

## **Comparing modern and ancient seafloor hydrothermal systems**

JOHN W. JAMIESON<sup>1</sup>

<sup>1</sup>Memorial University of Newfoundland, St. John's, Canada

Modern seafloor hydrothermal systems provide a rare opportunity for the direct observation of a major ore-forming process. By applying the law of uniformitarianism, advances in our understanding of modern seafloor hydrothermal systems have led to improved understanding of the formation of ancient land-based volcanogenic massive sulfide (VMS) deposits. With growing interest in the possibility of mining hydrothermal sulfide deposits on the modern seafloor, knowledge has also recently started flowing in the opposite direction, with the information gained from centuries of mining VMS deposits increasingly being applied to our understanding of the formation of modern seafloor massive sulfide deposits.

In this talk, I will discuss how deep-sea research has increased our understanding of seafloor ore-forming processes, and, by extension, our understanding of the formation of VMS deposits. For example, the study of modern hydrothermal systems allows us to investigate the specific physicochemical conditions (e.g. fluid temperature and composition) of ore formation, the local and regional tectonic and volcanic controls on the location and timing of sulfide accumulation, and the distribution of deposits. I will also discuss the current limitations associated with deep-sea exploration, and how consideration of VMS deposits in the ancient rock record can help fill major knowledge gaps, such as the three-dimensional morphology of deposits and the relative importance of seafloor and sub-seafloor sulfide precipitation.

Finally, I will compare grade and tonnage models between modern and ancient deposits, and implications of the differences between these models for our understanding of the spatial distribution of deposits, the timing of ore formation, and the preservation of deposits.