

Sable Island Ozone Profiling Project

During summer 2004, Sable Island Preservation Trust (SIPT) participated in an international research project to measure and describe inflow and outflow of pollution over North America, with an eye to improving understanding of factors shaping regional air quality in eastern North America, Western Europe and in remote regions of the North Atlantic. The International Consortium for Atmospheric Research on Transport and Transformation (ICART²) combined the efforts of many other institutions and governmental agencies in this joint regional air quality and climate change study.

SIPT staff contributed to this project by collecting atmospheric profiles of ozone concentrations, temperature, humidity, wind speed and direction, with funding by the Atlantic Coastal Action Program (ACAP) and in-kind contributions from Environment Canada and the Canadian Coast Guard.

Air pollution, modified by atmospheric chemical reactions, can follow well-known pathways, cross international boundaries and impact downwind locales significantly. In the lower atmosphere, ozone is produced by photochemical reactions, and poses direct health hazards. In the upper stratosphere, ozone is produced through interactions of ultraviolet light with oxygen molecules and has the beneficial effect of protecting organisms from UV.

Atmospheric profiles measured ozone concentrations in a broad swath from the southern US to Atlantic Canada, with additional 'upwind' sites in Western North America. These profiles were taken by radiosondes that transmitted meteorological data back to ground equipment located at the Sable Island station. The radiosondes were carried aloft by 2 meter diameter balloons filled with hydrogen gas. This equipment routinely ascends to altitudes of more than 40 kilometers in summer. Of 38 ascents launched from the Sable Island station each evening, 33 were successful.

Between July 1st and August 15th, 2004, almost 300 observations were made across twelve sites. These observations were disseminated quickly and computer models used the data to direct additional measurements from aircraft in the near real-time. A large amount of data was collected by the combined network of sites together with aircraft and satellite observations representing thousands of sites simultaneously collecting weather data.

Analysis to date characterizes the summer of 2004 in Ontario as unusual, due to a persistent low pressure system. Temperature inversions brought ozone-laden air from the upper atmosphere to lower elevations, and southerly winds, fog, and northerly pollution flow contrasted with the characteristic hazy, stagnant, and warm conditions of July and August. Further data analysis, reporting and project summary are in progress.

Understanding transport and transformation of pollutants in air masses over North America crossing the Atlantic Ocean and Europe will take many more years of study and analysis. For further information on the project, see <http://www.al.noaa.gov/ICARTT/> or contact the Sable Trust office at gleblanc@sabletrust.ns.ca.