculate on the end result of a puzzle long before the last piece is in place. But let's remember that the climate was a puzzle long before humans ever looked at it. Let us put a few more pieces in before we say what is the picture.

If I can argue that we have really no idea of the climatological effect of El Chichón so far how can anyone expect an answer as to its future effect? Any person can argue that it will not cause an ice age and any person can argue that it will not cause the seas to boil. In between, we can only say that El Chichón was an important geophysical event. To their great credit AES people recognized that fact, reacted and carried out a measurement program on the optical properties of the cloud emitted. There is good reason to believe that these measurements will prove to be very important in our efforts to unravel what causes what? It will take time and effort.

Dr. Phil Merilees, chief scientist, Canadian Climate Centre.

El Chichón

3D climate models will measure the effects

The eruption of El Chichón at 17°N latitude in Mexico is considered to be the most significant volcano eruption in this century in terms of its potential impact on atmospheric ozone photochemical cycle and global climate. The progress of the volcanic cloud has been monitored intensively by scientists both in U.S. and Canada since its spectacular eruption in April 1982. Observational data gathered so far shows that the volcanic cloud has risen to a height of about 32 km with cloud center located around 25 km. The cloud has continued to spread laterally and now extends from 30°S to 30°N and beyond in the stratosphere. The stratospheric cloud consists of mainly ash particles and sulphuric acid droplets, the latter being produced continuously by the photochemical conversion of sulphur dioxide and water. There is evidence to show that massive amounts of sulphur has been injected in to the stratosphere along with substantial quantities of other materials such as ash, chlorine and water. It is known that ash particles and sulphate aerosols in the atmosphere scatter and absorb solar and terrestrial radiation thus influencing the earth's radiation budget and hence the earth's climate. The injection of chlorine and water on the other hand would alter the ozone photochemical balance which in turn leads to the changes in the surface climate.

The problem of determining the effect of volcanic aerosols on global climate is a complex one. It requires detailed knowledge and understanding of the radiative transfer and photochemical processes and the feedback effect between the radiative heating and atmospheric dynamics. The problem also requires detailed information on the three dimensional distribution of aerosols concentrations and other factors such as size distribution, composition and particle shape which influence the optical properties of aerosols. Simple one and two dimensional climate model calculations in U.S. and Canada seem to indicate that the increased atmospheric aerosol concentrations resulting from the El Chichón eruption has the effect of cooling the earth's surface by about 0.5° while causing significant warming in the lower stratosphere (up to 5°C) during the first year after the eruption. Undoubtedly more advanced three dimensional climate models which allow variable aerosol concentrations and properties in space and time and which take into account the feedback effect of radiative heating and dynamics are needed before one can determine more accurately the effect of the El Chichón eruption on global and regional climate.

Dr. R.K.R. Vupputuri, research scientist, CCC's Numerical Modelling Division.

FUTURE FORUM

The computer: threat or opportunity?

This is the second in a series of interviews with a wide cross section of AES employees. Being about computers, it is naturally very future-oriented. The feature was contributed entirely by personnel of AES Atlantic Region.

Paul Galbraith (acting chief, Scientific Services)

Computers, in a variety of guises, will continue to influence our lives more and more. I expect that small computers will become about as common in consumer products as the electric motor is today. Home "micro-computers" are still in

Paul Galbraith

their infancy but will become much more sophisticated and probably able to respond to voice commands. They will be regarded as a near necessity within my lifetime much as electric dishwashers are today. Computers in the workplace will take over most repetitive/mechanical tasks and will continue to move into the more complex tasks as well.

Gary Balcom (superintendent, Financial Services)

The computer age is upon us and is affecting everyone's work and home life. I believe that computers are a great opportunity to release people from tedious tasks to more creative and productive endeavours. Micro-computers are the fastest growing segment in the data processing industry. These machines are quickly finding uses in houses, schools and the workplace. Their capabilities and operating simplicity are being continually improved along with their affordability. By the end of the decade they will be as common as television sets.

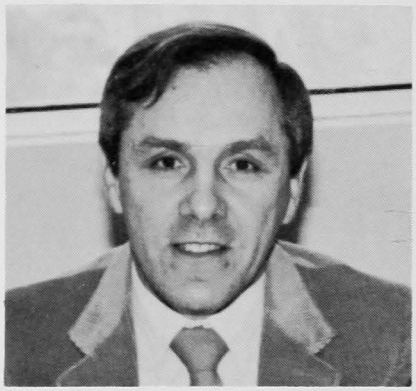
Gary Balcom

Security is the biggest problem and the potential for fraud, theft and invasion of privacy are enormous. We must ensure that computers are used to assist and not rule our lives.

