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Modern Glacial Concepts Applied to Indicator Mineral Dispersal Trains

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Glacial erosion, transport, and deposition has formed trains or fans of metal-rich debris down-ice from mineral deposits that are much larger exploration targets than their bedrock sources. Dispersal patterns may be the result of one or more phases of ice flow and vary in length from a few tens of meters to >100 km. Recognizing the complexity of continental ice sheets and ice-sheet dynamics is essential to understand the variation in glacial dispersal patterns and successfully searching for mineralized sources. Boulder tracing and till geochemistry have been widely used as exploration tools in glaciated terrain for more than 60 years. In the past 25 years, indicator mineral methods applied to till have become complementary key exploration tools. Geochemical and isotopic studies of recovered heavy minerals can then be used to provide information on sources of the grains, deposit types and potentially a vector towards mineralization. Indicator mineral chemistry has evolved considerably since the garnet classifications for diamondiferous kimberlite exploration and is now applied to a variety of mineral deposit types.