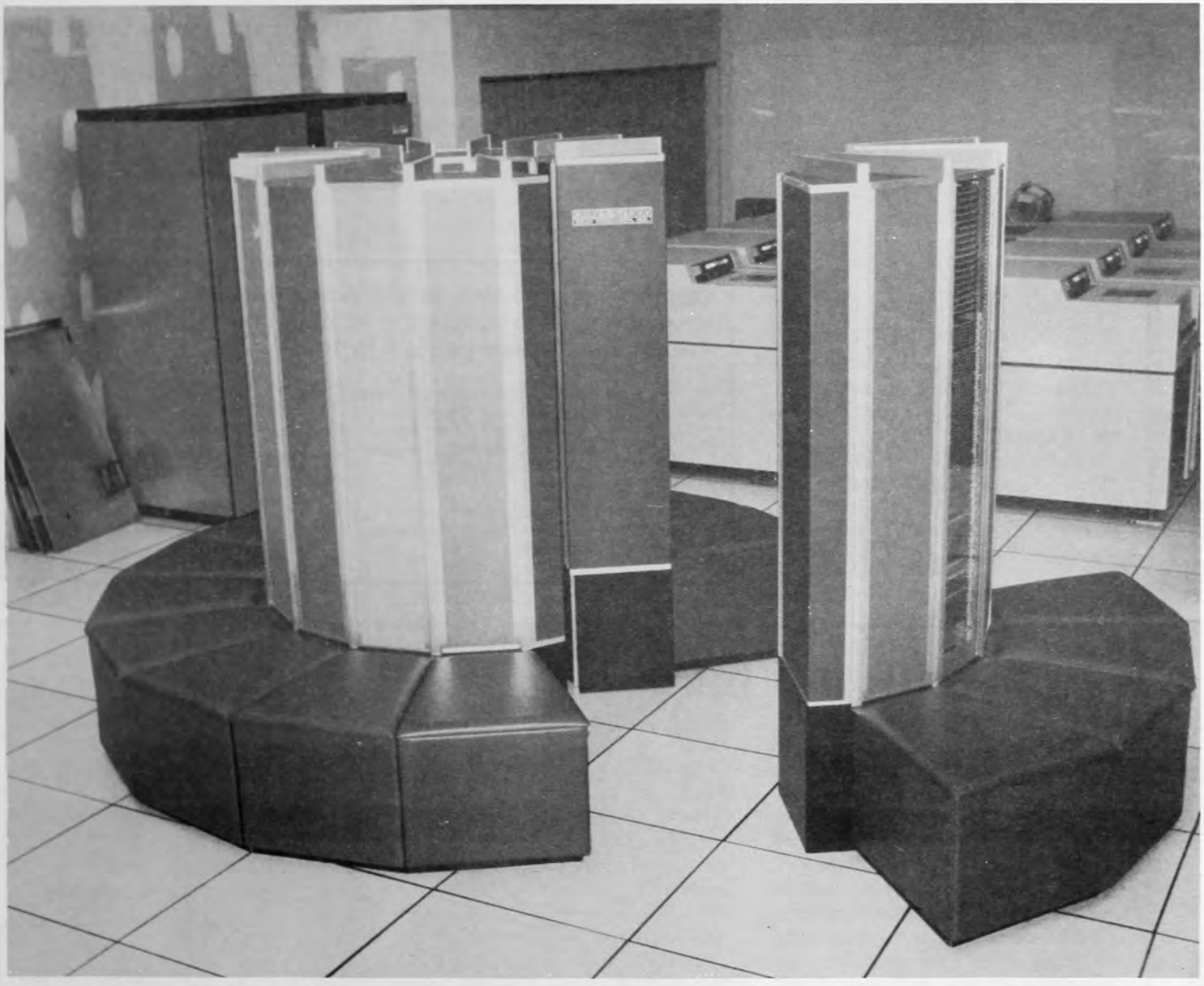
ZEPHYR



Inauguration of the CRAY Supercomputer

WMO Bureau meets in Canada

The ninth session of the Bureau of the World Meteorological Organization (WMO) was held in the AES Building, Downsview from January 31 to February 2, 1984 at the invitation of the Permanent Representative of Canada with WMO, ADMA Jim Bruce. The Bureau comprises the President, the three Vice-Presidents and special invitees including the Secretary General of the organization.*

The business section of the session dealt with administrative matters, long term planning and personnel questions in the Secretariat. Administrative arrangements for the 36th session of the Executive Council to be held in Geneva from June 6 to 23, 1984 were also finalized. The impact of the possible U.S. withdrawal from UNESCO and the Convention on the Protection of the Ozone Layer, presently being developed were also discussed.

On February 1 the Bureau members travelled to the Canadian Meteorological Centre (CMC) in Dorval, Que. to attend the official inauguration ceremony for the new CRAY vector computer.

