

Introduction: Great Basin tectonics and metallogeny

The Great Basin physiographic province in western North America chronicles a protracted tectonic history punctuated by events that produced a wide range of structures, basins, magmas, and fluids, leading to the formation of a diverse assortment of small to world-class metallic ore deposits for several important commodities. These ore deposits have been mined in several "boom-and-bust" cycles over the past 150 years. The Great Basin region is currently the world's second leading producer of gold. It also contains large silver and base metal (Cu, Zn, Pb) deposits, a variety of other important metallic (Fe, Ni, Mo, W, Be, REE, Hg, PGE, Ga) and industrial mineral (diatomite, barite, perlite, kaolinite) resources, and significant petroleum, geothermal energy, and groundwater resources. With the current high demand for metals in the United States and the increasing need for metals in developing countries around the world, the Great Basin is likely to remain an important exploration and mining area for many years to come.

Nearly all of the metallic ore deposits in the Great Basin formed in the Phanerozoic in a number of different environments, in response to tectonic events, at sites where both new and preexisting geologic features controlled hydrothermal fluid movement and chemistry. Most of these hydrothermal systems operated in the upper crust and were influenced by paleogeography and climate. Hence, the age and attributes of ore deposits in the Great Basin place important constraints on ancient geologic climatic environments. Subsequent burial/exhumation histories controlled the preservation or modification

of ore deposits and determined their positions relative to the present ground surface. Consequently, information on a wide variety of topics is of great interest to geologists involved in exploration and mineral resource assessments in important metallogenic provinces such as this. Such knowledge also facilitates the development of improved models that relate deposit formation to specific environments and styles of tectonism that are applicable to other areas of the globe.

This preface and the paper that follows it mark the beginning of a series of articles devoted to Great Basin tectonics and metallogeny. These papers will be published in the order in which they are accepted and will then be linked together to form a special volume. They are an outgrowth of a five-year U.S. Geological Survey project (Hofstra and Wallace, 2006) that sponsored sessions at the 2005 Geological Society of America Annual Meeting in Salt Lake City, Utah, titled "Great Basin Tectonics and Metallogeny." The meeting included presenters from the Survey, academia, and industry (*Geological Society of America Abstracts with Programs*, v. 37, no. 7). William R. Dickinson (University of Arizona) introduced the session with an overview on the geotectonic evolution of the Great Basin. His overview was followed by one on Great Basin metallogeny and then by a series of topical presentations on various aspects of geology and ore deposits. Many of the presenters are submitting manuscripts to *Geosphere*.

The diverse papers in this special volume of *Geosphere* demonstrate both the multidisciplinary

approach and the breadth of geoscience information that is required to understand the tectonic history and coupled metallogeny of the Great Basin. These papers provide a wealth of information on wide-ranging topics that include overviews on the tectonic evolution and metallogeny of the Great Basin; databases and syntheses on various aspects of the geology, geophysics, geochemistry, and mineral deposit types; site-specific studies and comparisons; and geologic maps and models that frame numerical simulations of hydrothermal fluid flow in important mining districts. Because of their diversity, these papers will appeal to a wide range of earth scientists interested in these topics and approaches in the Great Basin and in analogous areas in other parts of the world.

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REFERENCE CITED

Hofstra, A.H., and Wallace, A.R., 2006, Metallogeny of the Great Basin: Crustal Evolution, fluid flow, and ore deposits: U.S. Geological Survey Open-File Report 2006-1280, 37 p., <http://pubs.usgs.gov/of/2006/1280/>.

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