Joan Watts

Joan Watts (secretary, Regional Director's Office)

The computer will definitely play a greater role in my life in the future. I do have control to an extent over how much I am influenced by computers in my personal life. The work place is different. I was introduced to word processing equipment in 1982. I feel a positive approach is needed for automation. Word processors are great for productivity, freeing the employee for more administrative responsibilities. I do feel though that more study is required on health hazards associated with using video display terminals. So far, there is no conclusive evidence that VDTs are hazardous to your health over the long term, but you may suffer eye strain as a result of using the equipment now. I am all for automation, but not at the risk of employees' health.



Frank Amirault

Frank Amirault (Scientific Services, climatological office)

The computer is almost certain to play a greater role in one's way of life and work during the next decade, especially, if business and industry continue to employ computers and the technology continues to improve.

As for work, the computer will allow for new and faster methods of data retrieval and processing to be developed, providing rapid recovery of information containing the most recent data available. Better methods of data analysis will provide more precise information, allowing users to make better judgements and decisions.

The role of the Climatological Services Specialists will require greater skills and knowledge in order to adapt to the changes brought about by the computer which in some cases may require some specialized training, thereby creating new opportunities in the field of Climatological Services.

Don Bowlby (meteorological inspection, Data Acquisition Services)

A computer company magaziner recently claimed that from the beginning of

Don Bowlby

time through 1980 there were approximately one million manufactured computer systems. In 1982 alone that one particular company was scheduled to equal that total, or a doubling of numbers in one year. The computer will as usual have both good and bad effects. Our cherished concept of privacy will be completely swept away. As to whether the computer is an opportunity or a threat, I quote economist Leo Cherne: "The computer is incredibly fast, accurate and stupid; Man is unbelievably slow, inaccurate and brilliant. The marriage of the two is a force beyond calculation."

Lillian Wiley (clerk, Data Acquisition Services)

I expect the computer will play a very large role in our lives and in our place of work within the next decade. Although some may find this frustrating and a threat, I regard this as a challenging and exciting era. To observe some of the functions the computer can perform is

Lillian Wiley

sometimes awesome and I consider myself fortunate to work in an area where computers are widely used.

As the computer gradually takes on more and more of the tasks of humans, one begins to wonder what will become of person power in the future. Will computers continue to take orders from humans or will humans gradually learn to take orders from the computer?

Ken Reynolds (regional supervisor, Electronic Maintenance)

It is virtually inevitable that computers will continue to proliferate in all areas of life. The most significant impact in the work area will be in information handling. Due to the vast increase in information available to the public, it is a full-

Ken Reynolds

time job just to sort it into areas of concern, with little opportunity to absorb the data into our pool of knowledge. Word processors are now quite common in the work area, especially in the office. Ultimately the product is a sheet of paper carrying the desired information. The next step is to eliminate the paper and send the information electronically *direct* to the recipient terminal. Computers are now so common in the home, language once used only by engineers and programmers will soon be in general usage. (Listen to the kids in the local computer store!) As long as we are vigilant and avoid misuse of data or its deliberate destruction, we need not feel threatened.

(Special thanks are due to Lionel Haughn, Weather Services coordinator, Atlantic Region for gathering this material and taking the pictures. Ed.)

BOOK REVIEW

During the past two years the AES Downsview library has acquired a number of new periodicals covering a wide range of scientific and environmental topics. In place of the customary book review we asked Morley Thomas, recently retired director general of the Canadian Climate Centre to review two of these journals.

JOURNAL OF CLIMATOLOGY — A Journal of the Royal Meteorological Society

In recent years debates have taken place in both the American and Royal Meteorological Societies as to whether or not to begin periodicals devoted to climate. In the U.S. the AMS has decided to change the title of an existing periodical to Journal of Climate and Applied Meteorology in 1983 but in the U.K. the Royal Meteorological Society decided to sponsor this new periodical which is published by John Wiley and Sons. The journal is published quarterly and the first issue appeared early in 1981. The aims of the journal are to span the whole expanding field of climatology through the publication of research papers, major reviews of progress and book reviews. The editor is Professor S.

FEATURES

Gregory, a geographer at the University of Sheffield. Professor T.R. Oke of the University of British Columbia is a member of the editorial board.