While at CMC, Dr. Roman L. Kintanar, president of WMO gave a short speech praising the new computer and the key Regional Meteorological Centre in Montreal. He said they were both essential components of the WMO's World Weather Watch.

While in the building, the visitors toured other CMC facilities and received a briefing on all Centre activities. Before leaving, some of the WMO group received special computer-produced weather forecasts for their own countries as a souvenir of their visit to the CMC.

Other meetings were held in Downsview during the Bureau's visit here.

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The next issue of Zephyr will be a special Western Canada Edition.

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In addition all attendees were thoroughly briefed on AES by senior managers. After the first official morning session, the Bureau attended a press meeting in the Downsview Building lobby. As visitors were filmed by several TV crews they answered questions during informal meetings with the media. Topics ranged from the greenhouse effect and global climate change to the possibilities of continuing free international exchange of weather satellite data.

Other activities during the first Bureau visit to Canada included tours of the Ontario Weather Centre, of the Mount Forest (Ont.) manned and automatic weather station, of the Woodbridge radar station and experimental farm and of the AES Downsview Satellite Data Lab. A tour of the Ontario Science Centre was also organized.

Bureau members and special invitees who attended were:

Dr. Roman L. Kintanar, President of WMO and Director General of the Philippines Atmospheric, Geophysical and Astronomical Services Administration; Prof. Yuri Izrael, first vice-president of WMO and chairman of the USSR State Committee for Hydrometeorology and Control of the Natural Environment; Mr. Zou Jingmeng, second vice-president WMO and Administrator of the Chinese State Meteorological Administration; Mr. J.P. (Jim) Bruce, third vice-president WMO and Assistant Deputy Minister AES; Dr. G.O.P. Obasi, Secretary General WMO and former head of the Nigerian Institute for Meteorological Research and Training; Dr. Richard Hallgren, member of the WMO Executive Council, and Director of the United States National Weather Service; Dr. John William Zillman, member of the WMO Executive Council and Director of Meteorology of the Australian Weather Service; Mr. Workineh Degefu, President of WMO Regional Association I, (Africa) and General Manager, Ethiopian National Meteorological Services Agency and Mr. C.A. Grezzi, President of WMO Regional Association III (South America) and Head of the Uruguay Weather Service.

★ At Bureau meetings it is customary to invite participation by the Permanent Representatives of members operating World Meteorological Centres (Australia, USA and USSR), if they are not attending either as President or as a V.P. One or two others also attend as special invitees to provide representation from all six WMO Regions.

One of the principal stops of the WMO Bureau on their tour of AES facilities in Eastern Canada was at the Canadian Meteorological Centre in Dorval, Que. Trying the CRAY Supercomputer "for size", the entire Bureau and their special invitees join Environment Minister Charles Caccia, fourth from right, for a photo. From left to right are Dr. R.E. Hallgren, USA; Dr. J.W. Zillman, Australia (standing); Mr. Zou Jingmeng, People's Republic of China; Dr. G.O.P. Obasi, Nigeria — Secretary-General, WMO; Dr. R.L. Kintanar, Philippines — President, WMO; Mr. Caccia; Mr. J.P. Bruce, Canada; Mr. W. Degefu, Ethiopia; Mr. C.A. Grezzi, Uruguay.

Inauguration of the CRAY 1 — computer event of the 80s

General view of the audience at CMC during the inauguration of the CRAY 1 by Environment Minister Charles Caccia.

Canada's computer event of the decade took place on February 1 in a medium-sized office building near a Dorval, Que. shopping mall.

About 150 scientists, government and municipal officials, international guests, academics, data processing experts and media gathered on the main floor of the Canadian Meteorological Centre (CMC). The occasion was the inauguration by Environment Minister Charles Caccia of the CRAY 1-S/1300 supercomputer, the fastest and most powerful of its kind in Canada.

The Minister mounted the yellow-draped dais for his first major high technology speech since assuming his position last July. He told his audience that weather and climate information provided by Environment Canada is worth over one billion dollars annually to the Canadian economy and that "obviously anything which will improve the accuracy and usefulness of our weather information is valuable economically. And that's exactly what this new supercomputer will do."

The audience felt a sense of occasion when the Minister later pressed a button. A stirring fanfare sounded and a short series of weather maps of North America appeared on four video display screens around the room. These maps conveyed the first five-day weather forecasts achieved through CRAY computing. The presentation looked unrehearsed but had actually required several weeks programming using the new computer. Chief of CMC operations Iain Findleton had done part of the work at his home using telephone connections to the office. The result was the two minute repeating film shown on the screens.

