

**4.7.P02**

## **Large scale stream sediment chemical distribution patterns reflecting crustal structure in West Greenland**

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West Greenland has been covered with stream sediment samples collected systematically at a density of one sample per *c.* 30 km<sup>2</sup>. Calibrated analytical data comprise total concentrations of major element oxides and 33 trace elements mainly determined by X-ray fluorescence spectrometry and neutron activation analysis. Distribution patterns displayed by contoured grid images of single and grouped elements as well as of multi-element maps clearly reflect recognised as well as unrecognised variations in chemical properties of tectono-stratigraphical units of a 1500 km long section of Precambrian crust in West Greenland.

Low levels of LILEs illustrate that the southern part of Archaean crust, which is in granulite facies metamorphic grade, represent mid- to low crustal level, except for the early Archaean Godthåbsfjord region. The northern part of the Archaean has high levels of lithophile elements in agreement with predominance of amphibolite and greenschist facies rocks. High CaO and Na<sub>2</sub>O relative to K<sub>2</sub>O reflect that the mid- to low crustal environment is dominated by plagioclase-rich lithologies (tonalites). A Rb-Sr-Ba map suggests that the gneiss complexes may be further subdivided.

Archaean mafic volcanic rocks are reflected by high Ni and Cr, while their Palaeoproterozoic counterparts are distinguished by elevated Cu and Ti. Alkaline and carbonatitic magmatism has affected several areas within the Precambrian basement as outlined by Eu-Nb-P.

The stream sediment data of West Greenland has given an overview of continent-scale lithochemical variation that has not been possible to accomplish by means of existing irregularly distributed rock chemical data.

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## **Regional geochemical maps for risk assessors**

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Systematic regional geochemical mapping by the Federal government in Canada commenced in 1975 with the initial motivation being uranium mineral exploration. Stream and centre-bottom lake sediment surveys were undertaken in partnership with Provincial and Territorial agencies responsible for minerals and mining at an approximate density of 1 site per 13 km<sup>2</sup> in areas considered to have increased uranium potential. The georeferenced geochemical data were, and still are, released to the public within 1 year to 18 months of sample collection. After 1978 the program was broadened to include all metallic mineral resources and named the National Geochemical Reconnaissance (NGR). To date, almost 200,000 lake and stream sediment samples have been collected following consistent field and analytical protocols, representing some 2.6 million km<sup>2</sup> of Canada's 9.7 million km<sup>2</sup> landmass.

Since the early 1990s the Geological Survey of Canada has been called upon for geochemical data to support environmental risk assessments carried out by Canadian government agencies. Data are provided to the risk assessors at their request. To meet the growing need and use of NGR data by risk assessors and to increase public awareness of the characteristics of Canada's surface environment a series of maps, with tables and text, are being prepared that will be available through Canada's National Atlas website. In addition to traditional contoured geochemical maps the data are being presented as maps in the ecological and drainage basin spatial frameworks used by the risk assessors. In addition, summary statistical tables for NGR data on the basis of the different spatial frameworks will be available so that users can import the geochemical information into their own GIS facilities to meet their own particular needs. Text accompanying the maps will be aimed at the high school and general university level, with the objective of informing Canadians about their surface environment so that they can participate meaningfully in national debate concerning environmental issues. Examples of the new map products and tables will be presented.