

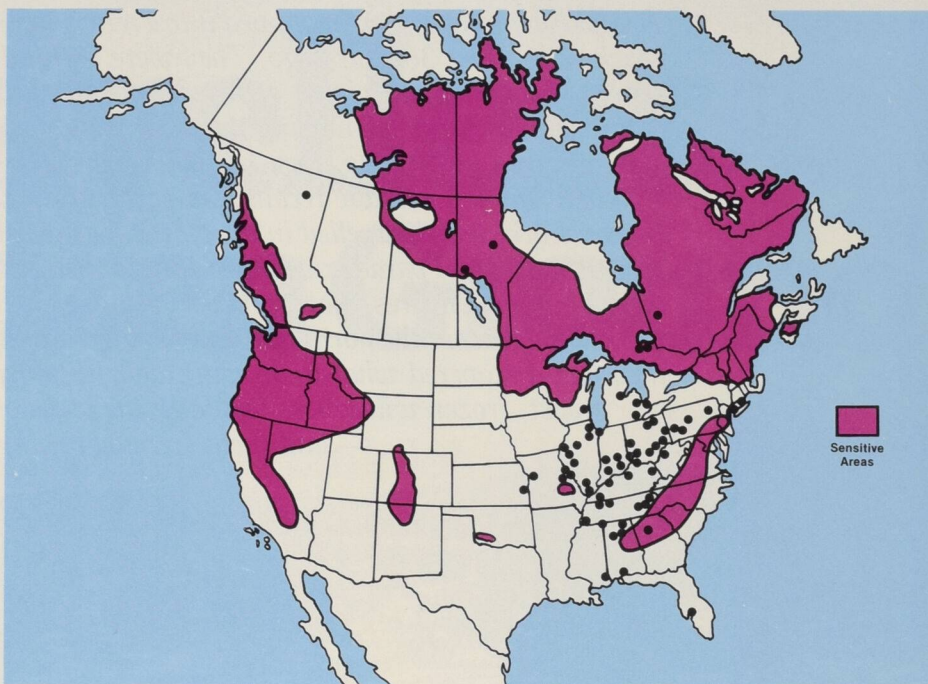
sensation of processes that go on in the atmosphere. It can also be used over shorter time periods than other models, and scientists hope to use it to look at individual acid deposition episodes.

The third thrust of atmospheric work, the study of chemical processes, is the one "where we have to choose the areas of greatest need carefully and combine these choices with our available resources, because it is here that we are most limited," explains Whelpdale.

CAPTEX is the acronym for the Cross-Appalachian Tracer Experiment, a large-scale project that uses a unique atmospheric tracer to follow transport and dispersion over distances ranging up to hundreds and thousands of kilometres. The tracer used in this joint Canada-U.S. project is a compound known as PMCH, perfluoro-monomethyl-cyclohexane, which doesn't react or deposit in the atmosphere. It is non-toxic, does not occur in the natural background, and can be detected in extremely small quantities. During the fall of 1983, there were seven releases: five at Columbus, Ohio, and two at Sudbury, Ontario. Altogether, more than 4600 samples were taken from the ground and in the air, between 300 and 1100 km from the release site.

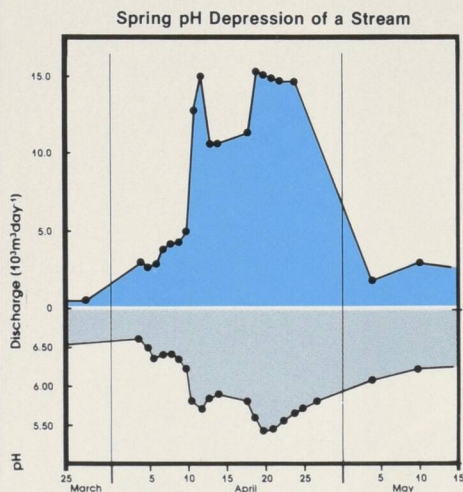
"We don't know a great deal about what goes on inside clouds in terms of chemistry, nor how chemistry and cloud dynamics relate," says Doug Whelpdale. For several years, AES has used two aircraft from NRC's National Aeronautical Establishment to make physical and chemical measurements below, in, and above clouds. A major field study took place this winter (1983-84) using the North Bay, Ontario, airport as a base for making measurements of clean air from the North and more polluted air from the South over Algonquin Park.

Another program that will add to our knowledge of the acid rain phenomenon is called the "Western Atlantic Ocean Experiment," a cooperative venture involving AES and the U.S. National Oceanographic and Atmospheric Administration as well as NASA and the Universities of Virginia and Delaware. Its goal is to look at the North American problem in a hemispheric context, by measur-



Certain areas in North America are deficient in natural buffers and are therefore particularly sensitive to the impact of acid rain. Shown in colour on this map, these areas include much of Canada's important forest and fishing zones. The black dots indicate main sources of sulphur dioxide emissions.

ing the amount of pollutant material that leaves North America and moves eastward, and by measuring how much goes into the ocean. Scientists including Whelpdale will make measurements of air chemistry and precipitation composition at Bermuda and on board ship in the Western Atlantic, supplemented by some aircraft measurements. This work may indicate whether North American pollution reaches Europe.



Springtime runoff of melting snow brings a fresh infusion of acidic materials into streams and lakes, sharply lowering pH for days or even weeks. This is a crucial period for much of the aquatic life present in the watercourses: eggs are being deposited and hatchlings are beginning life in the face of this chemical shock.

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## Historical Perspective

Scientists agree that their work would be easier if there were more historical data to help in assessing the relative health of the environment and to make prognoses. There are, however, several indirect ways of deriving information on the environment in past decades. Examination of sediment cores from lake bottoms, of the chemical composition of tree rings, and of core samples from glaciers provides a year-by-year record of the past that scientists can "read." Information from these sources indicates clearly that there has been a substantial change in the chemistry of the aquatic and terrestrial environment since about 1920. ☾

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