The sense of occasion grew stronger as Dr. Roman L. Kintanar, president of the World Meteorological Organization (WMO), specially invited to attend the CRAY opening, went to the lectern. He stressed the importance of the new super-computer in promoting international cooperation and the exchange of weather and climate data between developed and developing countries. While Dr. Kintanar spoke other prominent WMO delegates and officials looked on. These included Dr. G.O.P. Obasi, WMO secretary general, Zou Jingmeng, second vice president of the WMO and director general of the Chinese State Meteorological Administration, and the heads of five other national weather offices around the world.

Also speaking was Peter Gregory, vice president, Corporate Planning, Cray Research Inc.

At the end of the proceedings, the Minister made himself available to questions from the media. A crowd of reporters, TV interviewers and radio commentators bombarded him with questions on every aspect of weather high technology and the diverse uses of the supercomputer.

Meanwhile other guests were starting out on tours of the CMC facilities. Divided into small groups and led by a guide, their main point of convergence was of course the CRAY 1. Looking more modest than its supercomputer image suggests, its rounded, brightly colored, vertical segments and leather bench base reminded some people of an upturned Montreal billboard kiosk. Most groups moved on to inspect other data processing equipment in the room, including the CRAY's predecessor, the CYBER 176. As more and more groups entered the computer room, there was a short line up and tours lasted until well into the afternoon.

In the communications room above the computer, visitors were offered dedicated computerized weather maps. While in the forecast room nearby, they could order computerized weather forecasts, in both languages, for any point in the northern hemisphere.

The more curious were taken on tours of the basement to see the huge cooling systems — up to seventy-five tons of refrigeration equipment required to air condition the CRAY.

They also saw the recently upgraded Hydro Quebec power supply room as well as a room for the new Uninterrupted Power Supply system, essential if the CMC computer is to continue work during energy black outs and other emergencies.

Once official ceremonies were over, the room was converted into a reception area where guests could examine photo exhibits or mingle with fellow guests and exchange views on the new computer era just ushered in. University professors were seen comparing notes with mathematical modelling staff, seeking more information on outside research time to be made available on the CRAY. WMO delegates chatted with Canadian forecasters to learn about operational conditions in this country. Municipal representatives mingled with CMC administrative staff to discover more about the premises they had previously considered just an anonymous piece of real estate. Media personnel clustered around the Minister, ADMA Jim Bruce, senior CMC and CID personnel or other senior AES staf. They enquired how the CRAY would upgrade weather forecasts or be used in such areas as long-range climate prediction or tracing the transport of airborne pollutants.

AES officials were pleased with the turn out and the media coverage. "We only stage an event like this once every

A news photographer points a camera at Environment Minister Charles Caccia as he inaugurates the CRAY Supercomputer at CMC, symbolizing the fact that the ceremony was a media event.

ten years," comments François Lemire, director of the CMC. "This was the right time because the installation of the CRAY I represents a quantum leap in data processing for weather forecasting. We won't organize a similar occasion until we get the next generation of computers sometime in the 1990s."

Added CRAY Research Inc's Peter Gregory, "It's unusual to celebrate the installation of a CRAY computer on such a large scale. We are grateful for the interest shown."

The interest in the computer was not only restricted to the research and meteorological communities, but caught the imagination of a wider public. Reports on the opening had been carried on all major Canadian TV networks, both English and French as well as on numerous radio stations across the country. Many large newspapers and several big circulation magazines had run features depicting the new high tech age of weather forecasting in Canada. In all, five employees specially trained in media relations gave twenty-five interviews before, during and after the inauguration.

Mr. Lemire said his one regret was that other regions of Canada were unable to have direct conference links with the inauguration. Several AES regions reported, however, that they were very conscious of the day since they had received detailed advance briefings on the event. Dale Henry, chief of weather services, AES Central Region said that about 18 weather office personnel in his region had been briefed on the eventual uses of the CRAY. He added that public interest had also been aroused and the local media had done several interviews on the supercomputer.

Dr. Des O'Neill, AES Regional Director, Atlantic Region, said there was a high level of interest in the CRAY among all regional employees. "It's an event of great significance when Canada moves into a position of equality with the leaders in the field of meteorological computing."

He added that everyone from WO4 staff to the director's office personnel were now more aware of the CRAY and its huge potential. There was also excellent media coverage in his region.

Despite the praise pouring in from east and west and the moving ceremonies inside the CMC building, it was business as usual as far as the output of maps and forecasts to regional weather centres was concerned. Most forecasting staff in these centres did their job without realizing anything unusual was going on at CMC and even inside the Dorval complex it was a "normal" day for many personnel. Even if many people worked a full shift, all five floors of the CMC complex did in fact become an open house, and almost everybody played some part in hosting a unique event, both for CMC and for Environment Canada as a whole.

The great day has come and gone. In the months and years ahead, AES will in a quieter way get down to the challenging but exhilarating task of making the computer deliver its promises and of providing the Canadian people with better services.

