

SEG 100 Conference: Celebrating a Century of Discovery

D4

A Tale of Two Magnetites: An LA-ICP-MS Study of Massive and Disseminated Magnetite from the Bushveld Igneous Complex, South Africa

Daryll Bien C. Concepcion, Daniel Gregory
University of Toronto, Toronto, ON, Canada

The Upper Zone of the Bushveld Complex is an important source of V, a vital critical metal in today's economy. However, the manner in which it formed is still a matter of debate with different research groups arguing for either a single- or multiple-intrusion model. Here, we present in situ laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) data from magnetite from the Main Magnetite Layer and the directly overlying norite. We show that these two spatially close magnetites have significantly different chemistry, suggesting that the Main Magnetite Layer and the overlying disseminated magnetite formed from different sources and supporting the multiple-intrusion model for the formation of the Upper Zone. We performed more analyses than are usually done to assess how many analyses are needed to provide a statistically robust representation of the geochemistry of the magnetite sample and the best statistics to use to summarize the data. It was determined that the median and median absolute deviation are the most robust ways to summarize the data, though in some cases the geometric mean and multiplicative standard deviation can be used. Additionally, it was determined that for the Bushveld Complex, 10 analyses are sufficient for characterizing the trace element chemistry of the massive magnetite layer, but more are needed for the disseminated magnetite in the norite overlying it.

Figure caption: A summary of some of the median element geochemistry of the massive and disseminated magnetite analyzed by this study.

