



16th SGA BIENNIAL MEETING KEYNOTE SPEAKER



Keenan Jennings

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Mines and mineralisation – How a quality gap illustrates the need to enhance search spaces

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Since the mid-18th Century, geology has grown in prominence as a result of an acceleration in industrial development fuelling societal demand for metals, building materials, and hydrocarbons. Mineral exploration has changed radically in response to this demand, with keen observation, remote sensing tools, technological break-throughs, innovation, and – most recently – the emergence of data sciences all playing feature roles.

We describe the history of minerals exploration, evolving from a purely observational science at the turn of the 20th Century, to reliance on technology in the 1950's (detection-driven), to reliance on models in the 1970's (prediction-driven). We now are increasingly systems-driven, supported by new advances in data science to ingest and process ever more data.

However, through this journey, we have become very good at finding mineralisation, but increasingly bad at finding high-quality ore that is developed into mines. By combining discovery curves for metal inventory with deposit development, we can observe a significant quality gap between known mineralisation and mined deposits.

The challenge is to close this gap. Doing so in an holistic and integrative manner will be key; pursuit of data science without thoughtful hypotheses and a mineral systems framework will likely not deliver requisite results. We need disruptive thinking to open new search spaces. Defining broader elements of mineral systems and identifying mappable proxies that represent these features will increase the probability of success. Implementing research programs focused on finding, at the earliest point in the discovery history, credible, reliable, and repeatable indicators of high-grade ore will accelerate discovery of orebodies rather than discovery of mineralisation. Finally, leveraging the legacy data generated over the last 100 years of minerals exploration, assisted by machine learning, may also create new insights on search spaces.



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Keenan Jennings is a geologist with more than 30 years' experience in international management in the natural resources sector across multiple commodities, living and working in five continents.

A graduate from the University of Auckland (MSc, 1991) and Deakin University (MBA, 2004), Keenan started his career in Australia, prior to a move to Latin America in 1994. This led to an extended period of work with Anglo American across the continent covering copper, iron ore, gold, zinc, lead, and industrial minerals evaluation.

In 2007, Keenan joined Rio Tinto as Exploration Manager for China and Mongolia, leading the discovery and sale of a coal asset in Western Mongolia. In late 2009, he was given responsibility for establishing the open pit and underground geology teams at the world-class Oyu Tolgoi project. On commissioning of the Southern Oyu open pit in late 2012, Keenan returned to London and to Anglo American.

In 2014, he started his own UK-based consultancy, before returning to South America in 2016 to head up a private start-up focused on the application of machine learning to mineral exploration. He joined BHP in 2018 and assumed the Vice Presidency of Metals Exploration in July 2020.

Keenan is a Fellow of the Society of Economic Geologists, a Chartered Geologist, and a Member of the Society for Geology Applied to Mineral Deposits. He currently resides in Toronto, Canada.