Because of its association with the Royal Meteorological Society, this journal will probably rank as the prime journal in the climate field and attract first rate research papers. Papers of interest to Canadian meteorologists and climatologists to date include "Climate and Energy Balance on the Arctic Tundra", "Nature and Possible Causes of Droughts on the Canadian Prairies" and "Snow Cover Conditions in the Northern Hemisphere During the Winter of 1981". Although one of the aims of the journal is to encourage the application of climatological knowledge to a wide range of human activities, papers dealing with applications, as I define that sector, have yet to be published. Canadian climatologists have an opportunity, and a challenge, to submit good descriptive, theoretical and application climate papers for publication in this journal.

PHYSICAL GEOGRAPHY

The masthead of this new periodical advises that it is "a bi-annual journal dedicated to the dissemination of significant research articles of interest to geomorphologists, climatologists and related earth and atmospheric scientists." It is published by V.H. Winston and Sons in the United States. The periodical may have a relationship with the Association of American Geographers since individuals who are members of that Society are eligible for special subscription rates. The first issue is dated January — June 1980. Professor F.K. Hare of the University of Toronto is a member of the editorial board.

Climatology is well represented in the four issues published to date. Articles such as Winter Cyclones and Circulation Patterns on the Western Great Lakes, An Assessment of the Adequacy of the Solar Radiation Data Network for the Contiguous United States and The Normal Summer — Autumn Precipitation Decline in the North Central United States have been published. Classical climatology is well covered but no papers in applied climatology have been published. The climatology papers appear to be more descriptive than theoretical which may disappoint climatologists with a meteorological background. However the papers are informative and the periodical promises to become an additional vehicle for the dissemination of basic climate information.

STAFF CHANGES

Promotion & Appointments

J. Adamson (EG-7) Officer-in-Charge, WO4, Windsor, Ont.
M. Augert (SCY-2) Secretary, CAEW, Winnipeg, Man.
H.T. Baltazar (CS-1) Scientific Programmer, CMC, Dorval, P.Q.
B. Barrette (EG-6) Bilingual Tech. Writer, ACSN, Downsview, Ont.
L. Birmann (SCY-3) Secretary, AABD, Downsview, Ont.
F. Blanc (EG-1) Obs. Tech. WO4, Ottawa, Ont.
A. Boisvert (EG-1) Obs. Tech WO4, Sudbury, Ont.
A. Bouchard (EG-3) Aero. Obs. WO4, St. John's, Nfld.
G. Boulduc (EG-3) U/A Tech. WS1, Alert, N.W.T.
S. Boutot (EG-1) Weather Observer, WS3, Hudson Bay, Sask.
S. Broersma (FI-2) Superintendent, Finance, OAEA, Toronto, Ontario.
R. Bryanton (EG-6) Pres. Tech. WO4, Ottawa, Ont.
A. Cantin (MT-2) Meteorologist, Ontario Weather Centre, Toronto, Ont.
L. Chartrant (EG-1) Obs. Tech. OAEW, Toronto Int'l. Airport, Ont.
L. Cornish (SCY-2) Secretary, AFFC, Downsview, Ont.
M. Dalcourt (EG-1) Obs. Tech. WO4, Sudbury, Ont.
D. Delisle (EL-5) Electronics Technologist, PAEOE, Vancouver, B.C.
G. Deschênes (EG-3) Aero. Tech. WS1, Inukjuak, P.Q.
K. Devine (MT-6) Project Meteorologist, ACSN, Downsview, Ont.
D. Deyholos (CR-4) Clerk, Accounts, PAEAF, Vancouver, B.C.
B. Douglas (EG-7) Senior Tech. WO3, Regina, Sask
B. Duguay (EG-3) Aero. Tech. WS1, Sachs Harbour, N.W.T.
B. Girard (EG-6) Surface Station Inspector, QAEOI, St-Laurent, P.Q.
B. Greaves (MT-5) Meteorologist, ARMA, Downsview, Ont.
C.R. Hansen (EG-4) Met. Tech. WAED, WS3, Cabmridge Bay, N.W.T.
V. Jarvi (EG-3) U/A Tech. WS1, Eureka, N.W.T.
K. Johnston (EG-7) Senior Tech. WO3, Saskatoon, Sask.
L. Lacasse (CR-4) Clerk Admin. QAEA, St-Laurent, P.Q.
P. Lacasse (EG-1) Obs. Tech. OAEW, Toronto Int'l. Airport, Ont.
D. Lahn (EG-3) U/A Tech. WO1, Coral Harbour, N.W.T.
E. Law (EG-1) Obs. Tech. Weather Station, Toronto Island, Ont.
C. LeFevbre (EG-1) Obs. Tech. WS3, Atikokan, Ont.
G. Leger (EG-3) Aero. Obs. WS1, Sable Island, N.S.
S. Leger (EG-3) Aero. Obs. WS1, Sable Island, N.S.
G. Machnee (MT-5) Meteorologist, WO1, PRWC, Winnipeg, Man.
C.J. MacLeod (EG-5) Supervisor, MAEOO, Bedford, N.S.
J. Mann (EG-6) Pres. Tech. WO3, Regina, Sask.
C. Massé (MT-5) Meteorologist, QAEM, St-Laurent, P.Q.
B.A. Misanchuk (MT-5) Meteorologist, QAEM, St-Laurent, P.Q.

