



HAL
open science

Insights into the gold metallogeny of the Meguma terrane of Nova Scotia from LA-ICP-MS arsenopyrite geochemistry

Daniel J Kontak, Blandine Gourcerol, Joe Petrus, Phil C Thurston

► To cite this version:

Daniel J Kontak, Blandine Gourcerol, Joe Petrus, Phil C Thurston. Insights into the gold metallogeny of the Meguma terrane of Nova Scotia from LA-ICP-MS arsenopyrite geochemistry. 44th Colloquium and Annual Meeting - The Atlantic Geoscience Society (AGS), Feb 2018, Truro, Canada. pp.081-132, 10.4138/atlgeol.2018.003 . hal-02284257

HAL Id: hal-02284257

<https://brgm.hal.science/hal-02284257>

Submitted on 11 Sep 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Insights into the gold metallogeny of the Meguma terrane of Nova Scotia from LA-ICP-MS arsenopyrite geochemistry

DANIEL J. KONTAK¹, BLANDINE GOURCEROL^{1,2}, JOE PETRUS¹, AND PHIL C. THURSTON¹

1. Harquail School of Earth Sciences, Laurentian University, Sudbury, ON, P3E 2C6, Canada <dkontak@laurentian.ca,>2. Bureau de Recherches Géologiques et Minières (BRGM), F-45060, Orléans, France

The time-space distribution of ore deposits in regards to the evolution of geological terranes is known as metallogeny. In the case of the Phanerozoic Meguma terrane of southern Nova Scotia, the origin of its classic slate-belt hosted orogenic gold systems (i.e., Meguma gold deposits) has been the focus of study for well over a century. Despite considerable effort involving many sub-disciplines (e.g., field studies, structural analysis, litho-geochemistry, geochronology), many unanswered questions remain about these deposits, such as fluid and metal reservoirs, single or multiple ore-forming events, and nature of the mineralization. The advent of in situ LA-ICP-MS analysis has provided the means to assess the geochemical evolution of single minerals using a large elemental database at a spatial resolution (10s μm) not available before. Here we apply a novel approach to processing and interpreting such LA data generated from mapping arsenopyrite from eight gold deposits across the central and eastern Meguma terrane (i.e., the Ovens to Upper Seal Harbour) to further investigate its gold metallogeny. Using our approach, we first establish an elemental paragenesis for the mineralization in each deposit, assess the number of gold events and their nature (i.e., refractory vs non-refractory), characterize elemental associations and elemental abundances through time, and assess elemental reservoirs (e.g., Co, Ni) using a new set of discriminant diagrams. The results document a similar geochemical fingerprint for gold mineralization across the terrane based on a similar elemental paragenesis in deposits, but also indicates several gold events. Using Au-Ag binary plots with false-color coding to highlight elemental associations, the earliest gold event (>10 ppm Au; Au:Ag=10) is identified by a Co-Ni-Mo-Sb-Se association which equates spatially to primary growth zones in arsenopyrite. In contrast, a second event, characterized by an Al-Ti-V-Mn element association, Au:Ag >100 , and spatially associated with late fractures, is attributed to remobilization and upgrading of earlier refractory gold. A third event, characterized by a Bi-Pb-Cd-In-Ag elemental association, predates the second gold event and is also reflected in archived whole-rock litho-geochemical data. Collectively these results indicate a protracted history of precious-metal mineralization in all deposits from an early refractory event to subsequent remobilization events, which may be similar or separate temporally. In addition, the Co-Ni data may reflect interaction of ore-forming fluids with mafic rocks at depth. This study demonstrates therefore the important application of our approach to long standing problems in gold metallogeny, such as the Meguma terrane and also elsewhere.