

# **Snow geochemistry – a new environment friendly exploration method in the northern areas**

Pertti Sarala<sup>1,2</sup> and Anne Taivalkoski<sup>1</sup>

<sup>1</sup>Geological Survey of Finland, P.O. Box 77, FI-96101 Rovaniemi, FINLAND

<sup>2</sup>Oulu Mining School, P.O. Box 3000, FI-90014 University of Oulu, FINLAND

E-mail: pertti.sarala@gtk.fi, anne.taivalkoski@gtk.fi

Snow covers the landscape several months each year in the Northern Hemisphere and other cold areas. It increases the interest to use snow as a sampling media for mineral exploration. For example, in southern Fennoscandia the snow cover exists one to three months, but in the northern parts up to seven months. Snowing periods and the snow properties are constant in a regional scale, which gives a good foundation for large and comparable geochemical exploration. Snow sampling is easy and quick, and it does not cause any environmental impacts.

Although snow is composed of water coming from atmosphere, it includes both local and long-distance components like dust, metal ions, hydrocarbons and even mineral particles. The lowest part of snow cover gives the most stable sampling media because of the longest deposition history and the coverage of the upper snow layers. In addition, the lowest layer is in contact with the ground and is influenced by the gases and heat coming from the underlying soil and bedrock.

Soil gasses, originating in the bedrock and travelling through the sediment cover, accumulate into top soil and the bottom layer of snow. There are two ways to study a geochemical signal of snow: hydrocarbons and metal ions. The first ones can be determined using the Soil Gas Hydrocarbon (SGH) method, which is based on the classification of about 160 hydrocarbons into indicative groups for certain mineralization types. The second way is a direct analysis of the element concentrations in snow using high resolution ICP-MS. Certain gasses transport elements with them and these elements give a signature of the underlying buried mineralizations. Those are possible to detect with modern assay methods (ppt levels of concentration). There are several examples of good signature of the snow geochemistry in relation with various mineralization types in Finland.