AES vector computer now a reality

The Canadian Meteorological Centre (CMC) in Montreal has now installed Canada's first supercomputer, one of the largest and fastest of its kind in the world. The $5 million a year Environment Canada acquisition will benefit a wide cross section of Canadians, not only with respect to longer range and more accurate weather forecasting, but also in such areas as newly planned seasonal climate predictions and the tracking of acid rain and other long range chemical pollutants.

Officially inaugurated February 1 by Environment Minister Charles Caccia, the CRAY 1S 1300 is a vector computer with ten million bytes of memory, calculating at a rate of over 50 million operations per second (ten times faster than its predecessor, the CYBER 176). One of the reasons such enormous speed is required is that only two hours are allotted to the computer to forecast the weather.

General view of the CMC building, Dorval, Que.

Experimental testing, based on more sophisticated mathematical modelling of the CRAY 1 is now underway. The new machine should begin meteorological operations in June of this year.

Introduction of the new supercomputer won't change things overnight, but the big machine's extra speed and power allows it to provide not only improved weather forecasts but also to have a major multi-use capability. For example the CRAY 1 will be able to evaluate climate scenarios based on increased atmospheric carbon dioxide or large-scale volcanic eruptions.

It also has the extra speed for specialized weather forecasting calculations during emergencies such as the Mississauga, Ontario train derailment or the Three Mile Island nuclear mishap. Critical questions such as determining the next downwind direction could in either of these cases have been solved by a supercomputer.

Lastly, the new vector processor will be a boon to the entire academic community since ten per cent of its time will be set aside for use by universities and other research organizations enabling them to work on their own projects.

Currently a large weather computer such as the CYBER 176 can forecast the weather up to about four days ahead. When the CRAY 1's modelling is fully upgraded, it will be able to extend the forecast range to six days. Under a six and a half year contract signed between CRAY and Environment Canada a newer, faster

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The CRAY computer was delivered by truck to the CMC some four months before inauguration day. Workmen are seen unloading it prior to installation.

CRAY X/MP supercomputer will replace the CRAY 1 at CMC in 1986. With the introduction of even more sophisticated mathematical modelling, a ten day weather forecast at least will become possible.

In order to carry out its multi-use program as planned, the supercomputer's modelling will be upgraded approximately as follows:

1985-86

- Introduction of more sophisticated model will allow improved forecasting of large scale wind patterns.
- Extension of forecast period to six day forecasts.
- Fewer two to five day temperature forecasting errors.
- Improved accuracy in severe weather forecast over 24-28 hour period.

1986-87

- Automated prediction of all weather elements for longer time periods, greater accuracy in precipitation amount predictions and improved wind forecasts.
- A big increase in the number of specific locality forecasts.

1987-88

- New global model will extend range of forecasts for seven to ten days for all of Canada.

Since no computer has the power to predict weather everywhere, certain equally spaced points are selected for which forecasts are made. The closer the points the greater the ability to forecast detailed weather conditions for a given location such as a city. The closeness of the points is referred to as resolution; the nearer the points, the greater the resolution.

In the current model the points are about 300 km apart. Thus variations in the weather over areas smaller than 300 km cannot be predicted directly by the computer.

Winter storms are about 1 500 km across and are, therefore, generally predictable. High and low pressure zones are large enough to be predicted and since weather conditions are related to these pressure patterns, meteorologists can extract useful predictions from computer-generated maps.

Unfortunately, weather conditions vary significantly over distances less than 300 km. Rain may be falling in Montreal while it is snowing in Quebec City or it may be snowing and blustery in Edmonton while it is sunny and mild with a chinook in Calgary. The new computer will permit Environment Canada to use models of higher resolution and thus improve forecasts of these smaller-scale variations.

A second drawback of current models is the fact that they exclude data from the southern hemisphere. Mixing of weather between the two hemispheres and for forecast periods of up to five days the use of data for the northern hemisphere alone does not cause much error. For longer forecasts, it will be necessary to add weather information from the southern hemisphere to the model. The new computer is capable of handling this increased workload.

Atmospheric scientists at Environment Canada are pleased with the installation of the new supercomputer. Dr. Ian Rutherford, director of Meteorological Services for the Research Branch comments, "The CRAY supercomputer will allow research to proceed on much more sophisticated mathematical models of the physics and dynamics of the atmosphere for future use in weather forecasting. Weather forecasts will become more accurate, more detailed and valid for longer periods."

Dr. George Boer, head of Environment Canada's Numerical Modelling Division (Climate) adds, "Since the climate system and variation and changes in climate are studied by making extensive general circulation models of the atmosphere and ocean and since the amount of computation involved is formidable, it certainly requires the use of a modern vector computer such as the CRAY 1."

Intriging bronze work covers the walls of the lobby of the CMC building, making an elevator ride seem like a fantasy art experience.