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Geochemical mapping of Spitsbergen in the High Arctic using overbank sediments of deltas and floodplains

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Abstract Overbank sediment from deltas and floodplains was sampled to obtain geochemical maps of Spitsbergen, in the Svalbard Archipelago in the high Arctic. The purpose of the sampling programme was to produce geochemical maps that can be used for both mineral prospecting and environmental research. The overall aim is to detect anomalies where geochemical element abundances are higher than normal. It is concluded that overbank sediment is a representative sampling medium as it integrates sediments delivered from a number of different sources during floods. A review of sediment yield measurements show that yields from glacier-fed rivers range from 160–2900 t/km^2 year whereas yields of 28–83 t/km^2 year have been measured in the non-glacial areas. Sandur deltas and river fans are the dominating depositional landforms. Overbank sediment samples were collected from 650 locations and analysed for the content of 50 elements (total and acid soluble). The geochemical data are now available for public use and are actively used in mineral exploration. High concentrations of Au were discovered on the northwestern side of Spitsbergen and a gold deposit was discovered and drilled. The natural content and distribution of elements like arsenic, cadmium, copper, chromium, lead, mercury, nickel and zinc are documented for environmental purposes.

Key words sediment load; sediment sources; deltas; geochemical elements; overbank sediment