

SEG 2026 Conference in Salt Lake City, United States

Magmatic Volatile Influx as a Source of Metals in the Active Trans-Atlantic Gotraverse SMS Deposit and Ancient Mala VMS Deposit

Jennifer Bell¹, Andrew Martin¹

¹University Of Nevada, Las Vegas, Las Vegas, United States

Seafloor massive sulfide (SMS) deposits are metal-rich mounds that are actively forming from hydrothermal venting on the seafloor. Seafloor massive sulfide deposits are the modern analogue of ancient volcanogenic massive sulfide (VMS) deposits preserved on land. Ancient VMS deposits are sources of Cu, Pb, Zn, Ag, Au, and other critical metals that we currently mine, and active SMS deposits are gaining attention as a prospective source of these metals. Few studies have compared formation processes between SMS and VMS deposits, and the role of magmatic volatile influx as a source of metals is poorly constrained. Pyrite is ubiquitous in SMS and VMS systems, forming over a wide temperature range (~100-400°C), and can incorporate a large suite of trace metals. As pyrite crystals grow, past hydrothermal processes are recorded across individual grains. This study aims to use pyrite geochemistry to compare the Trans-Atlantic Geotraverse (TAG) SMS deposit (Mid-Atlantic Ridge) and the ancient Mala VMS deposit (Troodos, Cyprus) to determine if volatile influx from magmatic degassing is a major source of metals, if magmatic degassing decreases over time, and if ore-forming processes are comparable between deposits.