The 7th Annual Harold I. Schiff Lecture
Faculty of Pure and Applied Science

Presented by:
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on:

Secrets about atmospheric chemistry and global change discovered in polar ice cores

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3 p.m.

Senate Chamber, North 940, Ross Bldg.
York University

Abstract: Overleaf

Organized by the York Centre for Atmospheric Chemistry
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Abstract

Man's activities have a serious impact on climate and on the natural composition of the atmosphere. Information recorded in polar ice cores over the last several hundred millennia has demonstrated to be invaluable to studies aimed at understanding the pre-industrial environmental system and anticipating the future evolution of the atmosphere.

This talk will be limited to data concerning present climatic conditions, i.e., the last two

millennia and glacial records of compounds linked to human activities.

First of all, it will examine what and how atmospheric parameters are recorded. The isotopic composition of the H2O (ice) lattice is a reliable paleothermometer. Ambient air samples are encapsulated and stored in the ice bubbles by relatively simple processes but the interpretation of the chemical composition of deposited snow in terms of past atmospheric composition (trace gases, aerosol) is more intricate.

Arctic ice, in particular the Greenland ice sheet, has been studied extensively during the last decades. At Summit (central Greenland), American and European teams have recovered and analysed several shallow ice cores. On the basis of these studies, the development of human, agricultural and industrial activities in the past and the corresponding increase of northern hemisphere atmospheric pollution are now well documented. The Antarctic atmosphere is not directly affected by polluted air masses but Antarctic ice records are of great value for documenting the global trends of long lived atmospheric trace species, in particular greenhouse gases.

Results about gaseous and aerosolic species will be presented. CO2, CH4, N2O, CO concentration trends from Greenland and Antarctic ice cores will be shown. Depth profiles obtained in Greenland for major pollutants like sulfate and nitrate will be commented, in particular to separate natural and antropogenic contributions. The impact of biomass burning at high latitudes is assessed by using ammonium, carboxylic acids and carbonaceous species data. Trace metal deposition exhibits obviously strong increases in the XXth century, but an earlier long-range pollution from Europe has also detected in Greenland ice cores. In addition to the determination of concentrations, it will be shown how, in some cases, secondary measurements can improve the identification of pollutant sources. Artefacts which might affect some glaciological records will be discussed.