



CANADIAN SCIENCE AND THE OZONE LAYER

Canada has a long and active history in ozone research that dates back to the 1930s when Canadian scientists began studying the upper atmosphere as a potential aid to weather forecasting.

Under the auspices of the United Nations World Meteorological Organization, Canada has operated the World Ozone and UV Data Centre, and published Ozone Data for the World since the 1950s.

Canada began monitoring ozone levels over Toronto in the late-1950s and currently has monitoring stations at Goose Bay, Labrador; Halifax, Nova Scotia; Montreal, Quebec; Toronto, Ontario; Alert and Resolute, Northwest Territories; Churchill and Winnipeg, Manitoba; Saskatoon and Regina, Saskatchewan; Edmonton, Alberta; and Saturna Island, British Columbia.

As well, the Government of Canada has strengthened Canadian ozone-depletion research efforts. This included the establishment of a permanent High Arctic Ozone Observatory on Ellesmere Island in 1993. The Arctic Observatory is part of Canada's contribution to domestic and international ozone research. The Observatory provides an increased understanding of Arctic ozone depletion and its influence on the ozone layer over the rest of Canada. The Observatory is also intended to create partnerships among Canadian universities and the international scientific community.

In addition to the Arctic Observatory, Canada is contributing to international research as a participant in joint research programs with the United States, Japan, Europe, and Russia.

In the spring of 1992, Environment Canada launched Ozone Watch, a weekly report to provide Canadians with the most up-to-date information on the status of the ozone layer. Later that year, in response to heightened concern among Canadians about the hazards of excessive exposure to the sun, Environment Canada launched its UV Index program, which provides daily information on the intensity of



Canadian astronaut Marc Garneau with the Sunphotometer

the sun's ultraviolet rays.

In November 1993, Environment Canada released the results of a study which confirmed that the thinning of the stratospheric ozone layer in recent years has led to increases in ultraviolet (UV) levels at the earth's surface. Canada's long record of high-quality measurements of both ozone and UV contributed to the success of this study.⁸

Current research in Canada, Europe, and Australia has confirmed the importance of intermittent solar UV radiation as a risk factor for skin cancer. Studies have shown that high levels of intermittent UV-B exposure during childhood and adolescence can result in an elevated risk for malignant melanoma in later life. Canada's ozone watch and the UV index programs promote solar avoidance, especially for children.

Canadian scientists have made significant contributions to ozone research with the development of two ozone-measuring instruments: the Sunphotometer and the Brewer Ozone Spectrophotometer.

The Sunphotometer was developed by Environment

Canada scientists to measure gases and haze in the atmosphere. It was first used by Canadian astronaut Marc Garneau on his historic space flight in 1984. An updated version of the instrument flew with astronaut Steve MacLean in 1992.

The Brewer Ozone Spectrophotometer was patented in 1986 by scientists with Environment Canada's Atmospheric Environment Service, and is the most practical and accurate ozone-measuring device available. Sci-Tech, a Saskatchewan company, has manufactured over 100 units of the Brewer which are being used in about 30 countries.

In Canada there is concern about the cumulative effects of increased UV-B radiation and the linkages with other atmospheric issues such as, climate change, acid rain, biodiversity, and toxic chemicals. To better understand the interaction and relative importance of atmospheric stressors, studies of UV-B impacts on Canadian ecosystems are integrated with existing ecological research, monitoring, and assessment programs. The impact of increased UV radiation on important species in agricultural, forestry, and freshwater and marine ecosystems, as well as certain materials, are being studied.