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THE OSNACA PROJECT

Carl Brauhart

Multi-element geochemical analysis is one of the most powerful tools available to an exploration geologist. Yet, it is a tool that many skillful and seasoned practitioners struggle with. To help exploration geologists, in particular, deal with complex geochemical data and learn more about the geochemistry of the ore deposits that they search so hard for, a new publicly available resource known as the OSNACA Project has been initiated (OSNACA stands for 'ore samples normalised to average crustal abundance').

The OSNACA Project was deliberately established as an open-source project to maximise the exchange of ideas between academia and industry. One key advantage that it has is that variations in ore-element signature can be mapped either for a single ore deposit, a whole ore deposit class, or across all ore deposit classes. Samples are analysed for the same suite of 63 elements at Bureau Veritas – Ultratrace in Perth (Australia) at greatly reduced prices. Analytical methods have been selected to provide the best detection limits for ore and pathfinder elements, but high-quality data are also generated for all major elements and a wide selection of lithogeochemical elements, including a full rare earth element suite. Metadata include sample location, sample description, ore minerals, ore textures and deposit type.

The OSNACA Project began with the analysis of samples selected from the collection by Professor Steffen Hagemann at the University of Western Australia (UWA). This collection included over 200 samples of orogenic Au, volcanic-hosted massive sulfide, porphyry Cu, epithermal Au–Ag, Carlin Au, iron oxide gold copper, Fe deposits, and other mineralisation styles. Dr Eric Grunsky, formerly with the Canadian Geological Survey, joined the OSNACA Project early on and provided valuable assistance in the statistical treatment of the data. The OSNACA collection now contains 683 samples donated from all over the world, including samples from every major ore deposit class. There is a reference collection of hand specimens and laboratory pulps stored at UWA, and the data are available online at www.cet.edu.au/research-projects/special-projects/projects/osnaca-ore-samples-normalised-to-average-crustal-abundance.

The 'OSNACA transform' is applied to 24 ore and pathfinder elements that define most ore deposit signatures. This transform is described in full on the Centre for Exploration Targeting (CET) website, but the key aspects are log-normalisation of each element to average crustal abundance followed by scaling each sample to a fixed distance from the origin. The elements to which this transform are applied are Fe, Co, Ni, Re, Pd, Pt, Cu, Ag, Au, Zn, Cd, In, Pb, Tl, Hg, As, Sb, Bi, Te, Mo, W, Sn, La, U. The resultant data assists in the quantitative identification of mineralization styles at the early stages of exploration and allow for informed adjustments in exploration strategies.

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RECENT ARTICLE PUBLISHED IN *EXPLORE*

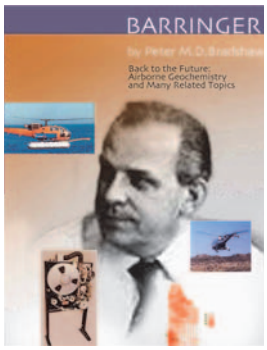
McClenaghan MB and 5 coauthors (2016) Overview of indicator mineral research at the Geological Survey of Canada – An update. EXPLORE, 170 (March 2016)

In the glaciated terrain of Canada, indicator mineral methods have been successfully applied to gold and diamond exploration for more than 30 years. The Geological Survey of Canada (GSC) has an ongoing indicator mineral research program to investigate indicator mineral methods for other deposit types. This research is supported by the GSC's Targeted Geoscience Initiative (TGI) and Geo-mapping for Energy and Minerals (GEM) programs. GSC research since 2008 has focused on the following deposit types: porphyry Cu, magmatic Ni–Cu–PGE, intrusion-hosted Sn and W, volcanogenic massive sulphides, Mississippi Valley Type Pb–Zn, basement-hosted U, and rare metals. This article describes some of the highlights of these research activities.

To view the complete article please visit the AAG web site: https://www.appliedgeochemists.org/index.php/publications/explore-newsletter.

BARRINGER – THE BOOK

Exploration, Remote Sensing, Environment, Analysis, Security



The 1960s and '70s were marked by an explosion in mineral exploration and remote sensing technology. A leader throughout this period was Dr. Anthony (Tony) Barringer and his team at Barringer Research Ltd (BRL). The highly successful airborne geophysical methods created at BRL are well known, whereas BRL's contributions to exploration geochemistry and many other fields are not. This book documents the many advances in geochemical theory – as well as the ground, airborne and remote sensing techniques and other analytical methods – that were conceived and developed under the leadership of Tony Barringer. Innovative concepts backed by pioneering research funded by BRL on the movement of metals in rock, soil and vegetation remain important areas of investigation. Tony Barringer's ability to bring together a diverse team, including geologists, geochemists and physicists together with electrical, optical and aeronautical engineers, under one roof, to provide leadership, and offer a highly stimulating environment and financial support, was truly remarkable. This led to ground-breaking advances in exploration geochemistry as applied to minerals and oil and gas; in environmental monitoring from the ground, aircraft and space; and in developing civilian and armed forces security. The underlying scientific principles for many of the inventions, now upgraded with modern electronics, are still considered state of the art. One of the many inventions from the BRL "incubator" described in this book is Ionscan, the drug and explosive screening device used in most airports today, which was conceived and developed by BRL in conjunction with technology for the detection of mineral deposits.

For information on pricing and to order a copy, please contact the AAG at office@appliedgeochemists.org.