Metallogenic principles as applied to the tectonic evolution of Newfoundland

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In its simplest definition, metallogeny has been described as the study of the factors (especially tectonic or large scale) that control the distribution of mineral deposits in space and time. In an orogenic belt such as the Appalachian Orogen in Newfoundland, the temporal and spatial distributions of mineral deposits involve variable tectonic regimes related by large scale plate tectonic processes. As a corollary, because these tectonic processes define the mineralization style, recognition of hither-to-fore unknown styles of mineralization can lead to the definition of new tectonic paradigms. It has been postulated by others that there are three main controls on the evolution of mineral deposits, viz.: (1) evolution of the hydrosphere and atmosphere, (2) decreasing global heat flow, and (3) large scale tectonic trends. Points (1) and (2) suggest that certain types of mineral deposits are restricted to specific periods in Earth history. In the case of the Appalachian Orogen in Newfoundland, the only major factor affecting mineral deposit formation is (3) long-term tectonic trends and these trends actually determine which different styles of mineralization develop as related to specific periods in the evolution of the orogen. These trends themselves are cyclic (i.e., are reflections of the Wilson cycle). Metallogeny in Newfoundland has typically been thought of as being pre-accretional, accretional, and post-accretional with respect to the Appalachian Orogen. In the past decade, however, earlier periods of mineralization related to metallogenic cycles within bounding Precambrian blocks, in particular the Gondwanan margin (i.e., pre-Appalachian Orogen), have been recognized extending the perceived economic potential of the island. Delineation of previously unknown styles of mineralization within the orogen itself has also led to new tectonic models for the orogen.