SCISAT: Canada's scientific satellite mission

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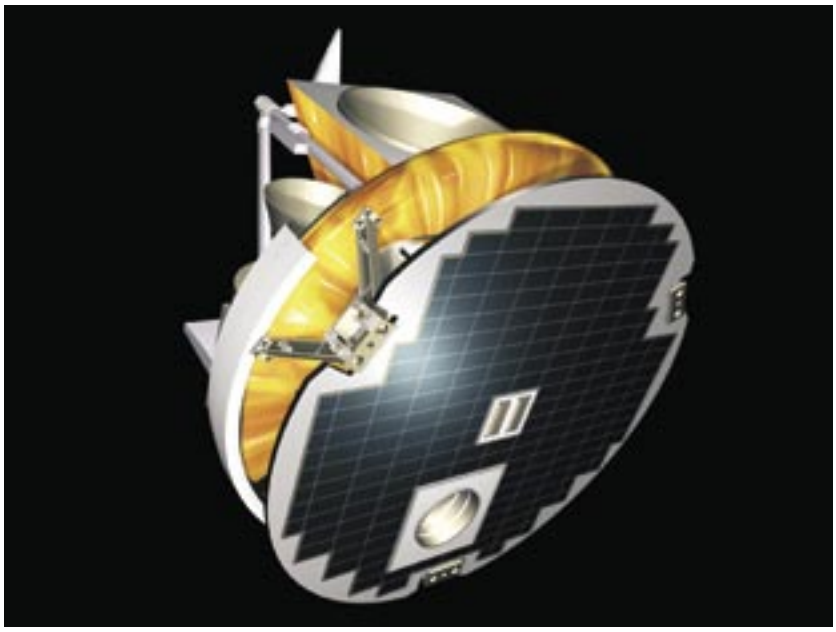
From dawn to twilight

In its 650-km-high polar orbit, SCISAT circles the Earth 15 times a day, experiencing 15 sunrises and sunsets. Its scientific instruments—a Fourier-transform spectrometer and the MAESTRO instrument—use sunlight to identify the gases and particles in the Earth's middle atmosphere. Both instruments are designed to gather information on the chemical processes occurring in the ozone layer, approximately 8 km to 50 km above the Earth's surface. The orbit of SCISAT has been tuned to maximize the capture of scientific data over Canada and the Arctic region. This data will help us better understand ozone layer depletion and determine whether measures such as the Montreal Protocol adopted in 1987 are producing tangible results.



Launched in August 2003 by a Pegasus rocket near Lompock, California, SCISAT is the first atmospheric research satellite developed and flown by Canada since ISIS-2 in the early 1970s. (Illustration: Bristol Aerospace, Canadian Space Agency)

SCISAT is tiny compared to giant satellites such as RADARSAT-1: it is 112 cm in diameter, 104 cm high, and weighs only 150 kg. Though small, this satellite is very powerful. Its size contributes to the cost-efficiency of the mission and, as such, is a model for future small satellite missions.

Mission Science Objectives

The principal goal of the Atmospheric Chemistry Experiment (ACE) mission is to investigate the chemical processes that are involved in the distribution of ozone in the atmosphere. The ACE mission will work in conjunction with other instruments and missions planned by NASA, the European Space Agency, and other international partners over the next decade to gain a better understanding of the chemistry and dynamics of the atmosphere that affect the Earth's protective ozone layer. The analysis of the large amount of data that will be collected will lead to a more informed assessment of international environmental policies such as the Montreal Protocol for the elimination of chlorofluorocarbons (CFCs).

The overall objective of the ACE mission is to improve our understanding of the depletion of the ozone layer, paying close attention to what is happening over Canada and the Arctic. The measurements obtained by the ACE-FTS and MAESTRO instruments will be combined with data gathered by ground-based, balloon-based and other space-based projects in order to obtain the best possible information to predict future trends relating to the ozone layer and its depletion.

The Government of Canada is working with the international scientific community to determine the extent and causes of atmospheric changes that threaten human health and safety. Sound scientific data is essential to finding effective solutions to problems such as depletion of the ozone layer and climate change. Environment Canada's studies of the ozone layer, which began over 50 years ago, support a worldwide research and atmospheric monitoring program. And through the leadership of the Canadian Space Agency, Canada is also involved in research studying the ozone layer from space.

