

Abstract # 35**Category:** *Technical developments in exploration***Title:** *Geoscience INTEGRATOR: The Missing Link in AI for Exploration***Presenter:** *John McGaughey, President, Mira Geoscience Ltd.*

Abstract: The potential benefits of AI in mineral exploration are staggeringly large, yet its application is far from simple. Explorers are trying to identify the location of an ore deposit at the core of a very complex, natural system, the result of millions of years of the geological processes of structural and hydrothermal alteration. Evidence of the deposit footprint must be assembled from interpretation of subtle alteration effects extending kilometres from the target. This is a very different, and much more complex, circumstance than found in traditional applications of AI. The route to solving these challenges is to take the focus off the methods of AI as a discipline unto itself and put the focus on how the mineral exploration problem is set up for AI. This is where deep domain knowledge and a mining industry-specific, supporting computational framework is required.

We have developed such a framework through intensive, industry-collaborative R&D over the past five years, directly addressing the problem of quantitatively integrating 3D and 4D mineral exploration data sets and interpretation. The system is called “Geoscience INTEGRATOR.” It brings together structured and unstructured data and interpretation, from drillhole data to all types of geological, geophysical, and geochemical data. It is fully 4D, tracking both space and time. Documents and files can be stored, managed, and linked to data and interpretation to provide relevant metadata and contextual links. It is the industry’s first multi-disciplinary, 4D data management framework and, as such, delivers the platform required by computational systems such as AI, that aim to answer questions that only quantitative data integration can answer.

Most importantly, the system provides a “data fusion” capability specifically aimed at mining industry problems. It does this by maintaining 3D earth model and 4D mine model geometrical data structures, upon which the multiple data sets are projected, interpolated, upscaled, downscaled, or otherwise processed appropriately for each data type so that the variables of importance for each problem can be co-located in space and time, a requirement for the application of any analytics or AI algorithms. Thus, the fundamental missing link standing in the way of AI success in these domains is overcome. This is game-changing technology for mineral exploration, providing a sound, robust solution to the once-intractable problem of integrating highly disparate data across space and time.

Authors: *John McGaughey*