STAFF CHANGES

T. McLean (EG-4) Weather Radar Tech. WS3, Broadview, Sask.
B. McVean (AS-4) Admin. CAEA, Winnipeg, Man.
G. Morneau (MT-2) Meteorologist, WAED, Edmonton, Alta.
J.P. Noel (EG-1) Weather Observer, WS3, Winnipeg, Man.
B. Owen (TI-6) Supervisor, Quality Assurance, ACSQ, Downsview, Ont.
D. Pacquette (EG-1) Obsv. Tech. WO4, Ottawa, Ont.
A. Patoine (MT-6) Instructor, QAEC, Montreal, P.Q.
R. Prior (EG-6) Surface Inspector, OAEOI, Toronto, Ont.
K. Sawers (SCY-3) Secretary, OAED, Toronto, Ont.
B. Shannon (MT-5) Meteorologist, ARMF, Downsview, Ont.
L. Suddick (EG-6) Surface Inspector, OAEOI, Toronto, Ontario.
D. Thibodeau (EG-1) Obsv. Tech. Weather Station, Toronto Island, Ont.
R. Verret (MT-6) Meteorologist, CMC, Dorval, P.Q.
G. Viau (EG-6) Technician, ACEQ, St-Laurent, P.Q.
W. Whittaker (EG-1) Obs. Tech. WO4, Windsor, Ont.
J.W. Young (EX-2) Director, ARQD, Downsview, Ont.

Transfers

E. Adamson (MT-2) Meteorologist, METOC, Halifax, N.S.
M. Beaudoin (EG-5) Met. Tech. WO4, Mirabel, P.Q.
M. Bouchard (EG-4) U/A Tech. WS1, Coral Harbour, N.W.T.
S. Buzza (EG-1) Weather Obs. WS3, Gimli, Man.
T. Chir (EG-6) Officer-in-Charge, WO4, Waterloo-Wellington, Ont.
R. Desjardins (EG-4) Aero. Tech. WO4, Frobisher, P.Q.
J.G. Desmarais (MT-6) Admin. QAEM, Montreal, P.Q.
D. Dueck (MT-7) Meteorologist, Program Manager Mini-Computer, AFSD, Downsview, Ont.
E. Favelle (EG-6) Weather Services Tech. WO1, PRWC, Winnipeg, Man.
B. Fehr (EG-6) Pres. Tech. WO4, Winnipeg, Man.
D. Fulcher (EG-2) Met. Tech. WS3, Vancouver Int'l. Airport, B.C.
L. Gibson (EG-2) Obs. Tech. WO4, Sudbury, Ont.
L. Gmitrowski (EG-4) U/A Tech. WS1, The Pas, Man.
J. How (EG-1) Met. Tech. WS3, Lytton, B.C.
F. Karg (EG-4) Aero. Obs. MAEOO, Shelburne, N.S.
M. Lambert (EG-1) Met. Tech. WS3, Slave Lake, Alta.
K. Leonard (EG-3) Met. Tech. Arctic Weather Centre, Edmonton, Alta.
D. Long (EG-2) Obs. Tech. WO4, St. Catharines, Ont.
D. Lynch (AS-3) Head, Management Info. AFON, Downsview, Ont.
E. MacDonald (EG-2) Met. Tech. WS3, Vancouver Int'l. Airport, B.C.
P. McCallum (EG-6) Pres. Tech. WO4, Windsor, Ont.
R. Nelis (SM) Chief, Weather Services, MAEW, Bedford, N.S.
S. Pailer (EG-3) Aero. Obs. MAEOO, Sable Island, N.S.
W. Palmer (EG-4) Climate Svc. Tech. CAED, Winnipeg, Man.
K. Perry (EG-2) Met. Tech. WS3, Hope, B.C.
S. Radechi (EG-2) Obs. Tech. WO4, Hamilton, Ont.
M. Sarcevich (EG-2) Obs. Tech. WO4, Kingston, Ont.
K. Sawers (SCY-3) Secretary, OAED, Toronto, Ont.
M. Séguin (SCY-2) Secretary, CMC, Dorval, P.Q.
M. Strange (EG-5) Pres. Tech. WO1, Whitehorse, Y.T.
R. Walls (EG-6) Weather Svc. Tech. WO1, PRWC, Winnipeg, Man.
J.H. Wilson (EG-6) Pres. Tech. WO1, Gander, Nfld.

