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Type: **Invited Talk**

## **Harnessing CHPC Resources for Large-Scale Geophysical Modelling and Mineral Prospectivity Analysis in Southern Africa**

*Wednesday, 3 December 2025 11:00 (20 minutes)*

Modern mineral exploration increasingly depends on the ability to process and integrate large, multi-source geoscientific datasets. At Integrated Geoscience Solutions (IGS), we use High-Performance Computing (HPC) infrastructure provided by the Centre for High Performance Computing (CHPC) to advance regional-scale geophysical modelling and predictive mineral prospectivity mapping across Southern Africa.

Access to significant compute resources is essential to manage terabyte-scale datasets from magnetotelluric (MT), gravity, magnetic, and hyperspectral surveys that demand intensive 3D inversion, data fusion, and machine learning routines.

By leveraging CHPC's multi-core architecture, parallelised inversion codes, and high-speed storage systems, we have reduced complex inversion runtimes from several days on standard workstations to under ten hours. These computational gains have directly enhanced exploration targeting, improved model resolution, and reduced project risk and cost.

The talk will discuss both the challenges (scalability, data I/O, and software optimisation) and successes (work-flow automation, reproducibility, and improved accuracy) of running large geophysical models on CHPC clusters. Finally, it will highlight the broader scientific and economic impact of HPC-enabled exploration, from accelerating discovery to supporting Africa's transition to a low-carbon, resource-resilient economy.

**Presenting Author**

**Email**

**Student or Postdoc?**

**Institute**

**Registered for the conference?**

**CHPC User**

## **CHPC Research Programme**

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**Session Classification:** HPC Applications

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