

Lecture

**MINERAL EVOLUTION
in the era of “big-data” mineralogy**

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A fundamental goal of mineralogy and petrology is the deep understanding of mineral phase relationships and the consequent spatial and temporal patterns of mineral coexistence in rocks, ore bodies, sediments, meteorites, and other natural polycrystalline materials. Network analysis provides a dynamic, quantitative, and predictive visualization framework for employing “big data” to explore complex and otherwise hidden higher-dimensional patterns of diversity and distribution in such mineral systems. Mineral networks also facilitate quantitative comparison of lithologies from different planets and moons, the analysis of coexistence patterns simultaneously among hundreds of mineral species and their localities, the exploration of varied paragenetic modes of mineral groups, and investigation of changing patterns of mineral occurrence through deep time. Mineral network analysis, furthermore, represents an effective visual approach to teaching and learning in mineralogy and petrology.

Robert M. Hazen, Senior Research Scientist at the Carnegie Institution of Washington’s Geophysical Laboratory and the Clarence Robinson Professor of Earth Science at George Mason University, received the B.S. and S.M. in geology at the Massachusetts Institute of Technology (1971), and the Ph.D. at Harvard University in earth science (1975). The Past President of the Mineralogical Society of America, Hazen’s recent research focuses on the possible roles of minerals in the origin of life. He is also Executive Director and Principal Investigator of the Deep Carbon Observatory.

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