The Mission Scientist is Dr. Peter Bernath from the Department of Chemistry at the University of Waterloo. He heads a Science Team that includes Canadian scientists as well as scientists from the United States, Belgium, Japan, France and Sweden. Participating organizations include Trent University, University of Toronto, University of Saskatchewan, University of Waterloo, University of Western Ontario, York University, Université Laval, University of Denver, Nagoya University (Japan), Belgian

Federal Office for Scientific, Technical and Cultural Affairs, Free University of Brussels (Belgium), Swedish Environment Research Institute, Centre National d'Études Spatiales (CNES/France), the Meteorological Service of Canada (Environment Canada), ITT Industries (US), and NASA Langley. NASA's Earth Sciences Enterprise and Institut d'Aéronomie Spatiale de Belgique are also Contributing Partners.

Total mass:	150 kg
Total power usage:	70 W
Powered by:	Single solar panel
Total memory:	1.5 Gigabyte
Spacecraft contractor:	Bristol Aerospace – Winnipeg, Manitoba
Scientific Payload:	ACE-FTS (ABB Bomem Ltd.) MAESTRO (Meteorological Service of Canada, University of Toronto, EMS Technologies)
Orbit:	650 km above the Earth

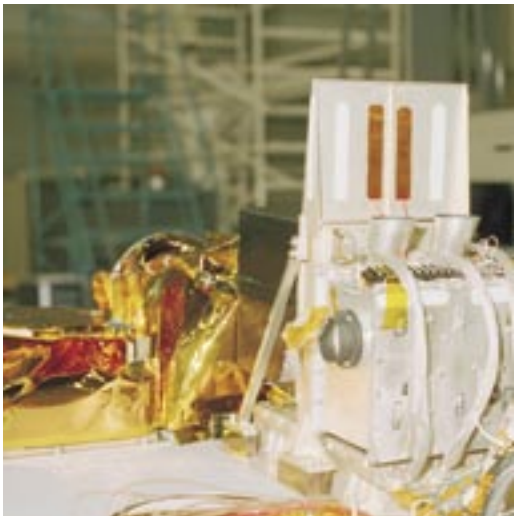
Canada's important role in the study of the ozone

The Canadian Space Agency, both in the past and now with the ACE-FTS and the MAESTRO instruments, continues to provide opportunities for Canadian involvement in space-based ozone research. Canadian scientists first started measuring ozone levels over Canada in the 1930s. In the 1980s this continued research led to the discovery that the ozone layer over Canada was being depleted. Scientists have found indications that over the past 20 years the total average ozone level over Canada has declined by six per cent. Of additional concern is the severe 20-40 per cent ozone depletion observed in the Arctic in early spring.

Maintaining and enhancing Canada's expertise in ozone research is crucial. Canada's northern geography makes it one of the most vulnerable countries in the world when it comes to the effects of ozone depletion in the Arctic region. Since the ozone layer is responsible for protecting us from harmful UV-B rays from the sun, any reduction in the layer is cause for alarm. Increased exposure to UV-B rays results in higher numbers of cases of skin cancer, eye damage and weakened immune systems.

Advances in our understanding of the mechanisms responsible for ozone losses will tell us whether an ozone "hole", such as the one found in Antarctica, is likely to occur above Canada in the future. More importantly, continued research, such as that which will be carried out on the ACE mission, will also help us identify how the ozone layer can be restored and preserved, thus protecting the health and well-being of all Canadians.

The Fourier Transform Spectrometer is the primary instrument selected for the ACE mission onboard the SCISAT satellite. This picture shows the input optics side of the instrument. The ACE-FTS was built by ABB Bomem, located in Quebec City. (Photo: Canadian Space Agency, ABB Bomem)



The MAESTRO instrument is one of two major instruments part of the Canadian Space Agency's SCISAT mission. It was built by by Toronto-based Meteorological Service of Canada, the University of Toronto, and EMS Technologies of Ottawa. (Photo: Canadian Space Agency)

About the Canadian Space Agency

Established in 1989, the Canadian Space Agency is responsible for coordinating all civil, space-related policies and programs related to science and technology research, industrial development, and international cooperation on behalf of the Government of Canada. The Canadian Space Agency directs its resources and activities through four key thrusts: Earth Observation, Space Science and Exploration, Satellite Communications, and Space Awareness and Learning. With the overall responsibility for advancing Canada's space policy and programs, the Canadian Space Agency leverages international cooperation to champion world-class scientific research and industrial development for the benefit of humanity.