Temporary & Acting Positions

B. Brisebois (MT-4) Meteorologist, CFB, Namao, Alta.
B. Broughton (EG-4) Iceberg Tech. ACIC, Ottawa, Ont.
J.J. Crevier (EG-5) Chief, WO4, Frobisher Bay, N.W.T.
D.M. Davies (AS-2) Admin. Officer, AABD, Downsview, Ont.
D. Dubuc (EG-5) Met. Tech. WSC, Sherbrooke, P.Q.
P. Dubrevil (MT-6) Meteorologist, MOP, AFWC, Downsview, Ont.
P. Ducharme (MT-7) Meteorologist, MOP, APDG, St-Laurent, P.Q.
H.R. Ellsworth (EG-8) Supt. Stn. Operations, MAEOO, Bedford, N.S.
S.A. Gauthier (EG-6) Met. Tech. WO4, Dorval, P.Q.
R. Gilbert (MT-7) Meteorologist, Chief, Scientific Services Div. QAES, St-Laurent, P.Q.
J. Glover (LS-4) Chief, AAL, Downsview, Ont.
C. Handfield (EG-7) Supervisor, WO4, Dorval, P.Q.
O. Koren (MT-7) Meteorologist, Project AFSD, Downsview, Ont.
L. Lamontagne (EG-6) Officer-in-Charge, WS1, Inukjuak, P.Q.
M. Loiselle (MT-3) Meteorologist, Projects, OAES, Toronto, Ont.
C.F. MacNeil (SM) Officer-in-Charge, Maritimes Weather Office, Bedford, N.S.
A. McBay (CR-4) Clerk, Special Projects, OAES, Toronto, Ontario.
G. Teeter (EG-7) Head, Quality Assurance & Inspection, AFON, Downsview, Ont.

Departures

C. Boulet, QAEM, St-Laurent, P.Q.
A. Doucette, Sable Island, N.S.
W. Emond, Sable Island, N.S.
P. Fellin, ARQA, Downsview, Ont. to Concord Scientific.
J. Gomes, OAES, Toronto, Ont. to Env. Canada RDG's office, Ont. Region.
L. Guzda, CAED, Winnipeg, Man.
R. Heartz, Port Hardy, B.C.
L. Johnston, AAM, Downsview, Ont.

STAFF CHANGES

Leave of Absence

L. Barrie, ARQT, Downsview, Ont. Development Leave — Sweden.

Retirements

A.J. Black, AAM, Downsview, Ont. Jan. 1983.
T. Green, The Pas, Man. Dec. 1982.
T. Guenther, CAED, Winnipeg, Man. Jan. 1983.
V. Kingston, PAED, Vancouver, B.C. Feb. 1983.
L.J. Marion, ACPN, Downsview, Ont. Jan. 1983.
G. Ouimet, QAEOU, Inukjuak, P.Q. Dec. 1982.
M.E. Schurter, CCAH, Downsview, Ont. Feb. 28, 1983.
M.M. Skinner, AAL, Downsview, Ont. Nov. 1982.
M.K. Thomas, CCDG, Downsview, Ont. Jan. 31, 1983.

Deaths

J. Thomas, Ontario Weather Centre, Toronto, Ont. Jan. 19, 1983.
C. Labelle, CMQ, St-Laurent, P.Q. Feb. 10, 1983.

Promotions, appointments, transfers, temporary or acting positions sections provide information on new postings including location. Only temporary or acting positions which involve a change of location are listed. Retirements and departures indicate the last posting. Abbreviations used are:

MT	– meteorologist
EG	– engineering & scientific support
SE-RES	– research scientist
PC	– physical scientist
ES	– economist, sociologist, or statistician
SX	– senior executive
DA-PRO	– data processing
EL	– electronics technologist
ENG	– engineer
GL-VHE	– general trades
ST	– secretary
FI	– financial officer

Before going on to work as a forecaster at the METOC Canadian Forces base in Halifax N.S. Colleen Farrell receives her meteorologist graduation certificate from Des O'Neill, director AES Atlantic Region. She is a graduate of the Meteorologist Operational Course (MOC 3) held at AES Downsview.