



## Environment and Sustainability Northern Circumpolar Soil Atlas

### Introduction

The permafrost regions of the world are occupied by CRYOSOLS. These regions are at high latitudes and also at high elevations which are remote or uncomfortable for people to live. The marginal conditions of the CRYOSOLS formation make them a very sensitive to climate warming and human-induced impacts. The CRYOSOLS cover about 25% of the world's surface and have physical, biological, and chemical properties different from other soils. The knowledge on CRYOSOLS and on the effect of permafrost on soil formation is insufficient.

The international scientific community decided to accord global efforts to improve knowledge on CRYOSOLS within the International Polar Year 2008. To meet this challenge, the European Commission's Joint Research Centre initiated a compilation of the Atlas, which will contain a series of maps showing the variation of soil properties in a circumpolar context, including soil maps and descriptions of the major soil ecological functioning and use.

The Atlas will be produced through the elaboration of a harmonized soil database for the northern circumpolar area.

The atlas will be an international collaboration of scientists from all northern latitude countries coordinated by the JRC EC (Ispra, Italy).

Frost affects features of soil and landscape. Soil scientists can recognize frost affects widely spread in warm climates and read the history of the Earth.



Photos provided by Charles Tarnocai (Canada)

Frost cracks the soil on polygons, which are common in Arctic.

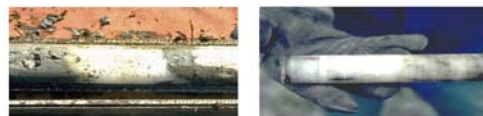


*Higher left:* Nonsorted polygons. The higher vegetation cover in the polygonal trench because of the higher moisture content of the soils. High Arctic, Cornwallis Island, Nunavut, Canada.

*Lower left:* Low-centre lowland polygons. The shallow water cover on the centres and the slightly elevated portion along the ice wedges. High Arctic, Bathurst Island, Nunavut, Canada.

*Below:* High-centre lowland polygons. The elevated centres compared to the ice-wedge trenches. Mackenzie River Delta area, Northwest Territories, Canada.

Soil scientists sample frozen soils to understand the history and forecast the future of the Planet under climate warming



Core samples from frozen soil showing ice lenses (left) approximately 10 cm thick and a pure ice layer (right).

CRYOSOLS contain a mass of organic matter (brown color). This organic matter expects decaying in the future warmer climate releasing CO<sub>2</sub> and raising the concentration of Greenhouse Gases in the atmosphere.



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